Convolvulaceae do Parque Nacional da Serra da Canastra, Minas Gerais, Brasil

Roberta Keyla Kojima






São Paulo
2019

Fotos da capa, da esquerda para a direita:

1. Botões de *Ipomoea aprica* House, *I. procumbens* Mart. ex Choisy, *I. langsdorffii* Choisy e *I. delphinioides* Choisy (da esquerda para a direita).
2. *Bonamia eustaquii* A.L.C.Moreira & Kojima
3. *Ipomoea procumbens* Mart. ex Choisy
4. *Distimake tomentosus* (Choisy) Petrongari & Sim.-Bianch.
5. *Evolvulus pterygophyllus* Mart.
6. *Jacquemontia sphaerostigma* (Cav.) Rusby

Fotos: 1, 3-4, 6: R.K. Kojima; 2: J. Faria; 5: R.S. Bianchini.

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Convolvulaceae do Parque Nacional da Serra da Canastra, Minas Gerais, Brasil

Dissertação apresentada ao Instituto de Botânica da Secretaria de Infraestrutura e Meio Ambiente, como parte dos requisitos exigidos para a obtenção do título de MESTRE em BIODIVERSIDADE VEGETAL E MEIO AMBIENTE, na Área de Concentração de Plantas Vasculares em Análises Ambientais.

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ORIENTADORA: DRA. ROSANGELA SIMÃO-BIANCHINI

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“Todos querem o perfume das flores,

mas poucos sujam as suas mãos para cultivá-las.”

Augusto Cury

“Esvazie sua xícara primeiro, só então você poderá provar meu chá. Afinal de contas, a utilidade da xícara está em poder esvaziar-se. Abra sua mente para receber novas ideias.”

Antigo provérbio chinês

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Resumo

Convolvulaceae está amplamente distribuída, com maior número de espécies nas regiões tropicais e subtropicais. No Brasil, ocorrem em todas as formações vegetais. As diferentes formas de relevo em Minas Gerais, somadas às especificidades de solo e clima, propiciaram paisagens recobertas por vegetações características, inseridas nos domínios do Cerrado (maior do Estado), da Mata Atlântica e da Caatinga. O Parque Nacional da Serra da Canastra (PNSC) é gerido pelo Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio), sendo a segunda maior unidade de conservação de Minas Gerais. Foram feitos o tratamento taxonômico e o estudo florístico de Convolvulaceae do PNSC com o objetivo de contribuir com o conhecimento da flora local, esclarecendo aspectos morfológicos e de distribuição das espécies na área. Foi realizada viagem ao campo com duração de 11 dias para coleta de amostras para estudo. Foram, também, analisados materiais botânicos depositados em herbários, destacando o da Universidade Federal de Uberlândia (HUFU), que abriga a coleção da flora da Serra da Canastra. Confirmou-se a ocorrência de cinco gêneros e 23 espécies de Convolvulaceae para o PNSC: *Bonamia eustachioi* A.L.C. Moreira & Kojima, *Distimake maragniensis* (Choisy) Petrongari & Sim.-Bianch., *D. tomentous* (Choisy) Petrongari & Sim.-Bianch., *Evolvulus aurigenius* Mart., *E. cressoides* Mart., *E. glomeratus* Nees & Mart., *E. goyazensis* Dammer, *E. lagopodioides* Meisn., *E. pterygophyllus* Mart., *Ipomoea. acutisepala* O'Donell, *I. aprica* House, *I. argentea* Meisn., *I. campestris* Meisn., *I. delphinioides* Choisy, *I. fiebrigii* Hassl. ex O'Donell, *I. langsdorffii* Choisy, *I. pinifolia* Meisn., *I. pohlii* Choisy, *I. procumbens* Mart. ex Choisy, *I. procurrens* Meisn., *I. verbasciformis* (Meisn.) O'Donell, *Jacquemontia prostrata* Choisy e *J. sphaerostigma* (Cav.) Rusby. São apresentadas chaves de identificação para gêneros e espécies, descrições morfológicas, comentários para cada táxon, ilustrações e fotos dos espécimes no campo (Capítulo 1). Constatou-se a ocorrência de uma nova espécie: *Bonamia eustachioi* A.L.C. Moreira & Kojima (Capítulo 2). Foi feito o estudo de descrição morfo-anatômica do sistema subterrâneo de *E. pterygophyllus* Mart. var. *puberulus* Meisn. (Capítulo 3). Por fim, foi elaborado um guia de campo das Convolvulaceae do PNSC (Capítulo 4).

Palavras-chave: Espécies raras, Flora do Brasil, Jetirana, Solanales, Taxonomia.

Abstract

Convolvulaceae is broadly distributed, with the greater number of species in the tropical and subtropical region. In Brazil, it occurs in all kinds of vegetation. The relief differences found in Minas Gerais, in addition to the soil and climate specificity, resulted in landscapes covered by characteristic vegetation types, which are inserted under the Cerrado (the biggest of the State), Atlantic Rainforest and Caatinga domains. The Serra da Canastra National Park (PNSC) is managed by Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio) and is the second bigger Conservation Unit of Minas Gerais. A taxonomic treatment and a floristic survey of the species of Convolvulaceae in PNSC were carried out in order to contribute with the knowledge of the local flora, clarifying morphological aspects and the distribution of species. A fieldwork expedition of 11 days was made to collect samples for study; also, botanic materials deposited in herbaria were analyzed, mainly those of the Uberlândia Federal University (HUFU), that holds the collection of the flora of Serra da Canastra. We confirmed the occurrence of five genera and 23 species of Convolvulaceae in the PNSC: *Bonamia eustachioi* A.L.C. Moreira & Kojima, *Distimake maragniensis* (Choisy) Petrongari & Sim.-Bianch., *D. tomentous* (Choisy) Petrongari & Sim.-Bianch., *Evolvulus aurigenius* Mart., *E. cressoides* Mart., *E. glomeratus* Nees & Mart., *E. goyazensis* Dammer, *E. lagopodioides* Meisn., *E. pterygophyllus* Mart., *Ipomoea. acutisepala* O'Donell, *I. aprica* House, *I. argentea* Meisn., *I. campestris* Meisn., *I. delphinioides* Choisy, *I. fiebrigii* Hassl. ex O'Donell, *I. langsdorffii* Choisy, *I. pinifolia* Meisn., *I. pohlii* Choisy, *I. procumbens* Mart. ex Choisy, *I. prucurrens* Meisn., *I. verbasciformis* (Meisn.) O'Donell, *Jacquemontia prostrata* Choisy and *J. sphaerostigma* (Cav.) Rusby. This work includes identification keys for genera and species, morphologic descriptions, comments for each taxon, illustrations, and photographs of specimens in nature (Chapter 1). It was constated the occurrence of a new species: *Bonamia eustachioi* A.L.C. Moreira & Kojima (Chapter 2). A study describing the morpho-anatomical underground system of *E. pterygophyllus* var. *puberulus* Meisn. was conducted (Chapter 3). Finally, it was elaborated a field guide for the Convolvulaceae of PNSC (Chapter 4).

Keywords: Rare species, Flora of Brazil, Morning glory, Solanales, Taxonomy.

1. Introdução geral

1.1. Convolvulaceae Juss. – Histórico

Em 1753, Linnaeus reconheceu quatro gêneros no *Species Plantarum* (*Convolvulus* L., *Cressa* L., *Cuscuta* L. e *Ipomoea* L.). Em 1762, reconheceu também *Evolvulus* L. Convolvulaceae foi reconhecida como uma família por Jussieu (1789) na obra *Genera Plantarum* e, desde então, poucas modificações foram realizadas quanto à sua delimitação. Nesta obra, os grupos botânicos são apresentados em uma ordem natural, relacionados com Boraginaceae Juss. e Solanaceae Juss. Foram reconhecidos 11 gêneros, referindo que *Cuscuta* seria um gênerob afim de Convolvulaceae.

No Brasil, o primeiro estudo de Convolvulaceae foi elaborado pelo frei José Mariano da Conceição Velloso, em sua obra *Florae Fluminensis* (1825, publicado em 1827), com a descrição de 20 espécies de *Convolvulus*. Em diversos pequenos trabalhos restritos, Moïse Étienne Stefano Moricand (1834-1847) contribuiu com o conhecimento de espécies novas para a Bahia, limitando-se aos materiais coletados por Blanchet. Neste mesmo período, foi publicada a primeira proposta de subdivisão da família (Choisy 1834), surgindo, então, quatro grupos, que ele chamou de "seções": Argyreieae Choisy, caracterizada pelo gineceu sincarpelar e frutos indeiscentes; Convolvuleae Choisy, com gineceu sincarpelar e frutos deiscentes; Dichondreae Choisy com gineceu dialicarpelar e frutos deiscentes; e Cuscuteae Choisy, abrangendo apenas plantas parasitas. Posteriormente, em colaboração com De Candolle, em seu Prodromus, Choisy (1845) substituiu as "seções" por tribos, mantendo os mesmos nomes e divisão.

Porém, o trabalho de maior importância para a família no Brasil ainda é o de Carl Friedrich Meissner (1869), publicado na *Flora Brasiliensis*, no qual o autor reconhece 14 gêneros com 312 espécies. Já o levantamento para a lista do Brasil (Flora do Brasil 2020, em constr.) vem ampliando estes dados. Junqueira & Bianchini (2006) referiram ocorrência predominantemente em áreas abertas como Cerrado e Caatinga, que possui espécies com características morfológicas bastante marcantes na região do semi-árido

Hans Johannes Gottfried Hallier (1893) realizou um amplo e importante trabalho com Convolvulaceae, incluindo estudos anatômicos, morfológicos e palinológicos. Destaca-se, neste trabalho, sua proposta de uma classificação da família em dois grandes grupos, baseada na morfologia dos grãos de pólen: Psiloconieae, composto por espécies que possuem pólen com exina psilada ou granulosa, no qual agrupou sete tribos [Cuscuteae (Choisy) Choisy,

Wilsonieae Hallier f., Dichondreae (Choisy) Choisy, Dicranostyleae Meisn., Poraneae Hallier f., Erycibeae (Endl.) Hall. f., e Convolvuleae (Choisy) Choisy]; e Echinoconieae, composto por espécies com grãos de pólen de exina espinhosa, abrangendo duas tribos[Argyreieae (Choisy) Choisy e Ipomoeeae Hallier f.). Neste trabalho, sintetizou um esquema compreensível para a família, contribuindo para a delimitação atualmente aceita; também realizou a transferência de muitas espécies entre os gêneros, melhorando a delimitação destes e influenciando todo o conhecimento acerca da família até hoje.

Simon Jan van Ooststroom (1934) colaborou especialmente para o conhecimento do gênero *Evolvulus* L., monografia que ainda é base de estudo para o gênero, onde apontou diversas espécies endêmicas do Brasil. Carlos Alberto O'Donell (1941, 1953a, 1953b e 1959) realizou diversos estudos, tendo sido um importante especialista na família para a América Latina.

Daniel Frank Austin foi o mais importante especialista em Convolvulaceae mundial, mesmo com a maior parte de seus estudos concentrados nas Américas (Austin & Cavalcante 1982, Austin & Secco 1988, Austin & Staples 1983, 1986, Austin & Simão-Bianchini 1998, Austin *et al.* 2015). Foi o responsável pela elaboração de Convolvulaceae para Flora Neotrópica, em conjunto com seu orientando George William Staples que, atualmente, está dando continuidade ao trabalho. Staples realizou trabalhos importantes para a flora da Ásia e atualmente, vem colaborando com os estudos no Brasil como integrante da equipe de taxonomistas brasileiros (Staples *et al.* 2012, Austin *et al.* 2015). Rosângela Simão-Bianchini se destaca como pesquisadora especialista na família para o Brasil, colaborando com estudos em diversas regiões, sobretudo no Sudeste do país, formando muitos novos especialistas na família (1991,1995, 1997, 1998, 2001, 2002, 2005, 2006).

Saša Stefanović *et al.* (2002, 2003) publicaram os primeiros trabalhos filogenéticos, baseados em sequenciamento de DNA, que agrupa Convolvulaceae em 12 tribos e confirma o monofiletismo da família, tendo Solanaceae como grupo irmão devido à sinapomorfia anatômica da presença de floema interno, alcaloides quimicamente semelhantes e muitos caracteres moleculares (Olmstead *et al.* 2008, Judd *et al.* 2009).

De acordo com APG IV (2016), Convolvulaceae está incluída na ordem Solanales, juntamente com Hydroleaceae R.Br., Montiniaceae Nakai, Solanaceae e Sphenocleaceae T.Baskerv., compartilhando características como folhas alternas, corola gamopétala e actinomorfa (Staples 2012).

Ana Rita Simões & George William Staples (2017), em estudos mais aprofundados com dados moleculares, analisaram o DNA de um maior número de espécies e comprovaram

o polifiletismo de “Merremieae”, grupo tradicionalmente circunscrito como tribo. Estas espécies foram delimitadas em gêneros que melhor se agrupam molecular, morfológica e geograficamente, sendo propostas, então, mudanças para as classificações genéricas dessas espécies (Simões *et al*. 2015, Simões & Staples 2017).

1.2. Caracterização morfológica

Convolvulaceae é uma família cosmopolita, que compreende cerca de 60 gêneros válidos e 2000 espécies, estando amplamente distribuída nos trópicos e apenas poucas espécies são encontradas nas zonas temperadas (Austin & Cavalcante 1982, Staples 2012). No Brasil, a família é constituída por 24 gêneros e 415 espécies, das quais cerca de 190 são endêmicas, ocorrendo em todas as formações vegetais (Buril-Vital 2009, Simão-Bianchini *et al.* 2016, Flora do Brasil 2020, em constr.). Os gêneros mais representativos para o Brasil são: *Ipomoea* (149 spp., 55 endêmicas), o maior gênero da família, seguido de *Evolvulus* (73 spp., 50 endêmicas), *Jacquemontia* Choisy (66 spp., 43 endêmicas) e *Cuscuta* (26 spp., oito endêmicas) (Flora do Brasil 2020, em constr.).

A família compreende plantas de hábito volúvel, podendo também se apresentar como ervas, subarbustos, arbustos, muito raramente árvores, ou holoparasitas (*Cuscuta*), com látex presente ou não. Inclui muitas pioneiras, bem como lianas nas florestas tropicais (Fosberg & Sachet 1977). Possui raízes pivotantes, tuberosas com células laticíferas, rizomatosas ou formando xilopódio (Metcalfe & Chalk 1950, Wood *et al.* 2017). O indumento é muito variável, formado por tricomas simples, malpiguiáceos, escamiformes, estrelados com três a muitos ramos, ou glandulares, sendo muito útil para caracterização de espécies (Pastore & Simão-Bianchini 2015, 2016, 2017, Petrongari & Simão-Bianchini 2016). As folhas são alternas, simples, inteiras, lobadas, cordiformes, palmatiformes ou compostas 3-7 (-9)-folioladas, sem estípulas, sésseis ou pecioladas, com nervuras bicolaterais (Simão-Bianchini & Pirani 1997).

As inflorescências possuem um padrão básico cimoso, formando dicásios, monocásios, tirsos, ou reduzidas a uma única flor (Simão-Bianchini 1991). As flores são diclamídeas, bissexuadas e pentâmeras. As sépalas são livres, raramente concrescidas na base (unidas em *Cuscuta*), imbricadas, sempre persistentes no fruto. A corola é actinomorfa e gamopétala, tem cinco áreas mesopetálicas bem definidas, glabras ou pilosas externamente, a prefloração é imbricado-contorta, (Austin & Cavalcante 1982, Simão-Bianchini 1998). As

estrias mesopetálicas correspondem à área que ocupa a região central longitudinal dos lobos da corola, de forma triangular, e afila-se no ápice, ficando exposta no botão, enquanto o restante da corola fica dobrada no interior da flor. Geralmente diferem muito das outras áreas da corola, tanto em cor quanto textura ou indumento, e podem ser importantes para separar gêneros ou espécies (Staples 2012). O androceu é composto por cinco estames alternos aos lobos da corola, adnatos ao tubo ou na fauce da corola; os filetes são filiformes; as anteras são bitecas, dorsifixas. O gineceu é formado por um ovário súpero, bicarpelar (raro tricarpelar) com 2, 4 ou raro 6 lóculos; o estilete pode ser inteiro, bífido ou com dois estiletes distintos; o estigma é terminal, filiforme, capitado, globoso ou elipsoide, bilobado, raramente 3-lobado. Na base do ovário há um nectário anular ou urceolado (Simão-Bianchini 1991, Silva *et al.* 2018). Os frutos de Convolvulaceae são secos, geralmente cápsulas loculicidas e septicidas, raramente de deiscência irregular, transversal, indeiscente ou bagas. As sementes são ovoides ou elipsoides (Simão-Bianchini & Pirani 1997).

1.3. Importância econômica e ecológica

Ipomoea batatas (L.) Lam. é a espécie mais conhecida e importante por seu uso econômico milenar. No Brasil, popularmente é chamada de batata-doce. É nativa das Américas do Sul e Central, segundo dados arqueológicos, sendo cultivada em 111 países, principalmente na África e América do Sul (FAO 2009). Além do uso tradicional em doces e salgados, há registros de seu consumo na forma de sorvete, potencializando a assimilação dos nutrientes e vitaminas (Gurgel *et al.* 2011). Na medicina popular, suas folhas são utilizadas na forma de chá, para aumentar a lactação (Lorenzi & Matos 2002).

Outros representantes de desse gênero também são consumidos de forma alimentícia, como, por exemplo, na região da Chapada Diamantina (Bahia). O trabalho de Vasconcelos *et al.* (2016) refere seis espécies que são conhecidas como batata-da-serra ou batatinha-da-serra, cujos tubérculos são utilizados como fonte de alimento: *Ipomoea serrana* Vasconcelos & Sim.-Bianch., *I. pintoi* O'Donell, *I. ana-mariae* Vasconcelos & Sim.-Bianch., *I. rupestris* Sim.-Bianch. & Pirani, *I. brasiliana* Meisn. e *I. regnellii* Meisn.

Ipomoea aquatica Forsk., o "espinafre d'água", é nativa da Ásia onde é amplamente consumida na alimentação, sendo no Japão conhecida como "*kuushinsai*" e também é muito difundida nos Estados Unidos (water spinach). São utilizados caules, folhas e pecíolos, que

são consumidos refogados, cozidos ou em caldos. Apresente potencial invasor alto, inclusive no Brasil (Austin 2007).

Os escravos, na antiguidade, torravam e moíam sementes de *I. alba* L. e *I. setosa* Ker Gawl. e consumiam como forma alternativa de café (Pio-Corrêa 1984, Simão-Bianchini 1998). As folhas e sementes de *I. quamoclit* L. são usadas como chá antirreumático, antiofídico e depurativo do sangue. A espécie é considerada também anestésica e calmante, mas tóxica quando consumida em excesso (Lorenzi 1991).

Frederico Carlos lHoehne (1922) citou que espécies como *Calystegia sepium* (L.) R.Br. (zonas temperadas e subtropicais), *Decalobanthus mammosus* (Lour.) A.R.Simões & Staples (leste da Índia e Indochina, cultivada na China e em Amboina), *Ipomoea carnea* subsp. *fistulosa* (Mart. ex Choisy) D.F.Austin (México e América do Sul), *I. pandurata* G.Mey. (Canadá e Estados Unidos), *I. jalapa* (L.) Pursh (México a Guatemala e oeste de Cuba), essa última com tubérculos que chegam a 25 quilos, poderiam ser consumidas em menor escala. Ainda segundo o mesmo autor, *I. imperati* (Vahl.) Griseb. e *I. pes-caprae* (L.) R.Br., ambas típicas de regiões costeiras dos trópicos e subtrópicos, eram bastante usadas como emoliente e supurativo, e suas folhas e raízes usadas para alvejar roupa. Foi referido o uso de *Ipomoea paniculata* (L.) R.Br. (Madagascar) contra gota e reumatismo, além de citar o efeito de emagrecimento. *Cuscuta corymbora* Ruiz & Pav. que ocorre desde o México a Venezuela e na Bolívia, era usada no tratamento contra queimaduras no Peru, e *C. racemosa* Mart., no Brasil, contra ulcerações e feridas (Hoehne 1922, Staples 2019).

A beleza e coloração das flores da maioria das Convolvulaceae fazem com que muitos agentes polinizadores sejam atraídos, principalmente dípteros, no entanto, também há algumas espécies de *Ipomoea* polinizadas por beija-flores, mariposas ou borboletas (Simão-Bianchini 1991). Flores diurnas e raramente perfumadas com corolas grandes, campanuladas, com centro vistoso e de cores chamativas são geralmente polinizadas por abelhas, já as flores com corola hipocrateriforme, geralmente brancas, noturnas, perfumadas, que produzem grande quantidade de néctar, são polinizadas por mariposas; espécies com essa mesma forma de corola, mas vermelha, são polinizadas por aves. *Ipomoea neei* (Spreng.) O'Donell, da seção *Quamoclit* (Mill.) Griseb., pode ser polinizada por morcegos. A corola é tubular ou hipocraterifome, de cor acastanhada. Suas flores são noturnas e as anteras produzem grande quantidade de pólen (Staples 2012).

Ipomoea pes-caprae (L.) R. Br. e *I. imperatii* (Vahl) são espécies que ocorrem em restingas e têm função ecológica de fixação das dunas de areia (Simão-Bianchini 1998). *Ipomoea carnea* Jacq., popularmente conhecida como “algodão-bravo”, é resistente à seca e

muitas vezes consumida pelos animais que sofrem intoxicações fatais (Pio-Corrêa 1984, Maia & Figueiredo 1992, Oliveira *et al.* 2009). Apesar do alto nível de toxicidade, essa espécie é utilizada na ornamentação de ruas e praças sem conhecimento prévio, onde crianças mantêm contato com essas plantas.

As resinas que se acumulam nos tubérculos com função de defesa contra insetos e parasitas, convolvulina e jalapina (Coelho *et al.* 2011), proporcionam o uso popular medicinal como laxante [*Operculina macrocarpa* (L.) Urb. e *Convolvulus scammonia* L. – também usadas na produção da aguardente alemã], anti-inflamatórios, purgantes, hepatoprotetoras [*O. turpethum* (L.)], ação purgativa e anti-helmíntica [*O. hamiltoni* (G.Don) D.F.Austin & Staples]. As folhas de *Argyreia nervosa* (Burm. f.) Bojer podem melhorar a atividade sexual masculina, se administrada sob forma de extrato alcoólico (Subramoniam *et al.* 2007).

Algumas espécies possuem, em suas sementes, o LSA, alcaloide semelhante ao LSD, conhecido por seu poder alucinógeno: *Ipomoea violacea* L., *I. triloba* L., *Turbina corymbosa* (L.) Raf. e *A. nervosa* (Almeida 2009).

Muitas espécies são exóticas invasoras ou ruderais (plantas que acompanham o homem); algumas podem causar danos à vegetação nativa e até mesmo às plantações agrícolas (plantas daninhas, principalmente trepadeiras delicadas que ocorrem junto às culturas e se enrolam em outras plantas dificultando a colheita). São popularmente conhecidas por corda-de-viola ou jetirana, como: *Ipomoea aristolochiifolia* (Kunth) G. Don., *I. cairica* (L.) Sweet., *I. hederifolia* L., *I. nil* (L.) Roth., *I. quamoclit*, *I. triloba*, *Jacquemontia densiflora* (Meisn.) Hallier f., *J. spherostigma* (Cav.) Rusby, *J. tamnifolia* (L.) Griseb., *Distimake aegyptius* (L.) A.R. Simões & Staples, *D. macrocalyx* (Ruiz & Pav.) A.R. Simões & Staples, *D. cissoides* (Lam.) A.R. Simões & Staples e *D. dissectus* (Jacq.) A.R. Simões & Staples; ou por serem holoparasitas e infestar plantas cultivadas, como *Cuscuta racemosa* Mart. (Leitão Filho *et al.* 1972, Lorenzi 1991, Kissmann & Groth 1992).

Devido à grande variação na coloração e beleza das flores, muitas espécies de Convolvulaceae são utilizadas como ornamentais, destacando-se representantes de *I. alba*, *I. carnea*, *I. indica* (Burm.) Merr., *I. hederifolia*, *I. horsfalliae* Hook., *I. purpurea* (L.) Roth., *Evolvulus glomeratus* Nees & Mart., *E. pusillus* Choisy e *E. nummularius* (L.) L. (Simão-Bianchini 1998).

No Japão, as *Ipomoea* têm um festival dedicado exclusivamente a seus representantes, o "*Iriya Asagao Matsuri*" (Festival das Glórias das Manhãs). Além da beleza e admiração por essas plantas, os japoneses acreditam que elas promovem a sorte. As plantas comercializadas

no local são usadas para atrair boa energia e servem para decoração (www.gotokyo.org). O evento ocorre no início do verão, em julho, na cidade de Tokyo, no Templo *Kishibojin*. Milhares de variedades são criadas por mais de 120 produtores, principalmente *I. indica*.

1.4. Justificativa e objetivos

Diante da ampla representatividade da família para o Estado de Minas Gerais, cerca de 19 gêneros e 227 espécies (Flora do Brasil 2020, em constr.), e da grande variabilidade morfológica de suas espécies, torna-se necessário o estudo e o aprimoramento da caracterização desta família para melhor tratamento taxonômico e conservação da flora. Pesquisadores de diversas instituições têm concentrado seus estudos na flora de Minas Gerais, devido a sua grande diversidade e necessidade de conhecimento para a preservação da sua riqueza. Rodrigues-Lima (2017) compilou 25 espécies de Convolvulaceae para o Parque Estadual Serra do Ouro Branco; Forzza *et al.* (2013) registraram seis espécies para a Serra do Ibitipoca, sudeste de Minas Gerais; foram registradas cinco espécies nas Cangas no quadrilátero ferrífero (Simão-Bianchini 2012). Simão-Bianchini (1991, 1995, 1997, 1998, 2005, 2012) vem realizando trabalhos com Convolvulaceae em Minas Gerais e na região Sudeste do Brasil, contribuindo para o conhecimento da família.

Os objetivos desse trabalho foram realizar o levantamento e o tratamento taxonômico das espécies de Convolvulaceae no Parque Nacional da Serra da Canastra (PNSC), como parte do projeto "Flora do Parque Nacional da Serra da Canastra", idealizada por Romero & Nakajima (1999), que inicialmente compilaram 768 espécies de angiospermas para o Parque, contando com 37 novas espécies e 45 endêmicas.

Com base em levantamento preliminar realizado pela orientadora e considerando a hipótese de 23 espécies de Convolvulaceae ocorrentes na área de estudo, com várias amostras com identificação duvidosa; buscou-se, ainda, apresentar descrições, chaves de identificação tanto para gêneros quanto para as espécies e ilustrações, buscando esclarecer os aspectos morfológicos e de distribuição geográfica, assim como analisar os dados bibliográficos e caracteres diagnósticos para reconhecimento das espécies, subsidiando novos projetos de preservação no PNSC; enriquecer a coleção do herbário SP com novas inclusões de materiais; atualizar as identificações das coleções dos herbários. Pretende-se, ainda, contribuir para o projeto Flora do Brasil 2020, permitindo que cada espécie ocorrente na região seja descrita

corretamente na plataforma, disponibilizando informações para a conservação e para o conhecimento da biodiversidade da flora brasileira.

2. Material e métodos

2.1. Elaboração da Dissertação

A dissertação está dividida em quatro capítulos sob a forma de manuscritos que serão submetidos para revistas específicas, para posterior publicação.

Capítulo 1: "Convolvulaceae from the Serra da Canastra National Park, Minas Gerais, Brazil" – apresenta o tratamento taxonômico das espécies registradas no PNSC, inclui chaves de identificação para gêneros e espécies, descrições morfológicas, material examinado, comentários para cada táxon, ilustrações e fotos dos espécimes em campo. O manuscrito foi elaborado de acordo com as normas da revista Rodriguésia.

Capítulo 2: "*Bonamia eustachioi* (Convolvulaceae), a new species from Brazil associated to environment of rocky Cerrado and Caatinga" – artigo elaborado segundo as normas da revista Brittonia, e está em via de submissão. Apresenta a descrição de uma nova espécie: *Bonamia eustachioi* A.L.C.Moreira & Kojima, além de ilustração e discussão sobre as relações morfológicas com espécies próximas do gênero. Este trabalho foi desenvolvido concomitantemente com a finalização da tese de doutorado de André L.C. Moreira, que estava revisando o gênero *Bonamia* sob orientação da Dra. Taciana B. Cavalcanti e co-orientação da Dra. Simão-Bianchini.

Capítulo 3: "Morpho-anatomy of underground system of *Evolvulus pterygophyllus* Mart. var. *puberulus* Meisn. (Convolvulaceae)" – redigido de acordo com os padrões da revista Willdenowia. Apresenta o estudo morfo-descritivo do sistema subterrâneo de *Evolvulus pterygophyllus* Mart. var. *puberulus* Meisn., visando contribuir com o conhecimento anatômico e taxonômico do grupo. O trabalho foi desenvolvido no Núcleo de Pesquisa em Anatomia, com colaboração da Dra. Adriana Hissae Hayashi.

Capítulo 4: elaborado em forma de guia de campo com as espécies de Convolvulaceae registradas no Parque Nacional da Serra da Canastra, seguindo as normas do Field Guide do Field Museum of Natural History.

2.2. Área de estudo

O Cerrado é o segundo maior domínio fitogeográfico do Brasil em área, ocupa mais de 2.000.000 km², cerca de 23% do território brasileiro (Ribeiro & Walter 2008). Abrange o Distrito Federal e os Estados de Goiás, Tocantins, Bahia, Ceará, Maranhão, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Piauí, Rondônia e São Paulo; também ocorre em áreas disjuntas ao norte do Amapá, Amazonas, Pará e Roraima, e ao sul, em pequenas "ilhas" no Paraná (Ribeiro & Walter 2008, IBGE 2012). Caracteriza-se pela presença de invernos secos e verões chuvosos, sendo que o clima predominante é Aw de Köppen (tropical chuvoso). Ocorre em altitudes que variam de cerca de 300 m a mais 1600 m, na Chapada dos Veadeiros – GO (Ribeiro & Walter 2008).

A vegetação do Cerrado é caracterizada por uma vegetação xeromorfa que reveste solos lixiviados aluminizados (IBGE 2012). Apresenta fitofisionomias que englobam formações florestais, savânicas, e campestres. Floresta, em termo fisionômico, representa áreas com predominância de plantas arbóreas, havendo formação de dossel, contínuo ou descontínuo. O termo savana é referente a áreas com árvores e arbustos espalhados sobre um estrato graminoso, onde não há formação de dossel contínuo. Campo se refere a áreas com predominância de espécies herbáceas e algumas arbustivas, faltando árvores na paisagem (Ribeiro & Walter 2008).

Existem 11 tipos fisionômicos para o Cerrado, enquadrados em: formações florestais – mata ciliar, mata de galeria, mata seca e cerradão; formações savânicas – cerrado sentido restrito, parque de cerrado, palmeiral e vereda; formações campestres – campo sujo, campo limpo e campo rupestre (Ribeiro & Walter 2008). A classificação mais recente, do IBGE (2012) considera quatro formações para o Cerrado: savana florestada (cerradão); savana arborizada (campo cerrado, cerrado ralo, cerrado típico e cerrado denso); savana parque (campo sujo de Cerrado, Cerrado de pantanal, campo de murundus ou covoal e campo rupestre); e Gramíneo-Lenhosa (campo limpo de Cerrado).

O clima continental, característico do Cerrado, proporcionou a esse domínio três tipos de vegetação, de acordo com a gênese e a fertilidade do solo: a Savana (Cerrado), que ocorre em terrenos areníticos lixiviados e ricos em alumínio trocável; e os tipos florestais estacionais – Floresta Estacional Semidecidual e Floresta Estacional Decidual – que ocorrem nos solos de origem eruptiva ou ígnea, portanto, mais férteis. Esses tipos de vegetação são eminentemente de origem amazônica, com espécies que foram se expandindo através da rede hidrográfica (IBGE 2012).

Os incêndios naturais representam um processo importante no Cerrado, exercendo funções relacionadas às estratégias adaptativas de flora e fauna (Durigan & Ratter 2016). Além das influências nas populações de plantas e na estrutura da comunidade (Hoffmann 1996, Munhoz & Amaral 2010), o fator fogo controla processos ecológicos, como as emissões de gases, ciclagem mineral e reprodução vegetal (Araújo *et al.* 2013). O fogo é, portanto, um fator crucial para a manutenção da estrutura, biodiversidade e funcionamento dos ecossistemas do Cerrado (Durigan & Ratter 2016).

Apesar da variação nos fatores ambientais, como a disponibilidade de nutrientes no solo e a influência da água na estrutura da vegetação, o fogo tem sido o fator mais importante na manutenção do gradiente de biomassa das diferentes formações de Cerrado, assim como em outras savanas do mundo (Coutinho 1990, Staver *et al.* 2011).

Mudanças no regime histórico de fogo, no entanto, podem ter um efeito negativo sobre a comunidade. Incêndios com frequência muito alta, intensificadas pelo *feedback* entre fogo e gramíneas invasoras, criam paisagens dominadas pela grama. Por outro lado, a supressão do fogo resulta em perda de biodiversidade, com a vegetação de floresta substituindo savanas e pastagens (Coutinho 1990, Durigan & Ratter 2006, Scott *et al.* 2012). Nas savanas de todo o mundo, está ocorrendo um processo de adensamento da vegetação, sendo substituída por uma vegetação fechada com perda de biodiversidade. No Brasil, a principal causa para este processo são as políticas de supressão do fogo (Dean 1997). Esse adensamento configura uma etapa sucessional do processo de expansão das florestas sobre as savanas.A maioria das plantas do Cerrado não suporta a sombra. Então, quando o dossel formado pelas copas das árvores se fecha e sombreia o solo, centenas de espécies de plantas endêmicas desaparecem (Pinheiro & Durigan 2012, Durigan & Ratter 2016). O fogo é necessário, mas precisa ser manejado.

Há registros históricos da presença humana nas áreas de domínio do Cerrado durante quase todo o Holoceno, existindo evidência de que episódios de fogo fizeram parte da história e ecologia dessa vegetação (Dean 1996). Dessa forma, o fogo se tornou um fator cujos efeitos foram incorporados à dinâmica do ecossistema e à adaptação das espécies (Pinheiro & Durigan 2009). O uso do fogo para manejo do Cerrado pelos indígenas é datado de milhares de anos. Eles queimavam por diferentes motivos e, portanto, com diferentes frequências. Alguns para facilitar a caça, outros para aumentar a produtividade de espécies vegetais utilizadas como alimento (Mistry *et al.* 2005). Torna-se necessário, então, reaprender esse manejo, como os indígenas já faziam há milhares de anos, conjugando a sabedoria ancestral com o conhecimento científico de vanguarda, de forma a viabilizar subsídios para uma

política responsável e consistente de uso do fogo (Pinheiro & Durigan 2009, 2012, Durigan & Ratter 2016).

No Estado de Minas Gerais, as variadas formas do relevo somadas às peculiaridades do clima e solo proporcionaram paisagens recobertas por vegetações características e adaptadas às condições ambientais, inseridas nos domínios do Cerrado, da Mata Atlântica e da Caatinga. A paisagem transita para o Cerrado ao sul e a oeste, para a Mata Atlântica a leste e para a região dos campos rupestres ao centro, e pequenas áreas de Caatinga ao norte. O Cerrado, maior domínio fitogeográfico do Estado, é localizado na porção centro-ocidental, ocupando cerca de 57% da extensão territorial do Estado. Aparece especialmente nas bacias dos rios São Francisco e Jequitinhonha. As estações seca e chuvosa são bem definidas e a vegetação é composta por gramíneas, arbustos e árvores. O domínio da Mata Atlântica, localizado na porção oriental, é de cerca de 41% da área do Estado. O domínio da Caatinga, restrito ao norte do Estado, ocupa cerca de 2% do território mineiro. O Cerrado é um domínio único no mundo devido grande parte de suas espécies de animais e plantas serem endêmicos. Este patrimônio biológico ainda é pouco estudado e corre grande risco de não ser identificado devido ao avanço do desmatamento descontrolado (IEF 2019).

A vegetação deste Estado exibe fases de transição de difícil caracterização ou manchas inclusas em outras formas de vegetação. Dentro dos domínios fitogeográficos aparecem as veredas e os campos de várzeas, em menor escala. Os campos rupestres formam uma cobertura vegetal de menor porte com ampla variedade de espécies, predominando a vegetação herbácea em que os arbustos e as árvores são escassos. São encontrados nos pontos mais elevados das serras da Mantiqueira, Espinhaço e Canastra (IEF 2019).

O Parque Nacional da Serra da Canastra (PNSC) é a segunda maior unidade de conservação de Minas Gerais, menor apenas que o Parque Nacional Grande Sertão Veredas. Situa-se na porção sudoeste do Estado, abrangendo parte dos municípios de Capitólio, Delfinópolis, Sacramento, São João Batista do Glória, São Roque de Minas e Vargem Bonita (fig. 1).

Foi criado pelo Decreto nº 70.355, de 3 de abril de 1972, com área de 200 mil ha, altitudes variando entre 800-1200 m, com um máximo de 1496 m na Serra Brava. É administrado pelo Instituto Chico Mendes de Conservação e Biodiversidade (ICMBio). Os dois maciços, o da Canastra e o da Babilônia, formam o berço de uma rede hidrográfica representada por cursos d'água que drenam para os rios São Francisco, Grande e Araguari (MMA/IBAMA 2005).

Além de preservar as nascentes do rio São Francisco, o Parque também possui vários outros monumentos. Os antigos proprietários de 83 mil hectares de área antigamente privadas foram indenizados, incluindo o chapadão da Canastra, e outros 117 mil hectares na região da Babilônia, abrangendo os municípios de Capitólio, Delfinópolis, São João Batista do Glória e Vargem Bonita ainda estão por ser regularizados (Romero & Versiane 2014, ICMBio 2019). A Serra da Canastra se situa em uma zona de entroncamento entre a Serra do Espinhaço e as Serras de Goiás (Romero & Martins 2002).

A maior parte do PNSC é coberta por formações campestres que compreendem tipos fisionômicos distintos (fig. 2): campo limpo, campo sujo, campo cerrado, campo hidromórfico e campo rupestre; formações savânicas, representadas pelo cerrado sentido restrito, o qual inclui as subdivisões fisionômicas cerrado denso, cerrado ralo e cerrado rupestre; além de formações florestais, subdivididas em mata ciliar, mata de galeria, mata seca e cerradão (MMA/IBAMA 2005, Ribeiro & Walter 2008).

O Parque está situado em uma zona de transição climática entre os climas tropical quente e temperado mesotérmico. O período de inverno é bastante seco, marcado por uma escassez de chuvas no mês de julho e um período de seca entre julho e meados de setembro (Nakajima & Semir 2001).

Diversos estudos botânicos já foram realizados para Serra da Canastra, visando o conhecimento da flora do Parque como um todo e evidenciando a importância da preservação destas áreas de extrema biodiversidade: Como estudos iniciais do projeto “Flora da Serra da Canastra”, Romero & Nakajima (1999), com coletas desde 1994, realizaram o levantamento das espécies de angiospermas do Parque (768 spp.), dando ênfase ao endemismo de espécies de diversas famílias. Estudos posteriores foram realizados por Romero & Martins (2002), que estudaram as Melastomataceae; Nakajima & Semir (2001) fizeram o levantamento de Asteraceae do Parque; Pontes & Mello-Silva (2005) de Annonaceae; Carvalho-Silva & Guimarães (2009) compilaram a flora de Piperaceae; Machado & Romero (2014) estudaram as Bignoniaceae; Morokawa *et al.* (2013) fizeram o levantamento e estudo taxonômico de Apocynaceae e Gonçalves *et al.* (2013), das Vochysiaceae.

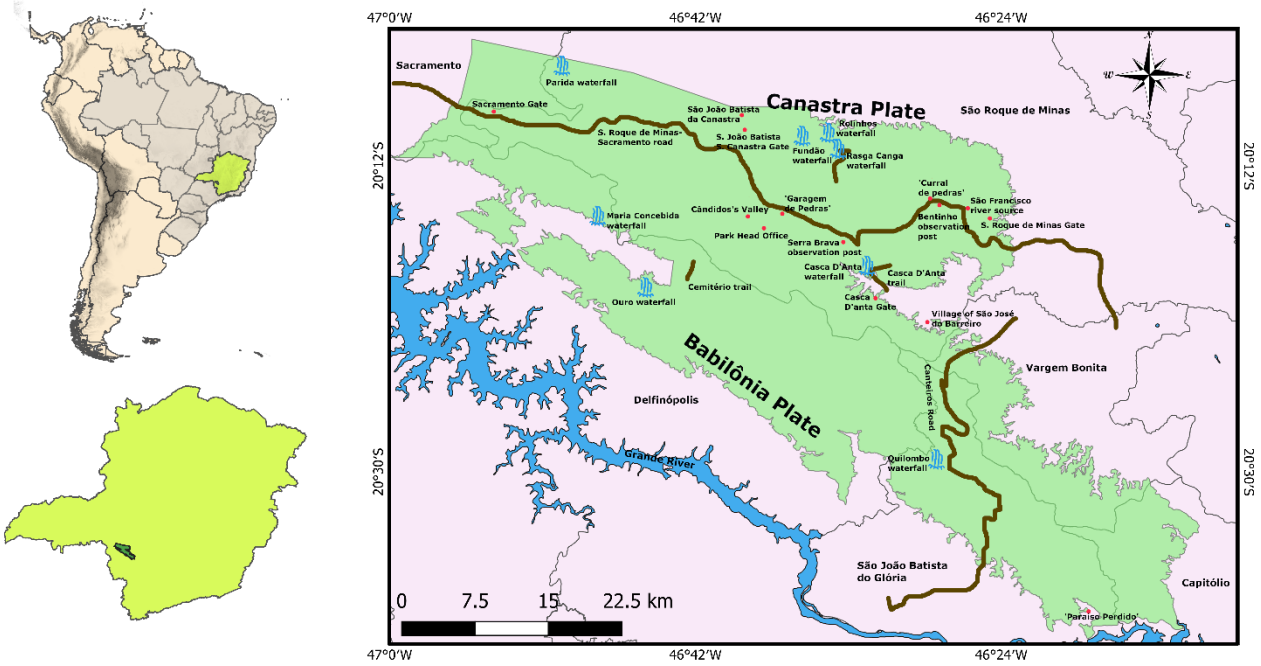

Figura 1. Localização do Parque Nacional da Serra da Canastra, Minas Gerais, Brasil (destacado em verde): Chapadão da Canastra e Chapadão da Babilônia com principais localidades.

Figura 2. Fisionomias de Cerrado no PNSC (MMA/IBAMA 2005) com a terminologia adotada pelo IBGE (2012): a. Cerrado sentido restrito bastante antropizado pelo uso intensivo da região para a formação de pastagens; b. Cerrado rupestre; c. Campo limpo; d. Campo sujo; e. Campo rupestre; f. Mata seca; g. Mata de galeria (Fotos: a, b, d: R.S. Bianchini; c, e-g: R.K. Kojima).

2.3 Elaboração do mapa

O mapa mostrando a área de estudo foi elaborado usando o programa QGIS, versão 3.10.0. As informações utilizadas foram baseadas em MMA/IBAMA (2005) e ICMBio (2019). Os arquivos base foram extraídos do Portal de Mapas do IBGE (2019).

2.4. Levantamento bibliográfico

A pesquisa bibliográfica foi baseada em consultas à obras clássicas e trabalhos que incluíam Convolvulaceae.

Para complementar as informações, foram constantemente consultados plataformas e bancos de dados online voltados para Botânica:

http://apps.kew.org/herbcat/navigator.do (Kew - Royal Botanical Garden)

http://biodiversitylibrary.org/ (Biodiversity Heritage Library)

http:/botanicus.org/ (Botanicus Digital Library)

http://convolvulaceae.myspecies.info/ (Staples, G.W. 2012. Convolvulaceae Unlimited)

http://floradobrasil.jbrj.gov.br/ (Flora do Brasil 2020, em construção)

http://splink.org.br/ (Species Link)

http://ipni.org/ipni (The International Plant Names Index)

http://mobot.org (Missouri Botanical Garden)

https://plants.jstor.org/ (JStor)

http://sweetgum.nybg.org/science/ih/ (Index Herbariorum)

http://tropicos.org/ (Tropicos)

https:/ville-ge.ch/musinfo/bd/cjb/chg/index.php?lang=em (Geneva Herbaria)

http://herbario.rjb.csic.es/ (Real Jardim Botánico)

http://herbarium.nrm.se/ (Swedish Museum of Natural History)

http://ww2.bgbm.org/herbarium/ (Herbarium Berolinense)

http://www.botanicalcollections.be/ (Meise Botanic Garden)

http://wcsp.science.kew.org/ (Staples, G.W. 2019. World Checklist of Selected Plant Families – WCSP)

2.5. Expedição de campo

Para a execução deste trabalho, foi realizada uma expedição de campo na área de estudo e em seu entorno, com autorização do Instituto Chico Mendes de Conservação da Biodiversidade – ICMBio de número 62094. A expedição ocorreu durante o período de 10 a 18 de fevereiro de 2018, com o intuito de encontrar espécies ainda não coletadas. Muitos materiais já haviam sido previamente coletados pela equipe da Universidade Federal de Uberlândia, responsável pelo projeto da flora da Serra da Canastra, sob a coordenação da Dra. Rosana Romero e Dr. Jimi Naoki Nakajima; outros materiais foram coletados pela orientadora, nos anos subsequentes.

O método de caminhamento de Filgueiras *et al.* (1994) foi utilizado para as coletas. Consiste em identificar a fisionomia da área a ser visitada e caminhar por ela coletando os materiais botânicos durante o período reprodutivo das espécies. A metodologia usual descrita em Fidalgo & Bononi (1989) foi seguida para a herborização do material coletado. Parte desse material também foi fixada em álcool 70% para estudo em laboratório e uma folha foi desidratada em sílica gel para futuros estudos moleculares. Ressalta-se a importância das observações ecológicas, da observação de campo para distinção das espécies, dos registros fotográficos e fixação de material como auxílio para descrever e ilustrar as estruturas.

Das espécies que ocorrem na área de estudo, somadas àquelas encontradas nos arredores do Parque, 14 foram coletadas em estado reprodutivo na área de estudo durante o desenvolvimento deste trabalho, como mostra a tabela 1. Para as espécies não coletadas durante a realização deste trabalho foram analisados materiais herborizados depositados nos herbários consultados.

Tabela 1. Espécies coletadas pela autora no PNSC e arredores, durante expedição de campo

Espécie	**Município / Localidade**
Distimake tomentosus (Choisy) Petrongari & Sim.-Bianch.	São Roque de Minas, PNSC
Evolvulus cressoides Mart.	Capitólio, PNSC
Evolvulus pterygophyllus Mart.	São Roque de Minas, PNSC
Ipomoea aprica House	São Roque de Minas, PNSC
Ipomoea delphinioides Choisy	Delfinópolis, PNSC
Ipomoea langsdorffii Choisy	Delfinópolis, PNSC
Ipomoea nil (L.) Roth	São Roque de Minas, em estrada
Ipomoea procumbens Mart. ex Choisy	São Roque de Minas, PNSC
Ipomoea procurrens Meisn.	São Roque de Minas, dentro da área do PNSC e nos arredores
Ipomoea triloba L.	São Roque de Minas, em estrada
Jacquemontia blanchetii Moric.	São Roque de Minas, em estrada
Jacquemontia cataractae Krapov.	São Roque de Minas, em estrada
Jacquemontia sphaerocephala Meisn.	São Roque de Minas, em estrada
Jacquemontia sphaerostigma (Cav.) Rusby	Capitólio, PNSC

2.6. Visitas a Herbários

Para os estudos iniciais, baseados nos materiais da Serra da Canastra já coletados, foi utilizada a coleção do Herbário SP, que conta com um elevado número de espécies, principalmente as duplicatas coletadas pela equipe da Universidade Federal de Uberlândia (HUFH). O herbário HUFU abriga a coleção florística da Serra da Canastra, sendo esta a principal coleção consultada para o desenvolvimento do estudo, pois nem todas as espécies listadas possuíam amostras depositadas no Herbário SP.

Para os estudos morfológicos das espécies, foram feitas consultas às coleções por meio de empréstimos e visitas aos herbários com importantes coleções brasileiras (Tabela 2). Foram examinados 1.119 materiais ao final deste trabalho. Essas visitas foram importantes por possibilitarem a análise das variações morfológicas, o levantamento de dados sobre as áreas de ocorrência e atualizações nomenclaturais em Convolvulaceae.

Tabela 2. Relação de herbários (visitados, com empréstimos concedidos e consultados eletronicamente – imagens de material tipo)

Sigla	Instituição
B	Botanischer Garten und Botanisches Museum Berlin-Dahlem, Berlim, Alemanha
BHCB	Universidade Federal de Minas Gerais, Belo Horizonte
BR	Meise Botanic Garden, Meise, Bélgica
C	University of Copenhagen, Copenhagen, Dinamarca
ESA	Escola Superior de Agricultura Luís de Queiroz, Piracicaba
F	Field Museum of Natural History, Illinois, Estados Unidos
G	Conservatoire et Jardin botaniques de la Ville de Genève, Genebra, Suíça
HRCB	Universidade Estadual Paulista, Rio Claro
HUFU	Universidade Federal de Uberlândia, Uberlândia
K	Royal Botanic Gardens, Kew, Inglaterra

LIL	Fundación Miguel Lillo, Tucumán, Argentina
M	Botanische Staatssammlung München, München, Alemanha
MEL	Royal Botanic Gardens Victoria, Victoria, Austrália
MPU	Université de Montpellier, Montpellier, França
NY	The New York Botanical Garden, Nova York, Estados Unidos
P	Muséum National d'Histoire Naturelle, Paris, França
PMSP	Prefeitura de São Paulo, São Paulo
R	Museu Nacional, Rio de Janeiro
RB	Jardim Botânico do Rio de Janeiro, Rio de Janeiro
S	Swedish Museum of Natural History, Estocolmo, Suécia
SI	Instituto de Botánica Darwinion, Buenos Aires, Argentina
SP	Instituto de Botânica, São Paulo
SPF	Universidade de São Paulo, São Paulo
SPSF	Instituto Florestal, São Paulo
UEC	Universidade Estadual de Campinas, Campinas
US	Smithsonian Institution, Distrito de Columbia, Estados Unidos

2.7. Microscopia Eletrônica de Varredura

A microscopia eletrônica de varredura (MEV) foi utilizada em materiais herborizados para observação de estruturas que possam separar gêneros e/ou espécies, como nectários extraflorais, tricomas, estilete, estigma e pólen. Foram extraídas amostras dessas estruturas. Para o indumento, foram amostrados tricomas foliares. Os grãos de pólen foram extraídos dos botões, evitando assim contaminação. As amostras das estruturas foram depositadas diretamente nos stubs, que foram revestidos a ouro sob alto vácuo, para posterior observação.

O equipamento utilizado para a realização das elétron-micrografias foi o microscópio eletrônico de varredura PHILIPS XL Série XL 20, S/W, versão 5.21., disponibilizado pelo Instituto de Botânica, com assistência e orientação da Dra. Luciana Benatti, técnica do laboratório de MEV.

2.8. Análise dos materiais

As atividades referentes aos Capítulos 1, 2 e 4 foram realizadas no Núcleo de Pesquisa Curadoria do Herbário SP, do Instituto de Botânica. As exsicatas de Convolvulaceae do herbário SP foram informatizadas em banco de dados, totalizando 581 espécimes. O estudo morfológico e taxonômico das espécies seguiu a metodologia usual e foram realizadas observações do hábito e análise qualitativa e quantitativa das estruturas vegetativas e reprodutivas dos espécimes. Foram consultadas bibliografias especializadas para análise e identificação das espécies, assim como chaves de identificação e comparação com fotos dos tipos.

As terminologias de Payne (1978) e Hickey & King (2001) foram seguidas para caracterizar o indumento. Já as terminologias de Radford *et al.* (1974) e Harris & Harris (1994) foram utilizadas para padronização de termos morfológicos. Para caracterizar a nervação foi utilizada a terminologia de Ash *et al.* (1999). Para descrição de estruturas não observadas, como frutos e sementes, foram consultados os trabalhos de Simão-Bianchini & Pirani (1997) e Rodrigues-Lima (2017). Sempre que necessário, foram consultados materiais de outras regiões, preferencialmente próximas à área de estudo, para complementar as descrições. A descrição do indumento das espécies relata tricomas de diferentes tamanhos.

Onde há citação para tricomas pequenos, foi considerado o intervalo de medida entre 0,1-0,4 mm de comprimento, e para os tricomas grandes, 0,5-1,5 mm. As ilustrações,

executadas pelo ilustrador Klei Sousa, foram baseadas em materiais coletados e fixados em álcool 70% (em caso de ausência, foi utilizado material herborizado e re-hidratado) e também com auxílio de fotografias do hábito, obtidas em campo. Foram utilizadas diagnoses e ilustrações originais, comparadas com fotos dos tipos, para a análise das espécies. Propostas para a solução de problemas nomenclaturais foram feitas à luz das regras do Código Internacional de Nomenclatura Botânica em vigência (Turland *et al.* 2018).

Os autores dos gêneros e das espécies foram citados conforme Brummitt & Powell (1992 e atualizações no IPNI).

O estudo referente ao Capítulo 3 desse trabalho foi realizado no Núcleo de Pesquisa em Anatomia do Instituto de Botânica. Os espécimes de *Evolvulus pterygophyllus* var. *puberulus* foram utilizados para o estudo morfo-descritivo do sistema subterrâneo.

O estudo contou com o apoio do projeto "Filling the gaps on Brazilian crop wild relatives in ex situ collections: germoplasm collecting of wild *Oryza*, *Ipomoea*, *Solanum*, and *Eleusine*", sob coordenação geral brasileira do CENARGEN/EMBRAPA, com financiamento de Global Crop Diversity Trust, especialmente para viagens de campo em áreas de Cerrado de Goiás, Minas Gerais e Bahia.

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Capítulo 1

Convolvulaceae from Serra da Canastra National Park, Minas Gerais, Brazil

Capítulo em formato de artigo adequado às normas da revista Rodrigués

Convolvulaceae from the Serra da Canastra National Park, Minas Gerais, Brazil
Convolvulaceae do Parque Nacional da Serra da Canastra, Minas Gerais, Brasil

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Convolvulaceae from Serra da Canastra, Minas Gerais

Abstract

The present treatment of Convolvulaceae is part of the project “Flora of Serra da Canastra National Park”. The Serra da Canastra National Park (PNSC) is in the southwestern region of Minas Gerais state, where Cerrado vegetation type is dominant. A taxonomic treatment and floristic survey of species of Convolvulaceae in PNSC was carried out in order to contribute to the knowledge of the local flora, clarifying morphological aspects and assessing the distribution of representatives in that area. The occurrence of 23 species in five genera was confirmed: *Bonamia*, *Distimake*, *Evolvulus*, *Ipomoea*, and *Jacquemontia.* We provide identification keys for genera and species, morphological descriptions, comments for each taxon, illustrations and photographs of species in field.

Keywords: Cerrado, morning glory, rare species, taxonomy, weeds.

Resumo

O presente tratamento de Convolvulaceae é parte do projeto Flora do Parque Nacional da Serra da Canastra. O Parque Nacional da Serra da Canastra (PNSC) está localizado na região sudoeste do Estado de Minas Gerais e está inserido no domínio do Cerrado. Foi feito o estudo taxonômico e florístico das espécies de Convolvulaceae no PNSC com o objetivo de contribuir para o conhecimento da flora local, esclarecendo aspectos morfológicos e de distribuição dos representantes da família nessa área. Foi confirmada a ocorrência de 23 espécies em 5 gêneros: *Bonamia*, *Distimake*, *Evolvulus*, *Ipomoea* e *Jacquemontia*. São fornecidas chaves de identificação para gêneros e para espécies, descrições morfológicas, comentários para cada táxon, ilustrações e fotografias das espécies no campo.

Palavras-chave: Cerrado, jetirana, espécies raras, taxonomia, ruderais.

Introduction

Convolvulaceae comprises about 60 genera and 1990 species, grouped in 12 tribes (Staples 2012; Mitchell *et al.* 2016). It is a diverse family, broadly distributed in the tropics, especially in Neotropics, with a few number of species in temperate zones (Austin & Cavalcante 1982). It usually presents climbing plants and includes many pioneers, as well lianas in rainforest vegetation (Fosberg & Sachet 1977; Simão-Bianchini 1998). It is popularly known due to colored and showy flowers widely used as ornamental, and due to includes the sweet-potato (Simão-Bianchini 1998; FAO 2009; Staples 2012). In Brazil, it is constituted by 22 genera, 415 species (190 endemic), occurring in all vegetation formations (Buril-Vital 2009; Simão-Bianchini *et al.* 2016; Flora do Brasil 2020, em construção).

The family is monophyletic and has Solanaceae as its sister group (Stefanović *et al.* 2002; 2003). The family is included in the order Solanales along with Hydroleaceae, Montiniaceae, Solanaceae and Sphenocleaceae (APG IV 2016), sharing characters as the alternate leaves, and the gamopetalous and actinomorphous corolla (Staples 2012). A recent important proposition in the family is the segregation of tribe "Merremieae" into genera that better fit the molecular, morphological and geographical evidence (Simões & Staples 2017). This group was paraphyletic based on DNA studies of a high number of species (Simões *et al.* 2015).

The representatives of Convolvulaceae have mainly the climber habit, but they also can be herbs, subshrubs, shrubs, rarely trees, and there is a holoparasitic genus (*Cuscuta* L.), with latex present or not (Metcalfe & Chalk 1950). They are usually recognized for their alternate, simple or compound leaves, lacking stipules and tendrils (Simão-Bianchini & Pirani 1997). The inflorescence is fundamentally cymose, with generally showy flowers, dialysepalous, rarely united at the base, and sympetalous corollas with five conspicuous mid-petaline bands (Austin & Cavalcanti 1982; Ooststroom & Hoogland 1953; Staples 2012). The androecium is composed of five stamens, alternating with the corolla lobes, adnate to the tube base or to the corolla throat, the filaments are filiform, the anthers are 2-loculed, dorsifixed. The pollen grain is medium to large, porate or colpate, and exine surface is psilate, perforate, spiculate or echinate (Erdtman 1952; Tellería & Daners 2003). The ovary is superior, bicarpellate, rarely tricarpellate, with 2, 4 or 6 locules, with style 1-2, entire or bifid, with a terminal stigma, filiform, capitate, globose 2-3-lobate, or ellipsoid; the nectary disc is annular or urceolate (Simão-Bianchini 1991; Silva *et al.* 2018). The fruit is often a dehiscent four-seeded dry loculicidal or septicidal capsule, rarely indehiscent or a berry (Simão-Bianchini & Pirani 1997).

The family is considered eurypalynous, due to huge variation in palynological characters (Telleria and Daners 2003). A widely accepted classification of Convolvulaceae proposed two main informal groups: 'Echinoconieae', which has echinate pollen, and 'Psiloconiae', with psilate pollen. It was the first study involving pollen exine character to delimitate the family (Hallier 1893). A molecular phylogenetic study at family level (Stefanovic 2002) demonstrated that "Echinoconieae" is monophyletic, and "Psiloconieae" is paraphyletic (with Echinoconieae nested within it), substantiating the interest and usefulness of pollen characters for systematic studies since Hallier (1893) to present days (Hallier 1893; Erdtman 1952; Laguardia 1961; Lewis & Oliver 1965; Sengupta 1972; Vij & Sachdeva 1974; Ferguson *et al.* 1977; Pedraza 1983; Tellería & Daners 2003; Welsh *et al.* 2010; Ketjarun *et al.* 2016; Simões & Staples 2017; Simões *et al.* 2019; Moreira *et al.* 2019; Vasconcelos *et al.* 2019), particularly in a family where morphological characters are very plastic, and high levels of homoplasy are documented (Austin 1998; Simões & Staples 2017).

The most representative genera for Brazil are *Cuscuta* L., *Dicranostyles* Benth., *Distimake* Raf., *Evolvulus* L., *Ipomoea* L., *Jacquemontia* Choisy, and *Maripa* Aubl. (Flora do Brasil 2020, em construção). The beauty and color of the flowers of most Convolvulaceae attracs many insects, mainly bees (Staples 2012). However, there are also some *Ipomoea* pollinated by hummingbirds, moths or butterflies (Simão-Bianchini 1991; Santiago-Hernández *et al.* 2019).

Minas Gerais is a state located in the southeastern region of Brazil. The surface area comprises 586.521,121 km² and has 853 counties (IBGE, 2019). The main vegetations types are Cerrado, Atlantic Rainforest and Caatinga. The landscape moves to the Cerrado to the south and west, to the Atlantic Rainforest to the east, to the region of rocky fields to the center, and small areas of Caatinga to the north (IEF 2019). It contains 332 federal, state, and municipal protected areas, comprising about 5.94% of the territory (Rezende *et al.* 2010, IEF 2019, ICMBio 2019).

In this state alone, 20 genera and 230 species of Convolvulaceae are found, while in the entire Brazil 22 genera and 415 species occur (Flora do Brasil 2020, under construction), therefore this state represents a significant part of the diversity of the family in the country. Yet, it is also one of the regions that has been target of more studies of this family (Simão-Bianchini 1997, 1998, 2005, 2009, 2012).

Taxonomic studies that help to document the morphological diversity of the flora of this region are an important step to contributing to its conservation. Researchers of several institutions have been concentrating their studies in the flora of Minas Gerais due its great

diversity and need of knowledge to preserve its biological wealth (Drummond 2005, Biodiversitas 2020).

The present study is part of the Flora of Serra da Canastra National Park project, that focuses on the floristic diversity of the Serra da Canastra National Park (PNSC), in Minas Gerais. The PNSC is an important complex due to the particularity of its phytogeography, limted by the Serra do Espinhaço in the south, and the mountain range of Goiás in the north (Romero & Martins 2002).The PNSC was created in 1972 and is managed by the Instituto Chico Mendes de Conservação e Biodiversidade (ICMBio 2019). PNSC is the second largest protected area in Minas Gerais. In addition, to preserving the sources of São Francisco River, the Park is home to a huge hydrographic system of water courses that drain into the Grande and Araguari rivers (MMA/IBAMA 2005). In this area is comprehended two great blocks, the Canastra plate and Babilônia plate. 83,000 ha. of private areas in Canastra plate become public and the owners were indemnified, and 117,000 ha. in Babilônia plate should be regularized, encompassing counties of Capitólio, Delfinópolis, São João Batista do Glória and Vargem Bonita (Romero & Versiane 2014, ICMBio 2019). The PNSC is in the trunking zone between Serra do Espinhaço, in Minas Gerais, and mountains in the state of Goiás (Romero & Martins 2002). The complex Serra da Canastra is also considered a disjunct part of the Espinhaço Range's chain, along with mountains range near to Furnas dam, Serra das Carrancas, Serra de São José, and Serra de Ibitipoca (Giulietti & Pirani 1988). The Park is inserted in Cerrado, the Brazilian Savanna, the second greatest domain of Brazil, comprising 23% of the territory (Ribeiro & Walter 2008). The Cerrado is the biggest domain of Minas Gerais, covering 57% of the territorial extension. Dry and rainy seasons are well defined, and grasses, shrubs and trees compose the vegetation (IEF 2019). Most of the PNSC is covered by rocky formations that comprise distinct physiognomic types: 'campo limpo', 'campo sujo', 'campo cerrado', hydromorphic camp and 'campo rupestre'. Savanna formations, represented by Cerrado *sensu strictu*, includes physiognomic subdivisions of 'cerrado denso', 'cerrado ralo,' and 'cerrado rupestre'. There are forest formations, subdivided into riparian forest, gallery forest, dry forest and 'cerradão' (MMA / IBAMA 2005, Ribeiro & Walter 2008). The Park is in a climate transition zone between the tropical hot and temperate mesothermal climates. The winter period is quite dry, marked by a rainfall shortage in July and a drought period between July and mid-September (MMA / IBAMA 2005). The natural fire is an important element in Cerrado and works in flora and fauna adaptation (Durigan & Ratter 2016). The current policies of fire prohibition come from over 20th century as a response to misuse of fire in pasture management or deforestation. This stance is reinforced in the face of climate change and global warming

(Dean 1997). In consequence to suppression of fire, the Cerrado has been suffering a thickening, being replaced from a dense and uniform tall vegetation, losing biodiversity and suffering a process of ecological changes (Pinheiro & Durigan 2009). Knowledge of indigenous people and scientists is a necessary base to implement policy implications in order to manage the fire correctly (Durigan & Ratter 2016).

Previous studies have demonstrated the importance of this park, as a Conservation Unit: 768 species of Angiosperms were recorded in Serra da Canastra National Park (PNSC), 45 of them restricted to this area, and 37 were new species (Romero & Nakajima 1999). Later, several studies have been contributed to knowledge of the flora of PNSC, such as Annonaceae (Pontes & Mello-Silva 2005), Apocynaceae (Farinaccio &Mello-Silva 2004, Morokawa *et al*. 2013), Asteraceae (Nakajima & Semir 2001), Bignoniaceae (Scudeller 2004, Machado & Romero 2014), Chrysobalanaceae (Hemsing & Romero 2010), Fabaceae (Filardi *et al.* 2007), Malpighiaceae (Volpi 2006), Melastomataceae (Romero & Martins 2002, Silva & Romero 2008), Piperaceae (Carvalho-Silva & Guimarães 2009), Rubiaceae (Silveira 2010), and Vochysiaceae (Gonçalves *et al.* 2013).

In order to continue the study of flora of Serra da Canastra, we provide a taxonomic treatment of Convolvulaceae to this area, with descriptions, identification keys of genera and species, and illustrations, aiming to clarify the geographic distribution and morphological characterization of species, and provide accurate floristic data for conservation actions in this Park.

Materials and methods

Study Area – The Serra da Canastra National Park (PNSC) spreads across the municipalities of Capitólio, Delfinópolis, Sacramento, São João Batista do Glória, São Roque de Minas, and Vargem Bonita, in the southwestern region of Minas Gerais state, southeasthern Brazil (20º00’ – 20º30’S and 46º15’ – 47º00’W). It occupies an area of about 200,000 ha. (Fig. 1), with an altitude range varying from 800 to 1,200 m, with a maximum of 1,496 m in Serra Brava.

Field collections – General collections were conducted between January 1998 and August 2019, focusing on the Canastra and Babilônia plates. Fields trips especially dedicated to collect Convolvulaceae were made in January 1998, October 2017 and in February 2018. Specimens were pressed and mounted following traditional methodology for preparation of

herbarium specimens (Fidalgo & Bononi 1989) and deposited at the SP herbarium (Instituto de Botânica, São Paulo, Brasil).

Confection of the map – The map showing the study area was make using the QGIS program version 3.10.0. The sources used to take information of the the Park were MMA/IBAMA (2005) and ICMBio (2019), and base maps source was IBGE (2019).

Floristic treatment – HUFU herbarium was the principal source consulted for the development of the study, in addition to SP herbarium, since it is home of a huge floristic collection from Serra da Canastra. This was especially important because not all of the species from Serra da Canastra were represented in the SP herbarium. Additional herbaria consulted for this studyare mentioned in the text (acronym according to *Index Herbariorum* – Thiers, continually updated). In the case of type specimens which images were consulted online (JSTOR), the barcode of the specimen is indicated.

Descriptions of genera and species were based on specialized bibliography of the family and then adapted according to what was observed in the genera and species occurring in study area. When this was insufficient to fully characterize the species, additional collections were analyzed, preferably from nearby regions, in order to complement the descriptions.

Morphological terminology followed Radford *et al.* (1974) and Harris & Harris (1994). Payne (1978) and Hickey & King (2001) were followed to describe the indumentum. Trichomes between 0.1-0.4 mm long were considered “short”, and 0.5-1.5 mm long were considered “long”. Venation terminology was based on Ash *et al.* (1999). To describe non observed structure in the samples, such as capsule and seeds, we consulted Simão-Bianchini & Pirani (1997), Moreira *et al.* (in press) and Rodrigues-Lima (2017).

Micromorphological analyses of vegetative characters were conducted under Scanning electron microscopy analyses (SEM). Herborized tissues of extrafloral nectaries, trichomes, style, stigma and pollen were sampled from herbarium specimens. The pollen grains were sampled from flower buds. The solution containing the structures was dripped directly onto the stubs, which were then sputter coated with gold under high vacuum. A PHILIPS XL Série XL 20, S/W, version 5.21. microscope was used, at the Instituto de Botânica, with the assistance of Dra. Luciana Benatti.

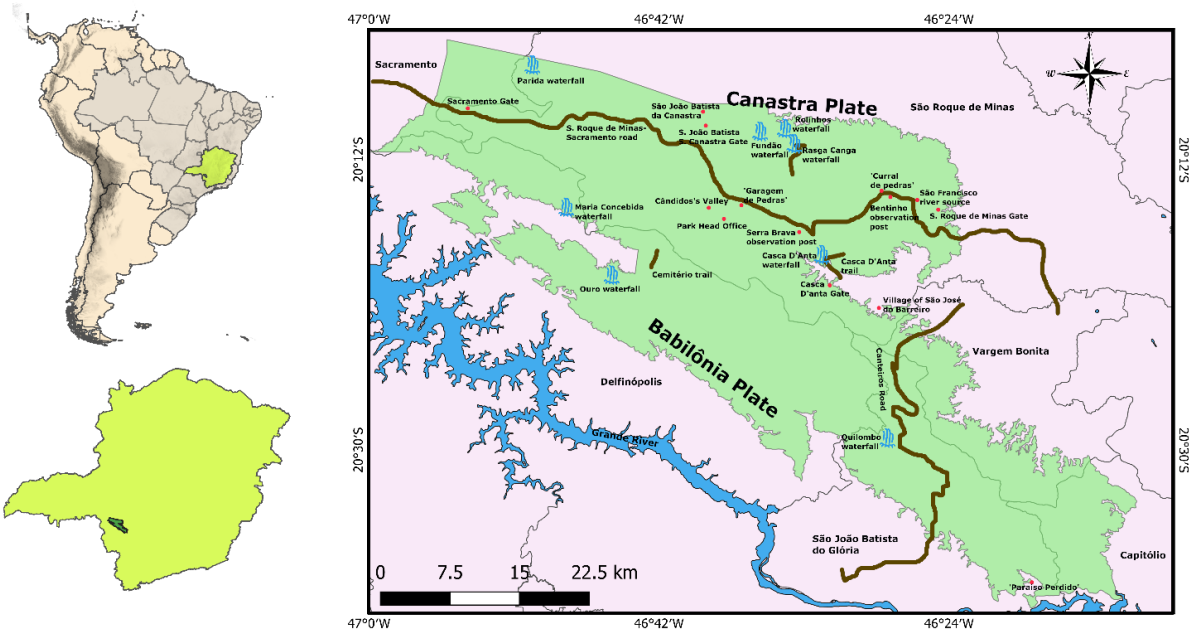

Figure 1 – Map showing the location of the study area, Serra da Canastra National Park, Minas Gerais State, Brazil (highlighting in green): Canastra Plate and Babilônia Plate, with main localities.

Results

Taxonomic treatment

Convolvulaceae is represented in the Serra da Canastra National Park by five genera and 23 species. *Ipomoea* is the most representative genus (12 species), followed by *Evolvulus* (6 species), *Distimake* (2 species), *Jacquemontia* (2 species), and *Bonamia* (1 species). *Ipomoea pohlii* Choisy is here presented as a new record to Minas Gerais. Only *J. sphaerostigma* (Cav.) Rusby is considered a weed species in the Park. The species are characteristic of the Cerrado vegetation type, and have been cited in the floristic survey of the PNSC conducted by Mendonça *et al.* (2008). In the surroundings areas, the buffer zones of the Park there were found 10 species: *Distimake* (2 species), *Ipomoea* (5 species), and *Jacquemontia* (3 species).

Identification key of Convolvulaceae genera in Serra da Canastra

1. Styles 2, free or united at the base; stems erect, prostrate or repent, never twining.
   2. Indumentum of forked trichomes, branches equal or subequal; corolla infundibuliform, 2.5-3 cm long, midpetaline bands densely sericeous; style branches unequal, longer one ca. 5.5 mm long and shorter one ca. 3.5 mm long, stigmas globose ..... 1. *Bonamia*
   2'. Indumentum of simple trichomes, or malpiguiaceous trichomes with branches subequal or very different; corolla hipocrateriform, 0.8-1.8 cm long, midpetaline bands sparcely sericeous; style branches equal, 2.5-12 mm long, stigmas elongate ..... 3. *Evolvulus*

1'. Style 1; stems voluble, erect or prostrate.
   3. Indumentum of stellate trichomes 3-several-branched or glandular; white or blue flowers; well demarcated, glabrous midpetaline bands; stigma ellipsoid or globose.
      4. Inflorescences with up to 3 flowers, corolla white; stigma globose; anthers twisted after anthesis; 4-valved capsules ..... 2. *Distimake*
      4'. Inflorescences from up to 32 flowers, corolla blue; stigma ellipsoid or subglobose; anthers not twisted after anthesis; 8-valved capsules ..... 5. *Jacquemontia*
   3'. Indumentum of simple trichomes or glandular; pink or lilac flowers, not well demarcated midpetaline bands sericeous, rarely glabrous; only stigma globose ..... 4. *Ipomoea*

1. *Bonamia eustachioi* A.L.C.Moreira & Kojima, **sp. nov. ined. in press.** Plant Ecology and Evolution. Type: BRAZIL. BAHIA: Igaporã, 21.IV.2015, *J.E.Q. Faria & A.R.O. Ribeiro 4444* (SP!, UB!, ALCB, CEN, HUEFS, K, NY, RB, SPF).

Fig. 3a-f, 6a, 7a-f

Erect subshrub, 40-80 cm tall; stem (1.5)2-3(4) mm, young branch verrucose, short-pubescent, mature branch tomentose, green to rusty, forked trichomes, with equal or subequal branches; internodes 1-2 cm long. Leaves elliptic or ovate, (2.1-) 3.1-4.1 (-5) x 1.7-2.1 (-3.5) cm, base rounded, apex cuspidate or acute, mucronate, margin entire, tomentose on both surfaces, forked trichomes, golden to ferruginous, brochidodromous, veins sulcate on adaxial surface, salient on abaxial surface; petiole 2-4 mm long. Inflorescence of 1-3 flowered axillary cyme; peduncle absent; bracteole subulate, apex acute, (2.5-) 3.5-6.5 mm long, tomentose; pedicel 1.5-2.5 mm long, tomentose; sepals unequal, ovate, outer 10-11 x 5.5-6 mm, inner 7.5-8 x 3.5-5 mm with hyaline margin, apex acute, tomentose, ciliate, ventral surface glabrous; corolla

infundibuliform, lilac or bluish, 2.5-3 cm, tube 1-1.3 cm, limb 1.1-1.2 cm, midpetaline bands densely sericeous; longer stamens 9-1 mm, shorter 5.5-7 mm, villous at the base, anthers basifixed, elliptic, 1.5-2 mm long, styles 2, united until 5 mm from the base, 8-13 mm total long, longer branch ca. 5.5 mm long, shorter branch ca. 3.5 mm long, each style with one globose stigma. Capsule globose or ovoid, apiculate, ca. 6 x ca. 4 mm, glabrous, cream-yellow; seed ovoid, glabrous, black.

Examined material: BRAZIL. MINAS GERAIS: Delfinópolis, condomínio de Pedra, 20º20'38"S, 46º51'14"W, 17.V.2003, *R.L. Volpi et al. 696* (HUFU, SP); estrada para "Casinha Branca Trilha Muro de Pedras", 20º20'38"S, 46º51'14"W, 12.III.2003, *R.A. Pacheco et al. 532* (HUFU, SP); estrada para Casa Branca, Fazenda Paraíso, 20º20'38"S, 46º51'14"W, 10.IV.2002, *R. Romero et al. 6307* (HUFU, SP).

Distribution: There is few records only in Brazil, comprising Bahia and Minas Gerais. (Moreira *et al.* 2019 – in press).

Ecology: Native species, characteristic of Cerrado and Caatinga, generally associated to rocky environments. In Serra da Canastra region, there are several records found in surroundings of the Park, in county of Delfinópolis, at Casinha Branca and Fazenda Paraíso localities, only in 'campo rupestre' physiognomy.

Recognition: *Bonamia eustachioi* is recognized by its subshrub ascending habit, with a rusty to green color, elliptic to ovate leaves, unequal sepals, bluish to lilac corolla and densely sericeous midpetaline bands. *B. eustachioi* might be confused with *B. rosiewiseae* J.R.I.Wood, which is distinguished by the leaves with rounded to emarginate apex, whitish to cream vestiture, more congested inflorescences, sepals obovate to elliptic with rounded apex and bigger corollas (3-3.5 cm long.).

Phenology: It was collected in flower from March to May.

2. *Distimake* Raf., Flora Telluriana 4: 82. [1836 publ. mid-1838].

The genus has 42 species (Simões & Staples 2017, Petrongari *et al.* 2018) with concentration in Tropical America and Tropical Africa and disjunct species in northern Australia and Asia (Simões & Staples 2017).

It occurs 18 species in Brazil, 9 of them been restricted. There are records in all phytogeographical domains, mostly in the Cerrado, but also in the Caatinga and the Atlantic Rainforest (Flora do Brasil 2020, em construção). Based on geographical, molecular,

morphological and palynogical evidences, *Distimake* was recently segregated from *Merremia s.l.* (Simões & Staples 2017, Simões & More 2018).

Representatives of *Distimake* are recognized in having climbing or prostrate herbaceous habit, rarely erect; the indumentum is frequently composed by stellate trichomes (figs. 4b, 8d-e); the leaves are five to seven palmately lobed or compound, exceptionally simple and entire (fig. 4a) or reduced to scales; the sepals are flat (never convex), appressed to base of corolla tube, accrescent in capsule (fig. 4c); the corolla is frequently white (fig. 6b) or yellowish, totally glabrous; the anthers are spirally when mature, and pollen is tricolpate (figs. 4e, 8a-b); the capsule is 4-valved, later sepals reflexing, the seed is glabrous (Simões & Staples 2017, Petrongari *et al.* 2018).

Identification key for *Distimake* species in Serra da Canastra

1. Prostrate herbs with voluble apex, not branched; internodes 2.5-5.5 cm long; elliptic to oblong leaves; pedunculated inflorescence ..... 2.1. *D. maragniensis*
1'. Erect subshrubs, branched; internodes 0.7-2 cm long; narrow-elliptic leaves; sessile inflorescence ..... 2.2. *D. tomentosus*

2.1. *Distimake maragniensis* (Choisy) Petrongari & Sim.-Bianch., Phytotaxa 340 (3): 298. 2018. Type: BRAZIL. MARANHÃO: *In sepibus ad fluv. Itapicuru prov. Maragniensis*, 1819, *C.F.P. von Martius s.n.* (M0184790).

Fig. 4a-e, 8a-c

Prostrate herb with voluble apex; stem 1-2 mm diam., tomentose, stellate trichomes with numerous branches; internodes (2.5-) 3.4-5.5 cm long. Leaves simple, entire, elliptic or oblong, (2.5-) 5-6.5 x 1.5-1.9 cm, rarely compound with 2-3 leaflets, base acute or rounded, apex obtuse or acute, mucron ca. 0.5 mm, margin entire or irregularly wavy, tomentose on both surfaces, brochidodromous, veins sulcate on adaxial surface, salient on abaxial surface; petiole (2-) 5-9 mm long. Inflorescence of 1-3 flowered axillary dichasium; the primary peduncle (0.3-) 1.2-5 (-9) cm long, secondary absent; bracteole lanceolate, apex acute, (2.5-) 5-6 mm long, tomentose or with sparse trichomes; pedicel 0-3 mm long, tomentose; sepals unequal, outer 5-11 x 3-3.5 mm, sparsely pilose, inner 13-14 x 4-5 mm, glabrous, elliptic or oblong, apex acute, mucronulate, margin hyaline; corolla infundibuliform, white, 2.8-3 cm, tube 1.1-1.5 cm, limb

1.3-1.6 cm, midpetaline bands glabrous; stamens longer 1,8-2 mm, shorter 17-19 mm, base villous, anthers basifixed, twisted after anthesis, elliptic, 5.5-6 mm long; styles 2, ca. 24 mm long, stigmas 2, globose. Capsule ovoid, 1-1.3 x 0.8-1.2 cm, glabrous; seed ovoid, brown, velutinous, white or brown trichomes, ca. 5.5 x 4-4.5 mm.

Examined material: BRAZIL. MINAS GERAIS: Sacramento, estrada São Roque de Minas - Sacramento, próximo ao córrego dos Passageiros, 13.V.1995, fl., *R. Romero et al. 2230* (HUFU, SP). São Roque de Minas, Estrada São Roque de Minas - Sacramento, 60km, 22.II.1997, fl., *J.N. Nakajima et al. 2254* (HUFU, SP); estrada para a garagem das Pedras, 23.III.1996, fl., *J.N. Nakajima et al. 1704* (HUFU, SP).

Distribution: The species is native and restricted to Brazil, occurring in broad distribution only in the Cerrado domain, confirmed in the Distrito Federal and the states of Maranhão, Goiás, Minas Gerais, São Paulo, and Paraná (Flora do Brasil 2020, em construção).

Ecology: In PNSC occurs in forest edge, in fields sometimes associated to rocky outcrops. It was collected near to Passageiros stream, in Sacramento count. In São Roque de Minas count it was found in São Roque de Minas-Sacramento road, in roado to Retiro das Pedras, near to Park division, in Guarita de Sacramento, in Rolinhos waterfalwatl, and in road to Garagem de Pedras.

Recognition: It can be promptly recognized by having dense tomentose indumentum with stellate trichomes and simple to compound leaves with elliptic or ovate leaflets. The number of leaflets can variate even in the same individual. Most individuals from Serra da Canastra have entire leaves. Only the material *Nakajima et al. 2254* has compound leaves with 2-3 leaflets. The material *Nakajima & Romero 1704* has an unusual supplementary bud in axils of each branch. These uncommon characters may be related to mutation, already mentioned in Convolvulaceae (Hunziker & Crovetto 1944). *Distimake maragniensis* resembles *D. tomentosus* (Choisy) Petrongari & Sim.-Bianch. by the tomentose indumentum and elliptical leaves, but differs in being a prostrate herb with twining apex and longer internodes, whereas *D. tomentosus* is an erect subshrub with entire leaves and has shorter internodes.

This taxon proposed recognized by Choisy (1845) under the name *Ipomoea maragniensis* Choisy and faced a long history of identification problems. Austin & Staples (1983) proposed the combination *Merremia digitata* var. *elongata* (Choisy) D.F.Austin & Staples for this species based at *Ipomoea tomentosa* Choisy var. *elongata* Choisy. More recently, after dissolution of the tribe ‘Merremiae’ and split of the genus *Merremia* (Simões & Staples 2017), this taxon was recombined to *Distimake* under the name *D. maragniensis* (Petrongari *et al.* 2018).

Phenology: It was observed in flower and fruit from January to July.

2.2. *Distimake tomentosus* (Choisy) Petrongari & Sim.-Bianch., Phytotaxa 340(3): 299. 2018. Type: BRAZIL. SÃO PAULO: *Prov. St.-Paul. campis elevatis*, 1835, *P.W. Lund s.n. [766]* (G *pro parte*: only left-hand specimen - G00134821).

Fig. 6b, 8d-e

Erect subshrub, 60-70 cm tall; stem 2.5-3.5 mm diam., branched, tomentose, cinereous, stellate trichomes with numerous branches; internodes 0.7-2 cm long. Leaves simple, entire, narrow-elliptic, 4.5-8.3 x 0.9-3.4 cm, base rounded or attenuated, apex rounded, margin entire, dense tomentose in both surfaces, brochidodromous, veins sulcate in adaxial surface, salient in abaxial surface; petiole 2-5 mm long. Inflorescence of 1-4 flowered axillary dichasium; peduncle absent; bracteole ovate or subulate, apex acute, 1.3-2 mm long, tomentose; pedicel 0.3-2 mm long, stellate tomentose; sepals unequal, outer 4-5.5 x 2-3 mm, inner 7-8.5 x 4-5.5 mm, ovate, apex rounded, glabrous or sparse pilose, trichomes more concentrated in margin and apex; corolla campanulate-infundibuliform, white, 2.3 cm, tube 1.3 cm, limb ca. 1 cm, midpetaline bands glabrous, well demarcated; stamens longer 8-9 mm, shorter 7-8 mm, base villous, anthers basifixed, twisted after anthesis, elliptic, 3.5-4 mm long; styles 2, ca. 12 mm long, stigmas 2, globose. Capsule ovoid, 0.5-1.1 x 0.45-0.8 cm, glabrous; seed ellipsoid, brown, velutinous, ca. 6 x ca. 3.5 mm.

Examined material: BRAZIL. MINAS GERAIS: São Roque de Minas, trilha para cachoeira do Ricardo e do Sonho, 14.II.2018, fl., *R.K. Kojima & R. Simão-Bianchini 23* (SP).

Distribution: It is native, typical of Cerrado domain and occurs only in Brazil, with broad distribution in Distrito Federal, Tocantins, Bahia, Goiás, Minas Gerais, São Paulo, and Paraná (Flora do Brasil 2020, em construção).

Ecology: In Serra da Canastra it is very well represented and was found in several places inside the Park, in counties of Capitólio, Delfinópolis, and São Roque de Minas, in ‘campo rupestre’, rocky outcrop, ‘campo sujo seco’, rocky soil, forest edge and in groove border physiognomies.

Recognition: *Distimake tomentosus* distinguishes from others for being erect branched subshrub, with tomentose indumentum and short internodes. It resembles *D. maragniensis*. as it is already discussed.

Phenology: It was collected in flower and fruit from February to December. In Serra do Ouro Branco, part of Serra do Espinhaço range, the species was collected with flower all over the year (Rodrigues-Lima 2017).

3. *Evolvulus* L., Species Plantarum (ed. 2) 1: 391. 1762.

Evolvulus has about 100 species, predominantly in the American continent. Only two species have cosmopolitan distribution: *Evolvulus alsinoides* (L.) L. and *E. nummularius* (L.) L. (Ooststroom 1934). In Brazil, there are recorded 71 species and 50 of them are restricted. They occur in all phytogeographical domains, mainly in Cerrado, with 59 species, followed by Caatinga and Atlantic Rainforest. Cerrado and Caatinga are important center of diversity of *Evolvulus*, due to occurrence of a high number of restricted species. Minas Gerais has 55 species and is the Brazilian state that holds the highest number of records (Flora do Brasil 2020, em construção).

The species of this genus are recognized in having herbaceous, subshrubs, erects, prostrates or repents habits (fig. 4h) ; the trichomes are malpighiaceous, with equal or unequal branches; the leaves are simples, entire, ovate, oblong, lanceolate or linear, sessile or short-petiolate (figs. 6c-d); the axillary inflorescence has few to numerous flowers, the bract is leafy; the flowers are small (figs. 9a-b), corolla campanulate, infundibuliform, hippocrateriform or rotate (figs. 4i, l, 6e-f); the pollen is spheroidal, tricolpate or pantocolpate, exine psilate, tectate or microechinate (figs. 9c-e); the two styles are free or united at base, each of them with two stigmas, cylindric, elongate or spatulate (figs. 4g, j-k, 9f); the capsule are 4-valved and glabrous (Ooststroom 1934; Simão-Bianchini 2009; Buril-Vital *et al.* 2008; Silva 2013).

Identification key for *Evolvulus* species in Serra da Canastra

1. Erect subshrubs; tomentose plants, golden trichomes.....3.4. *E. goyazensis*
1’. Erect, prostrate or repent herbs; glabrescent, hirsutullous, dense or sparse sericeous-villous plants, translucent trichomes.
2. Terete stem; ovate, broad-ovate, narrow-ovate, elliptic or oblong leaves with non decurrent base; eucamptodromous venation; not winged petiole 0-2 mm long.
3. Stem branched from the base; conduplicated leaves at branches apex, rounded, cuneate, attenuate or cordate leaves base; dichasium inflorescence.
4. Erect, prostrate or repent herbs; glabrous to hirsutullous plants.....
.....3.1. *E. aurigenius*
4’. Cespitose, erect herbs with some prostrate branches; sericeous-villous or sparse sericeous plants ..... 3.2. *E. cressoides*

3’. Stem not branched from the base; leaves not conduplicated, acute leaves base; spiciform to glomerular inflorescence .....3.3. *E. glomeratus*

2’. Winged stem; narrow-elliptic or lanceolate leaves with decurrent base; hyphodromous venation; winged petiole 2.5-5 mm long.

5. Upper leaves decreasing in size in comparison with lower ones; seeds ca. 1.5 x 1.5 cm .....3.5. *E. lagopodioides*

5’. Lower and upper leaves of the same size; seeds ca. 2.5 x 1.5 cm .....3.6. *E. pterygophyllus*

3.1. *Evolvulus aurigenius* Mart., Flora 24(2): 100. 1841. Type: BRAZIL. MINAS GERAIS: *Inter Cattas Altas et Inficionado, C.F.P. von Martius 1290* (M0184332).

Fig. 4f-g, 9a

Erect, prostrate or repent herb, branched from the base, 8-19 cm tall; tap root; stem 0.5-1 mm diam., terete, glabrous to hirsutullous, simple trichomes, 0.5-1.5 mm long, and malpighiaceous trichomes, with equal, short branches, ca. 0.25 mm long, or one shorter and another one longer, patent; internodes 0.6-1.6 cm long. Leaves ovate, broad-ovate or elliptic, conduplicate at apex of the branches, generally in young ones, 1.1-2.1 x 0.8-1.2 cm, base rounded or cordate, apex acute or rounded, margin entire, adaxial surface glabrous, sparse pilose or hirsute, abaxial surface hirsutullous or hirsute, denser in primary veins and in leaf base, two layers of indumentum, simple trichomes, 0.5-1 (-1.5) mm long, interspersed by malpighiaceous trichomes, eucamptodromous, veins sulcate or inconspicuous in adaxial surface, salient in abaxial surface; petiole 0-2 mm long. Inflorescence of 1-2 flowered axillary dichasium; peduncle absent; bracteole lanceolate or triangular, apex acute or acuminate, 1-2.5 mm long, sericeous, ciliate; pedicel 0.5-1 mm long, sericeous; sepals subequal, outer 2.5-3.5 x 0.5-1 mm, inner 3.5-4 x 0.5-1 mm, lanceolate, apex acute or acuminate, glabrous, sparse hirsutullous in all surface or only at vein, in 1/3 upper, ciliate; corolla hippocrateriform, blue, 1.5-2.4 cm, tube 0.8-1.4 cm, limb 0.7-1 cm, midpetaline bands sericeous; stamens 4,5-5 mm, base glabrous, anthers basifixed, stamens free at base, inserted ca.12 mm above from the base of corolla, elliptic, 1.5-2 mm long; styles 2, free at base, 11-12 mm, stigmas 2, linear, papillose after bifurcation, ca. 6 mm. Capsule ovoid, ca. 3.5 x ca. 3 cm, glabrous; seed ovoid, granular, brownish or vinaceous, 2-2.5 x 1-1.5 mm.

According to Ooststroom's (1934) review of *Evolvulus*, there are two varieties of *E. aurigenius* and the distinction can be recognized by the vestiture, while *Evolvulus*

macroblepharis Mart. was considered as a distinct species. Following Rodrigues-Lima (2017), this species was treated as a third variety.

Examined material: *Evolvulus aurigenius* var. *aurigenius*. BRAZIL. MINAS GERAIS: São Roque de Minas, Guarita de Sacramento, 06.III.1994, fl., *R. Romero & J.N. Nakajima 1432* (HUFU). *Evolvulus aurigenius* var. *macroblepharis* estrada para a Serra da Chapada, 08.I.1998, fl., *R. Romero et al. 4795* (HUFU). *Evolvulus aurigenius* var. *meissnerianus* estrada do Chapadão Diamante, 18.III.1995, fl., *J.N. Nakajima et al. 842* (HUFU).

Distribution: It is restricted to Brazil, extending from Distrito Federal and Goiás to Minas Gerais and São Paulo, in Cerrado domain (Flora do Brasil 2020, em construção).

Ecology: It is a native species and in the PNSC occurs three varieties, generally associated to rocky soil, in 'campo rupestre', 'campo limpo', 'campo sujo' and 'campo cerrado'. *E. aurigenius* var. *aurigenius* was collected in surroundings of Guarita de Sacramento, São Roque de Minas county, predominantly in 'campo rupestre' physiognomy. *E. aurigenius* var. *macroblepharis* was observed in 'campo rupestre', in road to Rolinhos waterfall, São Roque de Minas county. *E. aurigenius* var. *meissnerianus* was found in road to Chapadão do Diamante, in road to Sacramento, in 'campo limpo' and 'campo rupestre' physiognomies, São Roque de Minas county, and in forest edge in Delfinópolis county. This last variety has registered only to Minas Gerais State. *Evolvulus aurigenius* is a well represented species in PNSC, occurring in preserved areas.

Recognition: *Evolvulus aurigenius* can be distinguished by having prostrate, ascending or repent habit, conduplicated apex leaves, generally in younger ones, and cordate leaves base and hisutullous or glabrous indumentum. It resembles *E. cressoides* but it differs from *E. aurigenius* by cespitose habit and having sparse-sericeous leaves or dense indumentum. *E. rariflorus* (Meisn.) Ooststr. is also similar to *E. aurigenius*, which differs by having smaller and narrower tomentose leaves, whereas studied species has bigger and broader leaves with hirsute or glabrous indumentum.

Phenology: *Evolvulus aurigenius* was collected in flower in studied area from December to May.

Identification key for the varieties of *Evolvulus aurigenius* in Serra da Canastra

1. Leaves glabrous, hirsutullous or sparse hairy.
   2. Leaves adaxial surface glabrous; sepals glabrous, ciliate.....

.....*E. aurigenius* var. *macroblepharis* (Mart.) Hassl.

2'. Leaves hirsutullous or sparse hairy on both sufaces; sepals sericeous or glabrous only at base .....*E. aurigenius* var. *meissnerianus* Ooststr.

1'. Leaves hirsute .....*E. aurigenius* var. *aurigenius*

Evolvulus aurigenius var. *aurigenius* is distinguished by the dense indumentum on both surfaces of leaves, mainly in central vein, and sepals with rare, sparse, long trichomes (0.5-1.5 mm); *E. aurigenius* var. *macroblepharis* has glabrous leaves on adaxial surface and sparse trichomes on abaxial surface; glabrous, ciliate sepals; *E. aurigenius* var. *meissnerianus* has intermediate indumentum, slightly small trichomes (0.7-1 mm long.), sparse on both leaves surface and sepals base glabrous, apex sericeous. The reproductive part is similar in all varieties, not being an important criterion to split the taxa. Just in *E. aurigenius* var. *macroblepharis* might be repent habit. The morphological plasticity of complex *E. aurigenius* about the habit, that can be prostrate, repent or ascending, sometimes rooting in nodes, less or quite branched from the base, generate a lot of confusion in identifications.

3.2. *Evolvulus cressoides* Mart., Flora 24 (2): 100. 1841. Type: BRAZIL MINAS GERAIS: in high campos near Villa de Campanha, *C.F.P. von Martius s.n.* (M0184321).

Fig. 4h, 6c-d, 9b, f

Cespitose herb, with erect branches and some of them prostrate, branched from the base, 10-20 cm tall; tap root; stem 0.5-1 mm diam., terete, dense sericeous-villous to sparse sericeous, long simple trichomes, 1-1.5 mm long, interspersed by short malpighiaceous trichomes, branches ca. 0.25 mm long; internodes 0.3-1 cm long. Leaves ovate or narrow-ovate, conduplicate at apex of the branches when young, 0.9-1.6 x 0.3-0.8 cm, base rounded, cuneate or subcordate, apex acute or attenuate, margin entire, ciliated, adaxial surface glabrous, sparse pilose or hirsute, abaxial surface hirsutullous or hirsute, denser in primary veins and in leaf base, two layers of indumentum, simple trichomes, 0.5-1 (-1.5) mm long, interspersed by malpighiaceous trichomes, eucamptodromous, veins sulcate or inconspicuous in adaxial surface, salient in abaxial surface; petiole 0-1.5 mm long. Inflorescence of 1-2 flowered axillary dichasium; peduncle absent; bracteole lanceolate, apex acute, 0.5-1.5 mm long, glabrous or sericeous, ciliate; pedicel 0-1 mm long, glabrous or sericeous; sepals unequal, outer 2-3 x 0.5-0.8 mm, inner 3-3.2 x 0.5-0.7 mm, ovate or lanceolate, apex acute or acuminate, sericeous or dense

sericeous, ciliate, glabrous ventrally; corolla hippocrateriform, blue, 1.1-1.7 cm, tube 0.5-0.9 cm, limb 0.6-0.8 cm, midpetaline bands sericeous, white trichomes; stamens 3,3-4 mm, base glabrous, anthers basifixed, stamens free at base, inserted ca. 8.2-9 mm above from the base of corolla, elliptic, ca. 1mm long; styles 2, free at base, ca. 8-10 mm, stigmas 2, linear, papillose after bifurcation, 2.5-3 mm. Capsule ovoid, 3-3.5 x 3-3.5 mm, glabrous; seed ovoid or ellipsoid, granular, yellowish with brownish granules, 1.5-2 x 0.8-1 mm.

Examined material: BRAZIL. MINAS GERAIS: Capitólio, 17.II.2018, fl. and fr., *R.K. Kojima & R.Simão-Bianchini 25* (SP).

Distribution: It is native and restricted to Brazil, occurring from Distrito Federal and Goiás to Minas Gerais and São Paulo, on Cerrado domain (Flora do Brasil 2020, em construção).

Ecology: *Evolvulus cressoides* was found near to observation point, in road Sacramento – São Roque de Minas counties, in 'campo limpo' and rocky outcrop physiognomies, after burning; at 23 km and 12 km from administrative head office, in 'campo sujo' physiognomy, São Roque de Minas county; and also it was observed in Capitólio county, associated to rocky soil. The specimens were collected always in high altitudes.

Recognition: *Evolvulus cressoides* is distinguished by its erect cespitose habit, with prostrate branches, dense or sparse sericeous-villous indumentum, ovate to narrow-ovate leaves, conduplicated when young. The species has cespitose habit with many erect branches, some of them prostrate, and dense or sparse sericeous indumentum in both leaves surface with long (1.5-2 mm long.) or short trichomes (about 1 mm long.). The material *R.K Kojima & R.S. Bianchini 25* has smaller narrow-ovate leaves (0.9-1.3 cm long.) with sparse trichomes on both leaf surfaces. *Evolvulus cressoides* is quite resemble *E. aurigenius* in form and measurements of leaves and sepals, but the first might be distinguished by cespitose habit, with many erect branches and dense sericeous-villous to sparse sericeous indumentum, whereas *E. aurigenius* has erect, prostrate or repent habit, not cespitose, and glabrous to hirsutullous leaves.

Phenology: In PNSC, the species was found reproductive in January, February and April. In the remainder of its distribution, it flowers over the months of January to April (Flora do Brasil 2020, em construção).

3.3. *Evolvulus glomeratus* Nees & Mart., Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 11(1): 81. 1823. Type: BRAZIL. BAHIA: Circa Tamburil et Valos, *Prince zu Wied-Neuwied s.n.* (BR0000006588540, MEL 2353843).

Fig. 6e

Erect or prostrate herb, 15-30 cm tall; tap root; stem 1-2 mm diam., terete, sericeous, simple trichomes, ca. 3 mm long; internodes 0.6-1.2 cm long. Leaves elliptic or oblong, 1.4-2.2 x 0.3-0.7 cm, base acute, apex acute or obtuse, margin entire, sericeous in both surfaces, denser in abaxial surface, eucamptodromous, veins sulcate in adaxial surface, salient in abaxial surface; petiole 0.5-2 mm long. Inflorescence of 1-4 flowered terminal congested spiciform, globose; peduncle absent; bracteole narrow-elliptic, apex acute, 8-10 mm long, sericeous; flowers sessile; sepals equal, 5-6.5 x 0.5-1 mm, narrow-triangular or lanceolate, apex acuminate, sericeous; corolla hippocrateriform, blue or purple, tube white, ca. 1.5 cm, tube ca. 0.8 cm, limb ca. 0.5 cm, midpetaline bands sericeous; stamens 5,5-6 mm, base glabrous, anthers basifixed, stamens free at base, inserted ca. 8.2-9 mm above from the base of corolla, elliptic, ca. 2.5 mm long; styles 2, united to 2.5-5.5 mm from base, 5.6-7 mm total long, stigmas 2, linear, papillose after bifurcation, ca. 3.5 mm. Capsule ovoid, 2.5-3 x 2.5-3 mm, glabrous; seed ellipsoid, brownish, granular, 1.5-2 x 1.5-2 mm.

Examined material: BRAZIL. MINAS GERAIS: Sacramento, estrada São Roque de Minas - Sacramento. Próximo a torre de observação, 11.XII.1994, fl., *J.N. Nakajima & R. Romero 764* (HUFU, SP); guarita de Sacramento, 18.XI.1995, fl., *R. Romero et al. 3048* (HUFU); 6.XII.1994, fl., *R. Romero & J.N. Nakajima 1441* (HUFU).

Distribution: It is a heliophile species that occurs in sandy soils, native of Brazil and broadly distributed in South America (Simão-Bianchini 2009). It occurs in all phytogeographical domains in Brazil, except in Pantanal. It was not referred only to states of Amapá and Tocantins (Flora do Brasil 2020, em construção).

Ecology: In Serra da Canastra, *E. glomeratus* was found in ‘campo rupestre’ and ‘campo limpo’ associated to rocky outcrop physiognomies, in counties of São Roque de Minas and Sacramento, frequently in road side.

Recognition: *Evolvulus glomeratus* is easily recognized by the presence of undeveloped lateral gems in the leaf axils, forming a very short branch with congested undeveloped leaves, and by leaf-bracteous inflorescence, with internodes reduced and sessile flowers. It resembles *E. echioides* Moric., which differs by erect habit, little branched, absence of development of short branches with congested leaves and scarious margin in sepals. Ootstroom (1934) recognized several subspecies, varieties and forms, and all specimens found in PNSC belongs to *E. glomeratus* subsp. *glomeratus*.

The material *R. Romero et al. 3048* has an unusual three styles, partially united at the base and one locule of ovary has three ovules, rather than two. The material refers as *R. Romero & J.N. Nakajima 1441* has anther with epidermal vesicles, another character not common in

this species. Both materials were collected in Guarita de Sacramento, São Roque de Minas county. These anomalies support the occurrence of mutations in this species, as known in some species of *Cuscuta* (Hunziker & Crovetto 1944). The event might occur in cultivated species as *E. glomeratus* that is commercialized as ornamental. It is also known as 'mimo-do-céu' or 'vassourinha-rasteira' (Simão-Bianchini & Pirani 1997).

Phenology: In PNSC, it was collected reproductive from November to February. In another regions it blooms among all over the year (Junqueira & Simão-Bianchini 2006, Simão-Bianchini 2009).

3.4. *Evolvulus goyazensis* Dammer, Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie 23 (57): 37. 1897. Type: BRAZIL. GOIÁS: *Barra Du Rio Torto avec le Rio Paranana*, 14.II.1895, *A.F.M. Glaziou 21802* (BR0000006974503, C10009651, F0054799F, K000613176, MPU012079, NY00319023, P03546835, P03546832, R000012196, RB00538238, S04-1923, US 00111215).

=*Evolvulus goyazensis* Dammer var. *penicillatus* Ooststr., Meded. Bot. Mus. Herb. Rijks Univ. Utrecht 14: 217. 1934. **syn. nov.** Type: BRAZIL. GOIÁS: *Barra Du Rio Torto avec le Rio Paranana*, *A.F.M. Glaziou 21802* (S12-527).

Fig. 4i-k

Erect subshrub, caducous leaves at basal portion, 20-50 cm tall; tap root; stem 1-2.5 mm diam., terete, tomentose, golden trichomes, ca. 2.5 mm long; internodes 0.6-2 cm long. Leaves ovate-oblong, broad-ovate toward apex, clustered in a terminal spike at apex, 1.5-2.8 x 0.4-1.4 cm, base rounded, apex acute, margin entire, tomentose in both surface, bifurcate trichomes, one branch longer, 1.5-2 mm long and another shorter, ca. 0.5 mm long, eucamptodromous, veins slightly sulcate in adaxial surface, slightly salient in abaxial surface; petiole 0.5-1 mm long. Inflorescence of 1-3 flowered axillary congested spiciform dichasium; peduncle absent; bracteole lanceolate, apex acute, 2-4.5 mm long, tomentose; flowers sessile; sepals equal or subequal, 2-5 x 2.5-3 mm, lanceolate, apex acute or acuminate, sericeous; corolla hippocrateriform, lilac or bluish, 0.8-1.8 cm, tube 0.3-1 cm, limb 0.5-1 cm, midpetaline bands sericeous; stamens 3-3.8 mm, base glabrous, anthers basifixed, stamens free at base, inserted ca. 8-9 mm above from the base of corolla, elliptic, ca. 1.2 mm long; styles 2, united to 5-5.5 mm from the base, 8.5-9 mm total long, stigmas 2, linear, papillose at upper 2/3, 3-3.5 mm. Capsule ovoid, ca. 3 x ca. 2.5 mm, glabrous; seed ellipsoid, granular, yellowish, ca. 2.5 x ca. 1.5 mm.

Examined material: BRAZIL. MINAS GERAIS: Sacramento, estrada para o Retiro das Pedras, 14.V.1995, fl., *R. Romero et al. 2267* (HUFU, SP). São Roque de Minas, estrada para o retiro das Pedras, 21.III.1996, fl., *J.N. Nakajima & R. Romero 1676* (HUFU); estrada para a Cachoeira dos Rolinhos, 9.I.1998, fl., *R. Romero et al. 4870* (HUFU); estrada para a Serra da Chapada, 8.I.1998, fl., *R. Romero et al. 4807* (HUFU); estrada para o Retiro das Pedras, 18.IV.1997, fl., *J.N. Nakajima et al. 2385* (HUFU, SP); próximo à divisa do parque, 23.II.1997, fl., *R. Romero et al. 3954* (HUFU); 20.IV.1994, fl., *R. Romero et al. 993* (HUFU).

Distribution: It is native and restricted to Brazil, occurs only in Cerrado domain, in the states of Goiás and Minas Gerais (Flora do Brasil 2020, em construção).

Ecology: In Serra da Canastra, *E. goyazensis* was collected in road to Retiro das Pedras, road to Rolinhos waterfall and road to Serra da Chapada, in counties of São Roque de Minas and Sacramento, in physiognomies of 'campo limpo', rocky outcrop, 'campo cerrado', 'campo sujo', 'campo rupestre' and in hydromorphic field.

Recognition: *Evolvulus goyazensis* is easily recognized by erect branches with densely tomentose indumentum with golden trichomes, terminal congested spike-like inflorescences with sessile flowers. Ooststroom (1934) recognized *E. goyazensis* var. *penicillatus* Ooststr. based only on not so dense inflorescence as in typical form, he referred the same collection of Glaziou on both varieties (*Glaziou 21802*), and the holotype of *E. goyazensis* var. *penicillatus* is one of the material of S herbarium (S12-527). We propose the synonymization based on not only this fact, but mainly by the variation observed in the specimens studied from Serra da Canastra, in which inflorescence may variate among more or less dense in the same population or even in the same sample.

The species resembles *E. chapadensis* Glaz., though this one forms dense clump at base, much branched and broader sepals. *Evolvulus tomentosus* (Meisn.) Ooststr. is also quite similar to *E. goyazensis*, which distinguishes in having solitary flowers and flower-bearing leaves not forming a dense cylindric spike, longer internode and broader sepals, whereas *E. goyazensis* has 1-3 flowers and flower-bearing leaves in a dense cylindric spike, shorter internodes and smaller sepals. In herbaria material, there are confusions in identifications between *E. goyazensis* and *E. tomentosus*.

Phenology: The species was found in flower and fruit from December to May. In the remainder of its distribution, it was in flowers from January to March (Siva 2013).

3.5. *Evolvulus lagopodioides* Meisn., in *Flora brasiliensis* 7: 333. 1869. Types: BRAZIL. GOIÁS: Chapada de S. Marcos, *Riedel 2515* (K000613167, NY00319029, NY00319030). MINAS GERAIS: Lagoa Santa, *Lund* s.n. (BR0000005792658).

Fig. 9c-e

Erect herb, 30-40 cm tall; tap root; stem simple or with few branches, 1-2 mm diam., winged, glabrescent or sparse sericeous; internodes 0.6-2 cm long. Leaves narrow-elliptic or lanceolate, 1.1-2 (-2.7) x 0.15-0.25 cm, base decurrent on petiole, apex acute, margin entire, adaxial surface glabrous, abaxial surface sericeous or glabrescent, hyphodromous, veins sulcate in adaxial surface, salient in abaxial surface; petiole winged, 3-5 mm long. Inflorescence multiflorous terminal glomeruliform, globose or elongated; peduncle absent; bracteole subulate or linear, apex acuminate, 4-7 mm long, dense villous; flowers sessile; sepals equal, 3.5-5 x 0.25-0.5 mm, narrow-triangular or subulate, apex acuminate, dense villous; corolla hippocrateriform, blue, 1-1.2 cm, tube 0.5-0.7 cm, limb 0.4-0.5 cm, midpetaline bands sericeous; stamens ca. 4,3 mm, base glabrous, anther basifixed, stamens free at base, inserted ca. 2-3 mm above from the base of corolla, elliptic, 1.5-1.7 mm long; styles 2, free at base, united ca. 2 mm from base, ca. 7 mm total long, stigmas 2, linear, papillose at upper 2/3, ca. 4.5 mm. Capsule globose or ovoid, apiculate, 2-3.5 x 1.75-2 mm, glabrous; seed ellipsoid, brownish, granular, ca. 1.5 x 2 mm.

Examined material: BRAZIL.MINAS GERAIS: Sacramento, Chapadão do Diamante, 11.V.1995, fl., *R. Romero et al. 2175* (HUFU, SP). São Roque de Minas, trilha do córrego da Fazenda, 20.III.1996, fl., *R. Romero & J.N. Nakajima 3369* (HUFU); Chapadão do Diamante, 18.IV.1997, fl., *J.N. Nakajima et al. 2323* (HUFU).

Distribution: Native, the occurrence of this species is only in Brazil, typical of Cerrado domain. It comprises the Distrito Federal and the states of Goiás, and Minas Gerais (Flora do Brasil 2020, em construção).

Ecology: In Serra da Canastra it was found in ‘campo limpo’ frequently associated with rocky outcrop, ‘campo rupestre’, sandy soil and hydromorphic field, sometimes after fire, encompassing Córrego da fazenda trail, Chapadão do Diamante, road to Retiro das Pedras and road of Rio Morto, in county of São Roque de Minas.

Recognition: *Evolvulus lagopodioides* is distinguished by being an erect herb, few branched, glabrous, decurrent leaf-bases, having a glomeruliform, globose or elongated, and congested terminal inflorescence. The species resembles very closely *E. pterygophyllus* Mart. According to Ooststroom (1934) they can be distinguished from each other only by bracts length, which are longer than sepals in *E. pterygophyllus*, and by upper leaves length, which decrease in size in comparison with lower ones in *E. lagopodioides*. The criterion we used to distinguish the

species of Serra da Canastra was the length of upper leaves. In examined material, were found bracts longer and shorter than the sepals in the same inflorescence, so it was not an appropriate character to distinguish these species. *Evolvulus lagopodioides* is also similar to *E. pterocaulon* Moric. and *E. lagopus* Mart., the second differs by having longer and broader leaves, with villous or lanuginose indumentum; the last have lanate or villous indumentum, and leaf base slightly rounded, not distinctly decurrent. All these species belong to the same section Lagopodini Meisn. (Ooststroom 1934).

Phenology: In PNSC it was collected reproductive from February to July.

3.6. *Evolvulus pterygophyllus* Mart., Flora 24 (Beibl 2): 96. 1841. Type: BRAZIL. GOIÁS, 1839, *Pohl s.n.* (BR0000006973162, BR0000006973490, BR0000005949229, M0184583).

Fig. 4f, 6f

Erect herb, little branched above the median portion, 16-30 cm tall; tap root, gemmiferous; stem 1-2 mm diam., winged, glabrescent or appressed-lanate, cinereous, simple trichomes; internodes 0.5-2.2 cm long. Leaves narrow-elliptic or lanceolate, (1.3-) 2-3.1 x 0.2-0.4 cm, base decurrent on petiole, apex acute or acuminate, margin entire, glabrescent or appressed-lanate in both surfaces, more densely in adaxial surface, hyphodromous, veins sulcate in adaxial surface, salient in abaxial surface; petiole winged, 2.5-4 mm long. Inflorescence multiflorous terminal glomeruliform, globose or elongated; peduncle absent; bracteole subulate or linear, apex acuminate, 3-5.6 (-10) mm long, dense villous; flowers sessile; sepals equal, 4-4.5 (-5.8) x 0.25-0.5 mm, narrow-triangular or subulate, apex acuminate, dense villous; corolla hippocrateriform, blue, ca. 1cm, tube 2-4.5 mm, limb 4-7 mm, midpetaline bands sericeous; stamens ca. 6,6-7 mm, base glabrous, anthers basifixed, stamens free at base, inserted ca. 4.5 mm above from the base of corolla, elliptic, 1.3-1.5 mm long; styles 2, free at base, 7-8 mm, stigmas 2, linear, papillose at upper 2/3, 2.5-3 mm. Capsule ovoid, ca. 3 x ca. 2.5 mm, glabrous; seed ovoid, granular, black, ca. 2.5 x ca. 1.5 mm.

Identification key for the varieties *Evolvulus pterygophyllus* in Serra da Canastra

1. Leaves coriaceous, green, glabrous or sparse hairy .... *E. pterygophyllus* var. *pterygophyllus*

1’. Leaves chartaceous, cinereous, glabrescent or appressed-lanate .....

.....*E. pterygophyllus* var. *puberulus*

Examined material: *Evolvulus pterygophyllus* var. *pterygphyllus*. BRAZIL. MINAS GERAIS: São Roque de Minas, Estrada para Cachoeira dos Rolinhos, 14.V.1995, fl., *R. Romero et al. 2288* (HUFU). *Evolvulus pterygophyllus* Mart. var. *puberulus* Meisn. PARNA Serra da Canastra, 14.II.2018, fl., *R.K. Kojima & R.Simão-Bianchini 21* (SP).

Distribution: Species native, restricted to Brazil. It occurs in Caatinga and Cerrado domain, comprising Distrito Federal and Tocantins, Bahia, Goiás, Mato Grosso, Mato Grosso do Sul, Minas Gerais, and rarely São Paulo (Flora do Brasil 2020, em construção).

Ecology: In Serra da Canastra the species was collected only in 'campo limpo' physiognomy, in road to Sacramento, Guarita de Sacramento and road to Rolinhos waterfall, in São Roque de Minas county. In PNSC it was registered both varieties: *E. pterygophyllus* var. *pterygophyllus* was collected in 'campo limpo' on sandy soil, in road to Rolinhos waterfall. *E. pterygophyllus* var. *puberulus* Meisn. was found in 'campo limpo' near to 'campo rupestre' and after burning, in Guarita de Sacramento and road to Sacramento, São Roque de Minas county. There is just one material collected in PNSC of *Evolvulus pterygophyllus* var. *pterygophyllus*, while *E. pterygophyllus* var. *puberulus* is more frequent.

Recognition: *Evolvulus pterygophyllus* can be recognized by decurrent leaf-base, winged petiole and a spicate, dense, congested terminal inflorescence with densely villous sepals. It is similar to *E. pterocaulon*, that can be distinguished by having longer and wider leaves; and *E. lagopus*, which differs by the villose or lanate leaves and the leaves are not distinctly decurrent on petiole. *Evolvulus pterygophyllus* also resembles to *E. lagopodioides*, the differences between them was discussed in the *E. lagopodioides* comments.

Phenology: In PNSC, it was collected in December, January, February and May.

4. *Ipomoea* L., Species Plantarum 1: 159. 1753.

The genus *Ipomoea* is the most diverse of Convolvulaceae, comprising about 650 species, being widely distributed in the tropics, subtropics and temperate regions. The genus has a high ecological and economic importance. The sweet-potato - *I. batatas* (L.) Lam. - is cultivated in more than 100 countries, the most popular tuber consumed all over the world (Austin & Huáman 1996, Austin 1997, Simão-Bianchini 1998, Staples 2019). In Brazil, the genus is the broader one, represented by 146 species, of which 53 are endemic. Representatives

of *Ipomoea* occurs mainly in Cerrado domain and Minas Gerais have 85 species, the state with the highest number of records, which 70 species of them occur in Cerrado (Flora do Brasil 2020, em construção).

Its members are subshrubs, voluble or prostrate herbs, rarely trees (figs. 5e, 6g-h); the indumentum is glabrous or pilose, with simple, malpighiaceous or glandular trichomes, rare stellate (figs. 10a, e); the leaves are entire, cordiform, ovate, oblong, reniform, lobate or palmately compound, sessile or petiole, pseudo-stipule can be present; the inflorescence is dichasium or reduced to just one flower; the corolla is infundibuliform, campanulate, hippocrateriform or tubular, with limb entire or slightly lobate (figs. 5a, e, 6g, i-j); the stamens might be unequal, with two usually distinctly longer than the other three, inserted near the base of the tube, usually included, or equal, and exserted, the filaments are usually hairy at base, and glabrous above; the pollen is spheroidal, pantoporate, echinate (figs. 10c-d); the stigma is capitate or globose (fig. 10f), 1-3 lobes (Silva *et al.* 2018); the capsule is 4-valved (fig. 5c), seed glabrous or pilose (fig. 5d) (Austin & Huáman 1996, Simão-Bianchini 1998, 2009).

Identification key for *Ipomoea* species in Serra da Canastra

1. Erect subshrubs.
   2. Stem lanuginose; compound leaves, 6-8 linear-filiform leaflets ..... 4.6. *I. fiebrigii*
   2’. Stem glabrous, sericeous, lanate or tomentose; entire leaves (linear, linear-filiform, oblong, narrow-ovate or ovate).
      3. Concave sepals, rounded apex.
         4. Stem tomentose to dense sericeous; oblong leaves; crooked trichomes, golden in adaxial surface and silver in abaxial surface; midpetaline bands glabrous .... 4.3. *I. argentea*
         4’. Stem glabrescent or sparse sericeous; linear or narrow-ovate leaves; strigose trichomes on both surfaces; midpetaline bands sericeous ..... 4.2. *I. aprica*
      3’. Flat sepals, acute apex.
         5. Glabrous plants, stem striated; linear-filiform leaves, sessile; corolla 3.1-3.5 cm long.; midpetaline bands glabrous ..... 4.8. *I. pinifolia*
         5’. Lanate or tomentose plants, stem not striated; oblong to ovate leaves, petiolate; corolla 4-6.9 cm long.; midpetaline bands sericeous.
            6. Stem tomentose; ovate or oblong leaves, 6-10.7 x (2-) 3.1-5.2 cm; ovate sepals; corolla pinkish or purplish, tube inner darker ..... 4.12. *I. verbasciformis*

6’. Stem lanate; ovate leaves, 4.2-6.5 x 2-2.8 cm; narrow-triangular sepals; corolla pinkish, tube in the same color..... 4.9. *I. pohlii*

1’. Prostrate or voluble herbs.

7. Glabrous leaves, trichome sparse in the vein on *I. campestris*; midpetaline bands glabrous or with few trichomes at the apex.

8. Narrow-ovate or lanceolate leaves; short petiolate (1-4 mm) ..... 4.4. *I. campestris*

8’. Linear, narrow-elliptic or ovate leaves; long petiolate (4-15 mm).

9. Linear or narrow-elliptic leaves with attenuate base; rugose sepals..... ..... 4.10. *I. procumbens*

9’. Ovate leaves with cordate or oblique base, slightly asymmetric; verrucose sepals .... 4.11. *I. procurrens*

7’. Sericeous, hirsute or villous leaves, rare glabrescent; midpetaline bands sericeous.

10. Leaves, bracteoles and sepals hirsute ..... 4.1. *I. acutisepala*

10’. Leaves, bracteoles and sepals villous or sericeous

11. Narrow-ovate, entire or slightly trilobate leaves; ovate sepals with cuneate or acute apex, 7-9.1 mm long.; corolla pink, tube in the same color ..... 4.5. *I. delphinioides*

11’. Ovate or elliptic leaves; subulate sepals with acute or acuminate apex, 11-15 mm long.; corolla light pink, tube inner dark pink ..... 4.7. *I. langsdorffii*

4.1. ***Ipomoea acutisepala*** O'Donell, Lilloa 23: 478, t. 8. 1950. Type: ARGENTINA. MISIONES, Dep. San Ignacio, Santo Pipó, 3.XI.1947, *G.J. Schwarz 5098* (LIL001225, P00622213).

Prostrate herb, latex present; root not seen; stem 1.5-2.5 mm diam., up to 100 cm long., hirsute, simple trichomes, golden, ca. 3 mm; internodes 3-4.8 cm long. Leaves elliptic, 6-7 x 3.5-4 cm, base rounded or cuneate, apex acute or obtuse, mucronate, margin entire, smooth, hirsute in both surfaces, trichomes 0.5-1.5 cm long, brochidodromous, veins inconspicuous in adaxial surface, salient in abaxial surface; petiole 0.4-0.8 cm long. Inflorescence of 1-3 flowered axillary dichasium; peduncle primary 5-13.5 cm long, secondary absent; bracteole lanceolate, apex acuminate, caducous, 4-10 mm long, hirsute; pedicel 0.8-1.5 cm long., pubescent; sepals unequal, outer 12-17 x 2-3 mm, ovate-lanceolate, inner 10-13 x 3-4 mm, ovate, apex acute or acuminate, dorsally hirsute, denser at base and apex, ventrally glabrous or sericeous at central portion, margin hyaline; corolla infundibuliform, purple, lilac or pinkish, (4.5-) 6-8 cm, tube (1.5-) 2-2.5 cm, limb 3.5-4 cm, midpetaline bands sericeous; stamens longer 14-16 mm, shorter

1-12 mm, base villous, anthers basifixed, elliptic, 4-6 mm long; style 2-25 mm long, stigmas 2, globose. Capsule not seen.

Examined material: BRAZIL. MINAS GERAIS: São Roque de Minas, torre de observação, estrada para Sacramento - São Roque de Minas, 11.I.1998, fl., *R. Romero et al. 5001* (HUFU); estrada para garagem de Pedras, 09.XII.1994, fl., *J.N. Nakajima & R. Romero 738* (HUFU).

Distribution: It occurs in Argentina, Brazil (Ferreira & Mioto 2009), and Paraguay. In Brazil, *I. acutisepala* is a native species, occurring in Cerrado and Pampa domain, encompassing Mato Grosso do Sul, Minas Gerais, São Paulo, Paraná, Rio Grande do Sul, and Santa Catarina (Flora do Brasil 2020, em construção).

Ecology: In Serra da Canastra it was collected only at two places in São Roque de Minas county (Torre de observação and Garagem de Pedras), physiognomies of 'campo sujo' and 'campo limpo', sometimes after burning.

Recognition: *Ipomoea acutisepala* is recognized by prostrate habit, hirsute indumentum and sepals with acuminate apex. Leaves can variate to entire or 3-5 lobate (O'Donell 1950b). In PNSC all specimens collected have only entire leaves.

The species belongs to a complex that have very close morphological characters with broad variation and formation of intermediates, rarely forming fruits. These factors suggest hybrid origin (Simão-Bianchini 1998). It is very similar to *I. megalantha* J.R.I. Wood & Scotland, but differs from it by having longs trailing stems, usually branched inflorescence (1-3 flower), shorter corolla, shorter sepals and shorter, caducous bracteoles; while *I. megalantha* has shorter stems, solitary flowers, longer corolla (9 cm). *Ipomoea acutisepala* also resembles *I. hirsutissima,* which differs by the erect habit, and always entire leaves, whereas *I. acutisepala* may have entire and trilobate leaves also in the same individuals. *Ipomoea delphinioides* Choisy can be confused to *I. acutisepala*, but differs from it by the short villous indumentum, whereas *I. acutisepala* has hirsute indumentum. In PNSC all specimens observed have entire leaves.

Phenology: It was collected with flowers in December and January.

4.2. *Ipomoea aprica* House, Annals of the New York Academy of Sciences 18: 243. 1908. Type: BRAZIL. 1829, *Pohl s.n.* (M0184918, BR0000006972868).

Fig. 6g

Erect subshrub, latex absent, 40-150 cm tall; root tuberous; stem 1.5-2.5 mm diam., sparse sericeous or glabrescent, strigose trichomes; internodes 1-2.2 cm long. Leaves linear or narrow-ovate, 5.3-13.7 x 0.3-0.5 cm, base cuneate, base of abaxial surface with a couple of extrafloral

nectaries, not observed in all leaves, apex acute or acuminate, margin entire, sericeous or glabrescent in both surfaces, strigose and glandular trichomes, brochidodromous, veins inconspicuous in adaxial surface, salient in abaxial surface; petiole 1-2 mm long. Inflorescence of 2 -24 flowered axillary racemiform dichasium,; peduncle primary 0.5-2 cm long, secondary 0.1-0.2 cm long; bracteole ovate or lanceolate, apex acute, 2.5-3 mm long, sericeous; pedicel 0.3-1 cm long, sericeous; sepals subequal, outer 5.6-6.2 x 4.3-4.5 mm, inner 5.3-7.3 x 3.5-4.5 mm, ovate, concave, apex rounded, rarely acute, strigose, extrafloral nectaries 5, alternating to outer sepals, magin vinaceous; corolla campanulate-infundibuliform, pinkish, 4-5 cm, tube 1.5-2 cm, limb 2.5-3 cm, midpetaline bands sericeous; stamens longer 19-2 mm, shorter 13-15 mm, base villous, anthers basifixed, elliptic, 4.1-5.2 mm long; style 2-23 mm long, stigmas 2, globose. Capsule ovoid, 8-9 x 7-8 mm, sericeous; seed ellipsoid, brown, lanuginose at sides, trichomes simple, long, golden, ca. 3 mm long., 4.8-5.2 x 2.1-2.3 mm.

Examined material: BRAZIL. MINAS GERAIS: São Roque de Minas, PARNA Serra da Canastra, 11.II.2018, fl. and fr., *R.K. Kojima & R. Simão-Bianchini 10* (SP); 12.II.2018, fl., *R.Simão-Bianchini & R.K. Kojima 2190* (SP).

Distribution: Native in Brazil and characteristic of Cerrado species, rarely occurs in Paraguay and Bolivia (Wood *et al.* 2015).

Ecology: In Brazil, it was registered in Distrito Federal, Tocantins, Goiás, Mato Grosso, Minas Gerais, and São Paulo. In Serra da Canastra, *I. aprica* was collected at Serra da Babilônia and upside and trail to upside of Casca D'Anta waterfall and road to Serra da Chapada, in 'campo limpo' physiognomy, sometimes associated to sandy soil and rocky outcrop.

Recognition: *Ipomoea aprica* may have erect or rare prostrate habit, reaching 1.5 m tall (Simão Bianchini 1998), in PNSC it was observed only erect individuals. *Ipomoea aprica* differs from *I. campestris* Meisn. by narrow-oblong to linear leaves and ovate sepals with round apex, while the last species has ovate, narrow-ovate or lanceolate leaves, sometimes trilobate, and bigger sepals with acute apex. It can also be confused to *I. procumbens* Mart. ex Choisy, that differs by the voluble habit, glabrous leaves, verrucose stem and unequal sepals. *Ipomoea aprica* is also similar to *I. pinifolia* Meisn. by the linear leaves, but it distinguishes by the caducous and glabrous leaves, and unequal sepals.

Phenology: In PNSC *I. aprica* was collected reproductive in January, February and April. In the southeastern Region of Brazil, it blooms over the months of December to April (Simão-Bianchini 1998). In Serra do Ouro Branco, flowers were collected in January and fruits in September (Rodrigues-Lima 2017).

4.3. *Ipomoea argentea* Meisn., in Martius, *Flora Brasiliensis* 7: 247. 1869. Types: BRAZIL. *Prov. Piauhy et Goyaz*, 1844, *Gardner 3356* (BR0000005837519, K000612798); VENEZUELA. Prope Maypures, ad flumen Orenoco, *R. Spruce 3605* (BR0000005796137, K000612882, NY00319143, P03560661).

Fig. 10a

Erect subshrub, latex not seen, ca. 90 cm tall; root not seen; stem 2-7 mm diam., dense sericeous to tomentose, long, simple, crooked, and golden trichomes; internodes 1.2-2.6 cm long. Leaves oblong, 5.5-7.5 (-9.5) x 2.5-3.5 (-5.5) cm, base acute or slightly asymmetric, apex attenuate or obtuse, mucro 0.5-1 mm, margin entire or irregularly wavy, discolor, dense sericeous in adaxial surface with golden trichomes, dense tomentose in abaxial surface with silver trichomes, golden trichomes in veins region, brochidodromous, veins sulcate in adaxial surface, salient in abaxial surface; petiole 2-5 mm long. Inflorescence of 1-5 flowered axillary dichasium; peduncle primary 0.2-2.3 cm long, secondary 0-0.05 cm long; bracteole lanceolate or subulate, apex acute or acuminate, (5-) 7-14 mm long, tomentose; pedicel 1-10 mm long, tomentose; sepals subequal, outer 7-10 x 4-6 mm, inner 10-11 x 3-5 mm, ovate, concave, apex rounded, coriaceous, bright, inner sepals glabrous, outer sepals tomentose at least in base, glabrous ventrally; corolla infundibuliform, lilac or pinkish, outer of tube darker, 5-6 (-7.2) cm, tube 2-2.5 (-3) cm, limb 2.5-3.5 (-4) cm, midpetaline bands glabrous; stamens longer 15-16 mm, shorter 2-22 mm, base villous, anthers basifixed, elliptic, 5-6 mm long; style 21-23 mm long, stigmas 2, globose. Capsule ovoid or ellipsoid, 6-7 x 5-6 mm, glabrous; seed ellipsoid, black, trichomes long, golden, concentrated at apex and sides, ca. 5 mm long., 3.5-4.5 x 3.5-4.5 mm.

Examined material: BRAZIL. MINAS GERAIS: São Roque de Minas, 16.II.2000, fl., *R.C. Mota 137* (BHCB, SP); 12.I.1995, fl., *R. Romero et al. 1772* (HUFU).

Distribution: *Ipomoea argentea* is a very characteristic species of Cerrado and is native Brazil, extending to Paraguay, Venezuela, and Colombia (Wood *et al.* 2015). In Brazil, it was registered in Mato Grosso, Mato Grosso do Sul, Goiás, Distrito Federal, Minas Gerais, São Paulo and Paraná (Flora do Brasil 2020, em construção).

Ecology: In Serra da Canastra, it was found in ‘campo limpo’ and ‘campo sujo’ physiognomies, locality of Garagem das Pedras, São Roque de Minas county.

Recognition: *Ipomoea argentea* is characterized in being a perennial subshrub, having oblong leaves with densely sericeous-tomentose indumentum, golden trichomes and coriaceous, shiny sepals, the external ones tomentose in the base. Wood *et al.* (2015) recognized two forms of this species, sericeous and tomentose forms, citing to Brazil only tomentose form. In materials analyzed in Serra da Canastra we observed that the indumentum in adaxial surface is sericeous-

tomentose and in abaxial surface is tomentose. *Ipomoea marabensis* D.F. Austin & Secco is a morphologically similar species, differing in having herbaceous and climbing habit and flowers arranged in lateral of branches. In Serra da Canastra, *I. argentea* resembles *I. verbasciformis* but differs in oblong leaves, shorter peduncles (0.2-2.3 cm long) and subequal sepals, rounded apex in *I. argentea*, whereas *I. verbasciformis* has ovate to oblong leaves, generally longer peduncles (3.5-6.5 cm long), external sepals slightly bigger than inner ones, acute apex.

Phenology: In PNSC, it was collected in flower in January and February. In the remainder of its distribution, it flowers over the months of October and November, occasionally may flower at other times (Wood *et al.* 2015).

4.4. *Ipomoea campestris* Meisn., in Martius, *Flora Brasiliensis* 7: 254. 1869. Types: BRAZIL. MINAS GERAIS: Lagoa Santa, *J.E.B. Warming s.n.* (NY00319164).

Prostrate herb, latex not seen, ca. 15 cm long; root not seen; stem 1-1.5 cm diam., sparse trichomes, verrucose; internodes 1.1-3.4 cm long. Leaves narrow-ovate or lanceolate, entire or slightly lobate, 3.5-4.7 x -9-1.1 cm, base rounded or obtuse, apex acute, margin entire or irregularly wavy, glabrous in both surfaces, with just a few trichomes in veins region, brochidodromous, veins more salient in abaxial surface than in adaxial surface; petiole 1-4 mm long. Inflorescence of 1-2 flowered axillary dichasium; peduncle primary 1.1-2.3 cm long, secondary absent; bracteole narrow-triangular or lanceolate, apex acute or acuminate, 3.5-6 mm long, glabrous or sparse pilose; pedicel 5-6 mm long, sparse trichomes; sepals unequal, outer 8-9 x 3-4.5 mm, inner 9-11 x 3-6 mm, ovate, apex acute, glabrous or sparse sericeous in center, margin hyaline; corolla infundibuliform, pinkish, 4.5-6.7 cm, tube 2.-3.2 cm, limb 2.5-3.2 cm, midpetaline bands glabrous or with few trichomes at the apex; stamens longer 17-18 mm, shorter 11-12 mm, base villous, anthers basifixed, elliptic, 4.5-5 mm long; style 17-18 mm long, stigmas 2, globose. Capsule not seen.

Examined material: BRAZIL. MINAS GERAIS: São Roque de Minas, morro após o córrego dos Passageiros, I.1998, fl., *R. Romero et al. 4956* (HUFU); Parque Nacional da Serra da Canastra, estrada São Roque de Minas - Sacramento, I.1995, fl., *R. Romero et al. 1738* (HUFU).

Distribution: It is native, occurs only in Brazil and is characteristic of Cerrado domain. It encompasses Distrito Federal, Tocantins, Goiás, Mato Grosso, Mato Grosso do Sul, Minas Gerais, São Paulo, and Paraná (Flora do Brasil 2020, em construção).

Ecology: In Serra da Canstra, it was found in ‘campo rupestre’ physiognomy, after burning, in São Roque de Minas county.

Recognition: *Ipomoea campestris* can be distinguished by erect or prostrate habit, long corolla, reaching 6.7 cm, and pubescent to sparse pubescent indumentum. It is close to *I. procumbens* that differs by having glabrous, verrucose stem and unequal sepals. It is also related to *I. aprica*, which has erect habit and smaller, ovate, concave sepals. *Ipomoea attenuata* J.R.I. Wood & Scotland and *I. ensiformis* J.R.I.Wood & Scotland may be also confused to *I. campestris.* Although they have similar leaves, *I. attenuata* has longer sepals with long attenuate apex and racemiform inflorescence, while *I. campestris* has shorter sepals with acute apex and shorter inflorescence; *I. ensiformis* is a glabrescent plant and with leaves apex obtuse; in *I. campestris*, the indumentum is sparse pubescent and leaves apex is acute. *Ipomoea queirozii* J.R.I. Wood & L.V. Vasconc. is also related to *I. campestris*, but is immediately distinguished by glabrous corolla and sepals.

Ipomoea campestris had *I. hirsutissima* Gardner as synonym by Austin *et al.* (2015), but differs in having long spreading and rough trichomes covering vegetative parts and midpetaline bands, and in very acute to acuminate apex of sepals.

Phenology: In Serra da Canastra, *Ipomoea campestris* was collected in flower in January. In Serra do Cipó (Minas Gerais) it flowers over the months of December and February (Simão-Bianchini & Pirani 1997).

4.5. *Ipomoea delphinioides* Choisy, Mémoires de la Société de Physique et d'Histoire Naturelle de Genève 8(1): 53. 1838. Type: BRAZIL. SÃO PAULO: Taubaté, 1835, *Lund 771* (G00135575).

Fig. 6h

Prostrate herb, latex absent, ca. 100 cm long; root tuberous; stem 2-2.5 mm diam., villous, long, simple trichomes; internodes 1.5-3.5 (-4) cm long. Leaves narrow-ovate or slightly trilobate, 5.5-9.5 x 1.1-2.2 cm, base attenuate or rounded, apex obtuse or rounded, mucro 0.5-1 mm, margin entire, glabrescent or sericeous in both surfaces, brochidodromous, veins salient in abaxial surface; petiole (3-) 5-10 mm long. Inflorescence of 1-3 flowered axillary dichasium; peduncle primary 1.1-3.2 cm long, secondary 0-0.1 cm long; bracteole lanceolate or subulate, apex acute or acuminate, (1.5-) 4-8 (-16) mm long, villous; pedicel 3-5 mm long, villous; sepals equal or slightly unequal, outer 7-9.1 x 4-4.7 mm, inner 8-8.5 x 3.8-4 mm, ovate, apex cuneate or acute, villous, inner sepals with silver trichomes, extrafloral nectaries 4-5, alternating to outer sepals; corolla campanulate-infundibuliform, pinkish, 3.5-5 cm, tube 2-2.5 cm, limb 2-3 cm, midpetaline bands sericeous; stamens longer 19-21 mm, shorter 1-12 mm, base villous, anthers

basifixed, elliptic, 2-3 mm long.; style 12-13 mm long., stigmas 2, globose. Capsule globose, ca. 9 x 10-11 mm, glabrous; seed ellipsoid, brownish, velutinous, trichomes short, golden, 0.5-1 mm long., ca. 4 x 3 mm.

Examined material: BRAZIL. MINAS GERAIS: Delfinópolis, PARNA Serra da Canastra, 13.II.2018, fl., *R.K. Kojima & R.Simão-Bianchini 17* (SP).

Additional examined material: BRAZIL. SÃO PAULO: Franco da Rocha, Parque Estadual do Juquery, campo limpo após queimada, 24.X.2002, fl., *J.B. Baitello 1241* (SPSF).

Distribution: Native species, occurs in Paraguay and Brazil, in Goiás, Minas Gerais, São Paulo, Paraná, Santa Catarina and Rio Grande do Sul, in Cerrado and Atlantic Rainforest (Ferreira & Miotto 2009, Flora do Brasil 2020, em construção).

Ecology: In Serra da Canastra, is was collected in 'campo rupestre' physiognomy, locality of Serra da Babilônia, in county of Delfinópolis. The species is considered rare in PNSC due to just one record. Visitation in these high altitudes places is very dificult.

Recognition: The species is recognized by prostrate habit, entire, trilobate to 5-lobate leaves (Simão-Bianchini 1998), villous indumentum, persistent sepals and bracteoles persistent in capsule. In PNSC, the specimen found has narrow-ovate, entire leaves and slightly trilobate leaves. It resembles *I. acutisepala*, which differs by having hirsute indumentum. Also, it can be confused to *I. malvaeoides* Meisn., that has erect habit, narrower leaves and dense indumentum, and to *I. uruguayensis* Meisn., which distinguishes by tomentose indumentum and always entire leaves. *Ipomoea delphinioides* is also similar to *I. campestris*, which differs by sparse trichomes in whole plant, whereas *I. delphinioides* is villous. The similarity of studied species and *I. campestris* was appointed by Simão-Bianchini (1998), citing that these species might be hybrids.

Phenology: In PNSC, *I. delphinioides* was observed in flower in February. In southeastern Region of Brazil, the species flowers over the months of September to June, with peak of flowering and fruiting among November to January (Simão-Bianchini 1998). In Serra do Ouro Branco, it was collected in January, April and September (Rodrigues-Lima 2017).

4.6. *Ipomoea fiebrigii* Hassl. ex O'Donell, Lilloa 14: 169. 1948. Type: PARAGUAY. ALTO PARANA: *In regione fluminis Parana*, 1909/10, *K. Fiebrig 5675* (LIL001244, SI001299, US00111391).

Fig. 10b

Erect subshrub, latex not seen, ca. 40 cm tall; root not seen; stem 2-2.5 mm diam., lanuginose; internodes 1-2.1 cm long. Leaves compound, 6-8 leaflets linear-filiform, leaflets 2.7-3.4 x 0.05-0.1 cm, base acute, apex acute or spatulate, margin entire, glabrous in adaxial surface, sparse pilose in abaxial surface, glandular trichomes, hyphodromous, veins inconspicuous in both surfaces; petiole 2.5-5 mm long. Inflorescence of 1-3 flowered axillary dichasium; peduncle absent; bracteole lanceolate, apex acute or acuminate, ca. 1.5 mm long, sparse trichomes; pedicel 2-3.5 m long, pubescent; sepals unequal, outer 7-8 x 3.5-4 mm, inner 9-10 x 4.5-5.5 mm, ovate, apex acute, mucronulate, sparse pubscent, hyaline margin, extrafloral nectaries 4-6, alternating to outer sepals; corolla infundibuliform, purple or magenta, 4-6.3 cm, tube 1.8-3 cm, limb 2.2-4.5 cm, midpetaline bands sericeous; stamens longer 21-22 mm, shorter 18-19 mm, base villous, anthers basifixed, elliptic, ca. 5 mm long; style ca. 2.7 cm long, stigmas 2, globose. Capsule globose, 5-7 x 5-6 mm, glabrous; seed ellipsoid, brownish, sericeous, trichomes long at sides, golden, ca. 1.5 mm long., 3-4 x 2-3 mm.

Examined material: BRAZIL. MINAS GERAIS: São Roque de Minas, 21.XI.1998, fl., *M.A. Farinaccio 183* (HRCB); estrada São Roque - Sacramento, próximo à nascente do rio das Velhas, 22.XI.1996, fl., *R. Romero & J.N. Nakajima 3817* (HUFU); estrada para a Serra da Chapada, 8.I.1998, fl., *R. Romero et al. 4796* (HUFU).

Additional examined material: BRAZIL. GOIÁS: Alto Paraiso de Goiás, 3.II.1979, fl., *Gates & Estabrook 106* (CEN, NY, SP); 15.VII.1987, fl., *C.B. Toledo et al. 121* (SP, SPF); estrada para Colinas, 900m alt., 7.II.1987, fl., *J.R. Pirani et al. 1765* (K, SP, SPF).

Distribution: A characteristic species of Cerrado, occurs in Paraguay (O'Donell 1948, Wood & Scotland 2017), and Brazil, comprising Distrito Federal, Mato Grosso do Sul, Goiás, and Minas Gerais (Flora do Brasil 2020, em construção).

Ecology: In Serra da Canastra, the species was collected in 'campo limpo' physiognomy, in São Roque de Minas county.

Recognition: *Ipomoea fiebrigii* is recognized in being an erect subshrub, with lanuginose indumentum, compound leaves furnished with linear leaflets. It differs from *I. angustissima* by the lanuginose indumentum, ovate sepals with mucronulate apex (7-10 mm long.) and axillary inflorescence formed of 1-3 flowers. In contrast, *I. angustissima* has sericeous indumentum, widely ovate sepals (5-8 mm long.) and terminal or subterminal inflorescence formed by up to 20 flowers (following the original description). *Ipomoa fiebrigii* also resembles *I. itapuaensis* J.R.I. Wood & R. Degen, that is readily distinguished by the longer peduncles, which not exceed 5 mm length in *I. fiebrigii*, and by glabrous to thinly pubescent indumentum.

Wood & Scotland (2017) cited that *I. fiebrigii* is restricted to Paraguay, it has only ever been found in Alto Paraná Department in Paraguay (*Fiebrig 5675*; *Fiebrig 6706*; *Itaipú Binacional 1081*). They state that materials of Brazil were mistakenly identified as *I. fiebrigii.* and so, they proposed a new species to Brazil, *I. angustissima* J.R.I. Wood & Scotland, with occurrence only in Goiás, in Chapada dos Veadeiros and Minas Gerais, in Serra da Canastra (*R. Romero et al. 4796*), at altitudes between 1000 and 1600 m. However, with careful analysis of the material, we concluded that species referenced to Serra da Canastra actually is *I. fiebrigii*, as here we referred.

Phenology: In PNSC *I. fiebrigii* was observed in flower in January and November.

4.7. *Ipomoea langsdorffii* Choisy, in De Candolle, Prodromus 9: 368. 1845. Type: BRAZIL. "RIO DE JANEIRO": 1821, *Langsdorff s.n.* (P03560903).

Fig. 5a-b, 6i

Prostrate herb, latex absent, ca. 100 cm long; root not seen; stem 1-2 mm diam., villous, long, simple trichomes; internodes (2.7-) 3.3-5 (-10.7) cm long. Leaves ovate or elliptic, 5.3-8.5 x 2.2-4.2 cm, base rounded, apex obtuse or rounded, margin entire, villous in both surfaces, denser in abaxial surface, glandular trichomes, eucamptodromous, veins sulcate in adaxial surface, salient in abaxial surface; petiole 0.5-2.2 cm long. Inflorescence of 1-4 flowered axillary dichasium; peduncle primary 1-3.7 (-4.5) cm, secondary 0-0.4 cm; bracteole subulate or linear, apex acute or acuminate, 0.9-2.2 cm long, villous; pedicel 3-7 mm long., villous; sepals equal or subequal, outer 12-15 x 3-5 mm, inner 11-12 x 3-4 mm, subulate, apex acute or acuminate, villous; corolla campanulate-infundibuliform, pinkish, inner of tube darker, (3-) 3.5-4.3 (-5) cm, tube 1.5-2 cm, limb (1.5-) 2-2.5 cm, midpetaline bands sericeous; stamens longer 15-16 mm, shorter 12-14 mm, base villous, anthers basifixed, oblong, 4-4.8 mm long; style 0.8-1.1 cm long, stigmas 2, globose. Capsule ovoid, 7-8 x 7-8 mm, glabrous; seed ellipsoid, black, with sparse trichomes only at apex, ca. 15 mm long, 4-5 x ca.2 mm.

Examined material: BRAZIL. MINAS GERAIS: Delfinópolis, PARNA Serra da Canastra, 13.II.2018, fl., *R.K. Kojima & R. Simão-Bianchini 19* (SP). São Roque de Minas, 16.II.2000, fl., *R.C. Mota 151* (BHCB); 19III1996, fl., *R. Romero & J.N. Nakajima 3326* (HUFU).

Distribution: The species is native and restricted to Brazil. It was registered in Cerrado of Central Brazil with confirmed records only from Minas Gerais. Wood & Scotland (2017) considered that location recorded at holotype material, Rio de Janeiro, as unlikely.

Ecology: In Serra da Canastra, *I. langsdorffii* is of very rare occurrence with only two records in not yet regularized area. It was collected in 'campo limpo' and 'campo rupestre' physiognomies, locality of Serra da Babilônia, in São Roque de Minas county.

Recognition: *Ipomoea langsdorffii* distinguishes in being prostrate or climbing villous herb, leaves distinctly petiolate, and persistent subulate to linear bracteole. It resembles *I. burchellii* Meisn. by subulate sepals with similar size and sericeous midpetaline bands, which can be distinguished by the most conspicuous leaves venation and leafy thyrse inflorescence (Simão-Bianchini 1998).

The name *Ipomoea langsdorffii* Choisy was discussed was related to a long nomenclatural problems history involving *I. patula* Choisy and *I. monticola* (Meisn.) O'Donell (Wood & Scotland 2017). The type material that was designated to *I. patula* ("Brasilia" [almost certainly Africa], sin. data [lectotype P00434156]) is actually a species from Africa, *I. crassipes* Hook. This species has dimorphic, lanceolate leaves, about 2 cm long, lanceolate bracteoles and corolla measuring about 3 cm long, and this name was used to some materials collected in Brazil (Meissner 1869).

Using one of the varieties proposed by Meissner (1869) to *I. patula* which was based on the Martius collection (Brazil, Minas Gerais, Vila Rica, *Martiu's obs. 788* - holotype M0185028), this new name was proposed to *I. elegans* Meisn. (O'Donell1953). The original description of *I. monticola* and *I. langsdorfii* show that both species have similar leaves, longer than 2 cm long., corolla longer than 3 cm long. and bracteoles linear, constituting a synonym of *I. langsdorffii* (Wood & Scotland 2017).

Phenology: *Ipomoea langsdorffii* was collected with flower in February.

4.8. *Ipomoea pinifolia* Meisn., in *Flora brasiliensis* 7: 250. 1869. Type: BRAZIL. 1867, *Burchell 6700-7* (BR0000005837731).

Fig. 5c-d, 6j

Erect subshrub, latex absent, 30-150 cm tall; root not seen; stem 1-2 mm diam., glabrous, verrucose, sparse simple trichomes, glandular trichomes; internodes (0.3-) 0.6-1.2 cm long. Leaves linear-filiform, 1.5-7.6 x 0.05-0.1 cm, base truncate, apex acuminate, margin revolute, glabrous in both surfaces, striate, with glandular trichomes, hyphodromous, veins inconspicuous; petiole sessile. Inflorescence of 1-3 flowered axillary dichasium; peduncle primary 0-10 mm long, secondary absent; bracteole triangular or narrow-triangular, apex acute, caducous, 1-2 mm long, glabrous; flowers sessile; sepals unequal, outer 3.5-5 x 2-2.5 mm, inner

5.5-7 x 3 mm, ovate, flat, apex acute, glabrous, coriaceous, striate, verruculose, apex vinaceous; corolla campanulate-infundibuliform, pinkish, 3.1-3.5 cm, tube 1.2-1.5 cm, limb 1.6-1.9 cm, midpetaline bands glabrous; stamens longer 13-14 mm, shorter 11-12 mm, base villous, anthers basifixed, elliptic, 2-2.5 mm long; style ca. 1.5 cm long., stigmas 2, globose. Capsule globose, 7-12 x 8-10 mm, verruculose; seed ellipsoid, brown, lanuginose, 3.5-4 mm long., ca. 8 x ca. 5 mm.

Examined material: BRAZIL. MINAS GERAIS: Delfinópolis, Chapadão da Babilônia, 26.VI.1997, fl., *J.N. Nakajima et al. 2590* (HUFU, SP); Parque Nacional da Serra da Canastra, Trilha do Zé Carlinho, subida para Serra do Cemitério, 9.X.2002, fl., *J.N. Nakajima et al. 3225* (HUFU, UB); Condomínio de Pedras, 28.XI.2003, fl., *R. Romero et al. 7019* (HUFU).

Distribution: It is native and has common occurrence in Brazil, comprising Distrito Federal, Tocantins, Mato Grosso, Mato Grosso do Sul, Goiás, and Minas Gerais (Flora do Brasil 2020 em construção). It was registered also in Bolivia (Wood *et al.* 2015).

Ecology: In PNSC, it was collected in 'Trilha do Zé Carlinho', 'Trilha da Escada de Pedras', 'Condimínio de Pedras', these localities in Delfinópolis county, and near to Santo Antônio river valley, in São Roque de Minas county. The species was found only in physiognomy of 'campo rupestre'.

Recognition: *Ipomoea pinifolia* may be recognized for being a climbing herb or erect subshrub, wiry perennial of Cerrado, occasionally leafless, and outstanding pink corolla (Wood *et al.* 2015). The species is similar to *I. squamisepala* O'Donell, which differs by having only erect subshrub habit, linear-oblong, oblong-elliptic or oblanceolate leaves, while in *I. pinifolia* the individuals are climbing or erect, leaves are always filiform-linear, with larger pink corolla and larger inner sepals. *Ipomoea schomburgkii* Choisy (=*I. graminiformis* Meisn.) resembled *I. pinifolia*, but distinguishes in being always an erect subshrub. The species also resembled *I. aprica*, the differences between them was discussed in *I. aprica* comments. *Jacquemontia densifolia* (Chodat & Hassl.) Hassl. was considered as *I. graminiformis* Choisy var. *densifolia* Chodat & Hassl. Although visual similarity to *I. pinifolia*, *J. densifolia* has outer sepals longer than inner ones.

O'Donell (1950a) noticed that in *I. squamisepala* apical portion of outer sepals is caducous, and basal portion get rounded or truncate form. Simão-Bianchini (1998) cited this pattern, i.e. distal third portion of outer sepals caducous also to *I. pinifolia*, pointing surely that this both species have a common ancestor.

Phenology: In PNSC, *I. pinifolia* was observed in flower in June and in fruit in October and November. In Bolivia, it was collected with flower in May (Wood *et al.* 2015).

4.9. *Ipomoea pohlii* Choisy, Prodromus Systematis Naturalis Regni Vegetabilis 9: 355. 1845. Type: BRAZIL. BAHIA: *Serra Urubú*, 1839, *Pohl s.n.* (BR0000005307050; BR0000005307708, B† photo, F0BN013815, SP!; M0184991).

Fig. 5e-h, 10c-d

Erect subshrub, latex not seen, 30-50 (-150) cm tall; root not seen; stem 3-5 mm diam., lanate; internodes 0.8-3.5 cm long. Leaves ovate, 4.2-6.5 x 2-2.8 cm, base rounded or cordate, apex acute or acuminate, margin entire, lanate on both surfaces, discolor, abaxial surface cinereous, eucamptodromous, veins inconspicuous in adaxial surface, salient in abaxial surface; petiole 0-5 mm long. Inflorescence of solitary flowers terminal and axillary dichasium; peduncle absent; bracteole lanceolate, apex acute or acuminate, 1.6-2.3 cm long, lanate; pedicel 1-2 mm long, lanate; sepals unequal, inner 14-15 x 4-7 mm, narrow-triangular, flat, apex acute, outer 15-18 x 4-6 mm, lanate, flat, the most inner ones sometimes glabrous at the base; corolla infundibuliform, pinkish or purplish, 4-6.9 cm, tube 1.6-3.5 cm, limb 2.2-3.2 cm, midpetaline bands sericeous; stamens longer ca. 29-3 mm, shorter 2-22 mm, base villous, anthers basifixed, twisted after anthesis, elliptic, 4-4.5 mm long; style 2.1-2.2 cm long, stigmas 2, globose. Capsule not seen.

Examined material: BRAZIL. MINAS GERAIS: São Roque de Minas, próximo à Cachoeira dos Rolinhos, 21.XI.2002, fl., *P.C. Duarte et al. 163* (HUFU, SP); 21.XI.2002, fl., *R. Romero et al. 6633* (HUFU, SP); 21.XI.2002, fl., *P.C. Duarte et al. 167* (HUFU, SP); 21.XI.2002, fl., *R.A. Pacheco et al. 452* (HUFU, SP).

Distribution: It is native, characteristic of Cerrado and restricted to Brazil, with records to Bahia and Goiás (Flora do Brasil 2020, em construção). *Ipomoea pohlii* is rare, with just few records and here is the first time cited to Minas Gerais.

Ecology: The specimens were collected in only one locality at the Park, near to Rolinhos waterfall, in São Roque de Minas county, growing in ‘campo limpo’ physiognomy.

The material referred by Choisy (1845) in the protologue is *Brasilia ad Serra Uruba legit Pohl (v.s. in h. Mart.),* although he cited only the collection of M, there were some other specimens that are certainly duplicates, because the Pohl collection has no date, only the year. So, we are considering here all the materials of *I. pohlii* noted *Pohl s.n.* as isotype material, while the holotype must be the material from the *Herbarium Martii*, according to protologue in Choisy’s Prodromus (fig. 2).

Recognition: *Ipomoea pohlii* is recognized by the erect subshrub habit, lanate indumentum in whole plant, ovate leaves with acute to acuminate apex, narrow-triangular sepals, outer ones slightly longer than inner ones, solitary sessile flowers, concentrating in distal portion of

branches. In specimens of Serra da Canastra, anthers might be spiraling, not observed in all flowers. It is an unusual character in *Ipomoea* but very common in *Distimake*. It resembles *I. haenkeana* Choisy by the erect habit, dense indumentum and discolor leaves, it is distributed in the Midwest of Brazil and in Minas Gerais, also in Bolivia (Flora do Brasil 2020, em construção; Wood *et al.* 2015). It differs from Serra da Canastra species in oblong-obovate leaves, inflorescence in dense cymes, pedicellate flowers and oblong-ovate sepals. In PNSC, *I. pohlii* is similar to two species also characteristics of Cerrado, *I. verbasciformis*, which distinguishes by ovate to oblong leaves, acute, not acuminate apex, longer internodes (1.5-4 cm long.), ovate sepals and dichasium inflorescence (1-8 flowers); and *I. argentea*, that differs from *I. pohlii* in oblong longer leaves (5.5-9.5 cm long.), attenuate to obtuse, mucronulate apex, ovate, concave, unequal sepals and dichasium inflorescence with 1-5 flowers.

The locality of holotype specimen in not clear while Pohl did not indicate it, only citing *Serra Uruba*. Meissner (1869) cited this species to *Serra de Urubú*, Bahia. Probably they were referring to the same place, but this exact region is uncertain, while actually 'Serra do Urubu' is in the state of Pernambuco, not in Bahia. So, considering these facts and few records of this species, we realize that Pohl's collect might be in our study area, in a possible reencounter to *I. pohlii* in Serra da Canastra.

Although is noted by *Duarte et al. 167* that the corolla could be yellow with red midpetaline bands, here it will be considered an error, it is a rare colour to *Ipomoea* flowers, and all the other collectors referred pinkish or purplish flowers.

Phenology: The species was found flowering in Serra da Canastra in January and November. Along the distribution, the flowers were collected from February to May and November.

4.10. ***Ipomoea procumbens*** Mart. ex Choisy, in DC. Prodromus Systematis Naturalis Regni Vegetabilis 9: 351. 1845. Type: BRAZIL. MINAS GERAIS: *Martius 964* (M0184989).

Prostrate or voluble herb, latex absent, ca. 100 cm long; root tuberous, with viscous latex; stem 1-2 mm diam., glabrous, rugose; internodes (1.0-) 2-7 cm long. Leaves narrow-elliptic or linear, 3.5-6 x 0.3-1.5 cm, base attenuate, apex acute or slightly rounded, mucronulate or not, margin irregularly wavy, glabrous in both surfaces, rugose, brochidodromous, veins salient in abaxial surface; petiole 4-13 cm long, 1-2 pairs of extrafloral nectaries at apex. Inflorescence of 1-3 flowered dichasium; peduncle primary 1-5.5 cm long, secondary 0.1-2.3 cm long; bracteole lanceolate or triangular, apex acute or acuminate, caducous, 1.5-3 mm long, rugose; pedicel 0.2-1.5 cm long, rugose near to insertion of bracteole; sepals unequal, outer 6-8 x ca. 4 mm,

inner 1-13 x 4-7 mm, ovate, apex acute or rounded, membranous, rugose, hyaline margin, extrafloral nectaries 3-5, alternating to outer sepals, not observed in all flowers; corolla campanulate-infundibuliform, pinkish or lilac, internally darker, 5.8-6.6 cm, tube 2.5-3.3 cm, limb 2.5-3.5 cm, midpetaline bands glabrous, well demarcated; stamens longer 17-19 mm, shorter 13-15 mm, base villous, anthers basifixed, elliptic, 5.6-6 mm long; style ca. 2.5 cm long, stigmas 2, globose. Capsule ovoid, ca. 11-13 x 6-10 mm, glabrous; seed ellipsoid, brown, 5-6 x 2-3 mm.

Examined material: BRAZIL. MINAS GERAIS: Delfinópolis, 13.II.2018, fl., R.K. *Kojima & R.Simão-Bianchini 18* (SP). São Roque de Minas, 11.II.2018, fl. R.K. *Kojima & R.Simão-Bianchini 9* (SP); estrada de terra para vilarejo do São João Batista do Glória, 12.II.2018, fl. R.K. *Kojima & R.Simão-Bianchini 11* (SP); estrada para Sacramento, após o Curral de Pedras, 18.III.1995, fl., *J.N. Nakajima et al. 869* (HUFU); mata próxima à cachoeira Casca d'Anta., 12.XII.1996, fl., *L.S. Kinoshita & J.L.A. Moreira 96150* (UEC); morro próximo a sede administrativa, 7.XII.1994, fl., *J.N. Nakajima & R. Romero 631* (HUFU).

Distribution: *Ipomoea procumbens* is native and occurs only in Brazil, encompassing Distrito Federal, Bahia, Goiás, Minas Gerais, São Paulo, and Paraná, in Caatinga and Cerrado domains (Flora do Brasil 2020, em construção). Considering varieties of species, *I. procumbens* var. *elliptica* Chodat & Hassl. and *I. procumbens* var. *longepedunculata* Chodat & Hassl., the species also occurs in Argentina and known a single collection of Paraguay (Wood *et al.* 2015). These taxa are still considered as dubious, lacking more study about these. However, this fact suggests that the distribution of species might be broader.

Ecology: In Serra da Canastra it is very common, being well collected. *Ipomoea procumbens* was found in several localities within the Park in counties of Delfinópolis and São Roque de Minas, in physiognomies of ‘campo limpo’ and ‘campo ruprestre’.

Recognition: *Ipomoea procumbens* may be distinguished in narrow-elliptic to linear leaves, rugose indumentum, unequal and membranous sepals. *Ipomoea procumbens* is resembled *I. granulosa* Chodat & Hassl. and *I. rupestris* Sim.-Bianch. & Pirani. The last species differs by ovate to oblong leaves and smaller sepals than in *I. procumbens*; *I. granulosa* can be distinguished by erect habit and verrucose indumentum. In Serra da Canastra, *I. procumbens* might easily be confused with *I. procurrens* Meisn., which differs in ovate leaves and outstanding verrucose sepals, whereas in *I. procumbens* the leaves are narrow-elliptic to linear and rugose sepals.

Ipomoea kunthiana Meisn. may be confused to *I. procumbens* in habit and by unequal sepals, namely bigger inner sepals than outer ones, being possible distinguish them only by

ovate sepals with acute or rounded apex in the first mentioned species and ovate to ovate-elliptic sepals with rounded to mucronate apex in second one. O'Donnell (1959) thought that these two species might better been united, but more accurate and in-depth studies are needed to formally synonymize them.

Phenology: In PNSC, the species flower among December to May. In southeastern region of Brazil, it flowers over the months of October to May, with peak between January to March (Simão-Bianchini 1998). In Serra do Ouro Branco, flowers were collected among January to April (Rodrigues-Lima 2017).

4.11. ***Ipomoea procurrens*** Meisn., Fl. Bras. 7: 254. 1869. Type: BRAZIL. MINAS GERAIS: 1845, *Widgren 302* (BR0000005307715).

Fig. 10e

Prostrate herb, latex absent, ca. 100 cm long; root tuberous; stem 1-2 mm diam., sparse pubescent or glabrescent, rugose, glandular and strigose trichomes; internodes (3.5-) 6-11 cm long. Leaves ovate, 4.2-7.4 x 2.5-4.3 cm, base cordate or oblique, slightly asymmetric, apex rounded or slightly emarginate, mucronulate, margin irregularly wavy, glabrous or sparse trichomes in both surfaces, rugose, brochidodromous, veins sulcate in adaxial surface, salient in abaxial surface; petiole 6-15 cm long., 1 pair of extrafloral nectaries at apex or domicile, not observed in all leaves. Inflorescence of 1-4 flowered axillary dichasium; peduncle primary 0.7-6.2 (-9) cm long, secondary 0.2-1 cm long; bracteole triangular or subulate, apex acute or acuminate, 2-4.5 mm long, rugose; pedicel 0.5-1 cm long, rugose; sepals unequal, outer 7-12 x 4-5 mm, inner 14-17 x 3-7 mm, ovate, apex acute or rounded, coriaceous, dorsally verrucose, extrafloral nectaries 4-5, alternating to outer sepals, at pedicel base, not observed in all flowers; corolla campanulate-infundibuliform, pinkish or lilac, internally darker, 5-7 cm, tube 2.5-3 cm, limb 2-4 cm, midpetaline bands glabrous, well demarcated; stamens longer 19-2 mm, shorter 13-14 mm, base villous, anthers basifixed, elliptic, 4.5-5 mm long; style ca. 2.4 cm long, stigmas 2, globose. Capsule ovoid, 13-15 x 8-10 mm, glabrous; seed ellipsoid, brown, granular, ca. 7 x ca. 5 mm.

Examined material: BRAZIL. MINAS GERAIS: Sacramento, Estrada São Roque de Minas - Sacramento, próximo ao Córrego dos Passageiros, 13.V.1995, fl., *R. Romero et al. 2224* (HUFU). São Roque de Minas, estrada para Sacramento, 12.II.2018, fl., *R.K. Kojima & R.Simão-Bianchini 14* (SP); 14.II.2018, fl., *R.K. Kojima & R.Simão-Bianchini 22* (SP); Estrada

para o vilarejo de São João Batista, 12.II.2018, fl., *R.Simão-Bianchini & R.K. Kojima 2191* (SP).

Distribution: *Ipomoea procurrens* is a native characteristic Cerrado species, occurring in Bolivia, Paraguay and Central Brazil, comprising Tocantins, Goiás, Distrito Federal, Mato Grosso, Mato Grosso do Sul, Minas Gerais, São Paulo and Rio de Janeiro (Flora do Brasil 2020, em construção).

Ecology: In Serra da Canastra, it was collected in road Sacramento – São Roque de Minas, in Guarita de Sacramento and near to Córrego dos Passageiros, all these localities in portion of PNSC in São Roque de Minas county. The physiognomies in which *I. procurrens* was collected are ‘campo limpo’ and ‘campo sujo’.

Recognition: *Ipomoea procurrens* is readily recognized mainly by prominent rugose sepals, added to short petiolate, oblong to ovate leaves. Chodat & Hassler (1905) recognized *I. procurens* var. *pilosula* Chodat & Hassl., distinguishing it from typical form only by leaves sparse pubescent. Here we treated the specimens studied as species level considering the slight difference between the varieties.

The species resembles *I. rupestris* Meisn., which differs in not verrucose sepals and smaller leaves. Other similar species is *I. kunthiana* Meis., which has narrower leaves, longer sepals with acute apex. This species is more common in North of Argentina and in south of Brazil (Simão-Bianchini 2009). *Ipomoea procurrens* is also very close to *I. procumbens*, both sympatric species. We discussed the differences between them in *I. procumbens* comments.

Phenology: In PNSC, *Ipomoea procurrens* was collected with flower in December, January and May. In Serra do Cipó, Minas Gerais, it flowers over the months of November to April, concentrating the bloom among January to March (Simão-Bianchini & Pirani 1997). In Bolivia, the species flowers from November to May, during the summer rainy season (Wood *et al.* 2015).

4.12. ***Ipomoea verbasciformis*** (Meisn.) O'Donell, Lilloa 23: 502. 1950. Type: BRAZIL. MINAS GERAIS: 1845, *Widgren 304* (BR0000005305742).

Fig. 10f

Erect subshrub, latex present, 40-150 cm tall; root not seen; stem 0,4-9 cm diam., tomentose or dense tomentose, trichomes 1.5-2 mm long; internodes 1.5-4 cm long. Leaves ovate or oblong, 6-10.7 x (2-) 3.1-5.2 cm, base rounded, apex acute, margin entire or irregularly wavy, pubescent or tomentose in both surfaces, brochidodromous, veins sulcate in adaxial surface, salient in abaxial surface; petiole 1.5-6 mm long. Inflorescence of 1-8 flowered axillary dichasium; peduncle primary (0-) 3.5-6.5 cm long, secondary absent; bracteole lanceolate, apex acute or acuminate, 6-15 mm long, tomentose; pedicel 2-5 mm long, tomentose; sepals equal or subequal, outer 1-11 x ca. 6 mm, inner 9-10 x 5-6 mm, this ones with margin hyaline, ovate, apex acute, tomentose, striate, ventrally glabrous, corolla campanulate-infundibuliform, pinkish, inner of tube darker, 5.6-7 cm, tube 3.2-3.5 cm, limb 3-3.5 cm, midpetaline bands sericeous; stamens longer 25-26 mm, shorter 14-15 mm, base villous, anthers basifixed, elliptic, 4.5-5.5 mm long; style 2.3-2.4 cm long, stigmas 2, globose. Capsule ovoid, 10-11 x 5-6 mm, glabrous; seed ellipsoid, black, trichomes long, golden, concentrated at apex and sides, ca. 3 mm long., 4-5 x 1.5-2.5 mm.

Examined material: BRAZIL. MINAS GERAIS: São Roque de Minas, Estrada São Roque de Minas - Sacramento, morro após a nascente do rio São Francisco, 18.III.1995, fl., *J.N. Nakajima et al. 806* (HUFU).

Distribution: This species is native, and its distribution is restricted to Brazil, in Goiás and Minas Gerais, in Cerrado domain (Flora do Brasil 2020, em construção).

Ecology: In Serra da Canastra it was collected in São Roque de Minas county, in localities denominated trail to Sítio São Domingos, Córrego dos Peixes hill, road to Fazenda do Fundão, valley of the São Francisco river source, hill after valley of São Francisco river and road to Sacramento, in physiognomies of 'campo rupestre' and rocky outcrop. The species is relatively well represented in Park.

Recognition: *Ipomoea verbasciformis* is distinguished by erect subshrub habit, tomentose indumentum in whole plant, ovate to oblong leaves with rounded base, acute apex and ovate sepals, the outer ones slightly bigger than inner ones. Wood *et al.* (2017) cited the similarity between *I. verbasciformis* and *I. dasycarpa* J.R.I.Wood & Scotland, which the last one distinguishes by larger dimension of sepals and strong mucronate leaves and by acuminate, submucronate sepals apex. In Serra da Canastra, *I. verbasciformis* resembles *I. argentea*, the differences between them are in *I. argentea* comments.

Phenology: The species was found flowering over the months January to April.

5. *Jacquemontia* Choisy, Mémoires de la Société de Physique et d'Histoire Naturelle de Genève 6(2): 476. 1834.

The genus is relatively big and comprise about 120 species and most of them are distributed in Neotropical zone with few species occurring in Africa, Asia and Oceania (Staples *et al.* 2008, Staples 2012). In Brazil occurs 66 species, which 43 of them are endemic. Cerrado holds the greater number of species, followed by Caatinga, Atlantic Rainforest and Amazônia. Majority of species (41) occur in the state of Minas Gerais (Flora do Brasil 2020, em construção).

The representatives are recognized by subshrubs or herbs, climbing (figs. 5i-j, 6k-l), scandent rarely erect habit; the indumentum generally has trichomes 3-8 branched (figs. 5k, 11a-b, d-f), equal or unequal, rarely malpighiaceous or glandular; the leaves are simple, entire, rare lobate, linear, lanceolate, ovate or elliptic, usually petiolate with entire repand or wavy margin (figs. 5i-j); the inflorescence is axillary dichasium, lax, dense (figs. 5i-j, 6l) or reduced to one flower; the sepals are persistent in fruit (fig. 5m); the corolla is bluish to purplish with midpetaline bands glabrous (figs. 5i-j, 6k); the pollen is spheroidal or prolate-spheroidal, tricolpate or pantocolpate, microechinate (figs. 11g-h) (Tellería & Daners 2003), the lobes of stigma are ellipsoid or subglobose, dorsoventrally flat (figs. 5l, 11c); the capsule are 8-valved (fig. 5m), the seeds are glabrous, verrucose or striate, with margin slightly winged (fig. 5n) (Simão-Bianchini & Pirani 1997, Simão-Bianchini 2009, Pastore & Simão-Bianchini 2017).

Identification key of *Jacquemontia* in Serra da Canastra

1. Prostrate subshrubs, rusty trichomes; tomentose indumentum; elliptic leaves, rounded or cuneate base.....5.1. *J. prostrata*
1'. Climbing herbs, translucent trichomes; hirsutullous and glandular indumentum; ovate leaves, cordate base .....5.2. *J. sphaerostigma*

5.1. *Jacquemontia prostrata* Choisy, Prodromus Systematis Naturalis Regni Vegetabilis 9: 399. 1845. Type: BRAZIL. MINAS GERAIS: *Martius 881* (M0184704).
Fig. 5i, 11a, d, g

Prostrate subshrub, ca. 50 cm compr.; root not seen; stem 2-2.5 mm diam., tomentose, 3-branched trichomes, rusty; internodes 1.5-4.6 cm long. Leaves elliptic, 3.2-5.2 x 1.6-2.4 cm, base cuneate or rounded, apex rounded, mucronate, margin entire or irregularly wavy, tomentose in both surfaces, brochidodromous, veins sulcate in adaxial surface, salient in abaxial surface; petiole 2-7 mm long. Inflorescence of 3-7 flowered axillary capituliform cyme; peduncle primary (2.5-) 3.2-6.2 cm long, secondary absent; bracteole lanceolate, apex acute or acuminate, 0.8-1.1 cm long, tomentose; pedicel 0-2 mm long, tomentose; sepals unequal, outer 7-9 x 2-4 mm, lanceolate or oblong, inner 6-8 x 0.5-3 mm, lanceolate, apex acute or acuminate, tomentose, ventrally glabrous; corolla infundibuliform, blue, ca. 1.6 cm, tube ca. 0.5 cm, limb ca. 1.1 cm, midpetaline bands glabrous, well demarcated; stamens longer 10-11 mm, shorter 8-9 mm, base papillose, anthers dorsifixed, elliptic, ca. 9 mm long; style ca. 2.5 mm long, stigmas 2, ellipsoid. Capsule globose, 4-5 x 4-6 mm, glabrous; seed trigonous, two flat surfaces and one convex, glandular, brownish, ca. 2.5 x ca. 3.5 mm, ala inconspicuous and not continuous, ca. 1 mm long. at sides.

Examined material: BRAZIL. MINAS GERAIS: São Roque de Minas, Estrada São Roque de Minas - Sacramento, morro após o córrego dos Louros, 12.I.1995, fl., *R. Romero et al. 1756* (HUFU, SP).

Distribution: It is a typical of Cerrado domain species, native and restricted to Brazil, recorded in Minas Gerais and Rio de Janeiro. It was first described to Goiás and Minas Gerais (Meisner 1869, Flora do Brasil 2020, em construção).

Ecology: In Serra da Canastra, *J. prostrata* is rare, having only one record in hill beyond Córregos dos Morros locality, in São Roque de Minas county, in ‘campo cerrado’ physiognomy.

Recognition: *Jacquemontia prostrata* is recognized in prostrate or climbing habit and in having tomentose and rusty indumentum in whole plant, blue midpetaline bands in the same tone of corolla, always well demarcated, bracteoles and sepals persistent in capsules. In Serra da Canastra, it was found only prostrate individuals.

Jacquemontia prostrata is similar to *J. linarioides* Meisn., which differs in linear leaves, sparse trichomes and pauciflorous inflorescence; and also to *J. lasioclados* (Choisy) O'Donell, that is readily distinguished by having erect habit, broad-ovate to oblong leaves, cinereous indumentum in older leaves and rusty indumentum only in younger ones. *J. sphaerocephala* Meisn., other Cerrado characteristic species, resembles *J. prostrata* in dense, rusty indumentum, elliptic leaves and dense inflorescence, but differs in longer leaves (4.4-6.2 cm

long.) and shorter peduncles (1.3-4.5 cm long.) in *J. sphaerocephala*, while *J. prostrata* has shorter leaves (3.2-5.2 cm long.) and longer peduncles (2.5-6.2 cm long.).

Phenology: In PNSC, it was found with flower in January. In Serra do Ouro Branco and in Serra do Cipó National Parks, in the state of Minas Gerais, it flowers all year long (Simão-Bianchini & Pirani 1997, Rodrigues-Lima 2017).

5.2. ***Jacquemontia sphaerostigma*** (Cav.) Rusby, Bulletin of the Torrey Botanical Club 26(3): 151. 1899. Type: MEXICO. *Née s.n.* (MA222550).

Fig. 5j-n, 6k-l, 11b-c, e-f, h

Climbing herb, viscous; root not seen; stem 1-2 mm diam., hirsutullous and glandular, forked, glandular and 3-branched trichomes, translucent; internodes (1.7) 2-6 cm long. Leaves elliptic or ovate, (1.9-) 2.4-4.5 x 1.1-2.7 cm, base cordate, apex acuminate or long acuminate, margin repand, both surfaces villous-stellate, denser in abaxial surface, forked trichomes, three-branched trichomes with two shorter branches and one longer (twice or more than twice the shorter ones), interspersed by glandular trichomes, brochidodromous, veins sulcate in adaxial surface, salient in abaxial surface; petiole 3-17 (-27) mm long. Inflorescence of 1-32 flowered axillary congested umbeliform cyme; peduncle primary (0.5-) 1.2-7 cm long, secondary 0-10 mm long; bracteole lanceolate, apex acute or acuminate, 0.3-1 cm long, hirsutullous and glandular; pedicel 0-4.5 mm long, hirsutullous and glandular; sepals subequal, outer 4-6.5 x 1-1.5 mm, inner 5-7 x 0.5-1 mm, this ones glabrous at the base and with margin hyaline, ovate or lanceolate, apex acute or acuminate, hirsutullous, glandular, ciliate; corolla infundibuliform, bluish or purplish, 5-9 mm, tube 1-2 mm, limb 6-7 mm, midpetaline bands glabrous, well demarcated; stamens longer 4.3-5 mm, shorter 3.5-4 mm, base papillose, anthers dorsifixed, elliptic, 1-3 mm long; style 4.5-5 mm long, stigmas 2, subglobose. Capsule globose or ovoid, 3-5 x 3-4 mm, glabrous; seed trigonous, two flat surfaces and one convex, glabrous, rugose, yellowish, 1.8-1.9 x 1.1-1.4 mm, ala inconspicuous.

Examined material: BRAZIL. MINAS GERAIS: Capitólio, 17.II.2018, fl. and fr., *R.K. Kojima & R.Simão-Bianchini 24* (SP).

Distribution: It is a native species, not restricted to Brazil, it has a broad distribution in Tropical America, comprising Mexico, whole Central America, Peru, Bolivia and Venezuela (O'Donell 1960, Robertson 1971). In Brazil, the species has confirmed record in all country, not occurring only in Roraima, Acre, Rondônia, Tocantins, Rio de Janeiro and south region. It occurs in Amazon, Caatinga, Cerrado and Atlantic Rainforest domains (Flora do Brasil 2020, em

construção). It is very common, being considered even as weed plant in anthropized areas (Rodrigues-Lima 2017, Moreira *et al.* 2018).

Ecology: In Serra da Canastra, it was registered just in Capitólio county, at road side, in rocky soil.

Recognition: *Jacquemontia sphaerostigma* may have a huge variation in measurement of leaves, petiole, peduncle and pedicel, not being so easy to recognize this species (Robertson 1971, Simão-Bianchini & Pirani 1997). Despite this, it can be recognized by climbing or ascending habit, with noticeable viscosity provided by glandular indumentum in whole plant and persistent bracteoles and sepals.

Jacquemontia evolvuloides (Moric.) Meisn. is the most similar species to *J. sphaerostigma*, being distinguished by having only stellate trichomes and inflorescence in lax monochasium (1-3 flowers), with peduncles reaching 7 cm long. This species is broadly distributed in Tropical America and in Brazil occurs in Caatinga and Cerrado domains (Pastore & Simão-Bianchini 2017). *J. sphaerostigma* also resembles to *J. pentanthos* (Jacq.) G.Don, which differs in longer leaves and peduncles, unequal, bigger sepals and lacking glandular trichomes.

Phenology: In PNSC it was collected with flower in February. In Serra do Ouro Branco, *J. sphaerostigma* flowers all over the year, and mainly among September to February in Serra do Cipó (Rodrigues-Lima 2017, Simão-Bianchini & Pirani 1997).

Pollen morphology

Identification key of pollen grains of Convolvulaceae genera

1. 'Echinoconieae' ..... *Ipomoea*

1'. 'Psiloconiae'.

2. Large pollen grain.

3. Oblate, exine with slightly irregular relief with perforations and granula regularly scattered ..... *Bonamia*

3'. Oblate-spheroidal, exine granulate ..... *Distimake*

2'. Medium or small pollen grain.

4. Small pollen grain, spheroidal, exine microechinate ..... *Evolvulus*

4'. Medium pollen grain, suboblate or spheroidal, exine echinulate ..... *Jacquemontia*

The study genera are classified according to two groups of Convolvulaceae proposed according to pollen morphology (Hallier 1893): 'Echinoconieae' (*Ipomoea*) and 'Psiloconiae' (*Bonamia*, Distimake, *Evolvulus*, *Jacquemontia*).

Bonamia s.l. is an euripalynous taxon mainly in what concerns polarity and aperture type. The pollen grains are monads, of medium or large size, prolate or oblate, subprolate or spheroidal. The genus has two major distinct pollen types: isopolar, 3-colpate, and apolar, 12–32 pantocolpate. The ornamentation of exine is verrucate, microechinate, granulate, reticulate or microreticulate (Tellería & Daners 2003; Vasconcelos *et al.* 2019; Moreira *et al.* 2019). In study species the pollen is large, oblate, 3-colpate, perforate, the surface has slightly irregular relief with perforations and granula regularly scattered (fig. 7c-d).

Distimake has large pollen, subprolate, prolate-spheroidal or oblate-spheroidal, monad, isopolar, 3-6 colpate, 4-6-zonocolpate or 6-pantocolpate, with exine microechinate or granulate (Leite *et al.* 2005; Buril-Vital *et al.* 2008; Vasconcelos *et al.* 2015). There was recognized three different groups according to pollen morphology: *D.* sect. *Schizips*, *D.* sect. *Xanthips* and *D.* sect. *Cissoides*, suggesting that the genus is euripalynous (Leite *et al.* 2005). In species analyzed, the pollen grains are large, oblate-spheroidal, 3-colpate with exine granulate (fig. 8a-b).

Evolvulus is a stenopalynous genus, with homogenous pollen grains. It is small, medium or large size, such as in *E. glomeratus*, spheroidal, monad, apolar, 3-5 colpate or 8-16 pantocolpate, exine psilate, tectate or microechinate (Hallier 1893; Buril-Vital *et al.* 2008; Silva

2013; Vasconcelos *et al.* 2019). In study species pollen grains are small, pantocolpate, and microechinate (fig. 9 c-e).

Represents of *Ipomoea* have large size pollen, spheroidal, monad, apolar, pantoporate, echinate with pointed spine and bulbous base (Buril-Vital *et al.* 2008; Vasconcelos *et al.* 2015) such as in specimens analyzed here (fig. c-d). The species also might be subdivided into types and subtypes according to the form, the arrangement and number of spines, and the exine ornamentation (Tellería & Daners 2003).

In *Jacquemontia*, the pollen is medium or large, monad, apolar or isopolar, suboblate, subprolate, prolate-spheroidal or spheroidal, 3-colpate, 6-30 pantocolpate or zonocolpate, the exine is tectate granulate, microechinate, perforate (Tellería & Daners 2003; Buril *et al.* 2014; Vasconcelos *et al.* 2019). This genus is euripalynous in concern to aperture type and exine ornamentation, (Vasconcelos *et al.* 2019) and was recognized three types according to aperture (Buril *et al.* 2014). The specimens analyzed have medium pollen grains, suboblate or spheroidal, 15-30 pantocolpate and exine echinulate (fig. 11g-h).

Discussion

Among the species of few records and/or of rare distribution, according to criteria adopted by IUCN (2012): *Bonamia eustachioi* falls within the endangered (EN) category with extent of occurrence (EOO) of 96,779.988 km^2 and area of occupancy (AOO) of 12.000 km^2 (GeoCAT 2019). Due to relevant restricted range, this taxon is under immediate threat. There are records of *B. eustachioi* in protected and non-protected areas. Two environmental conserved areas are Serra da Canastra National Park and Serra do Cipó National Park, both in the state of Minas Gerais. *Evolvulus aurigenius* is considered as least concern (LC) category (CNC Flora 2019). *Evolvulus cressoides* is considered as near threatened (NT) (CNC Flora 2019). *Ipomoea acutisepala* is considered as least concern (LC) (CNC Flora 2019). Although the few records of *Ipomoea langsdorffi* in PNSC, without further studies it only can be classified as Data Deficient (DD). *Ipomoea pohlii*. is considered as least concern (LC) for Extent of occurrence – EOO and as endangered (EN) about Area of Occupancy – AOO: 28.000 km^2 (GeoCAT 2019).

In comparison with other studies carried out in Minas Gerais about Convolvulaceae, Forzza *et al.* (2013) compiled 6 species in Ibitipoca State Park, which three of them are common to PNSC: *E. aurigenius* Mart, *I. delphinioides* Choisy and *I. procumbens* Mart. & Choisy, In Cangas do Quadrilátero Ferrífero, Simão-Bianchini (2012) listed out 19 taxa, of which five are

similar to those found in PNSC: *E. aurigenius* var. *aurigenius* Mart., *E. aurigenius* var. *meissnerianus* Ooststr., *I. delphinioides*, *I. procumbens* and *J. prostrata* Choisy. In Serra do Cipó National Park, Simão-Bianchini & Pirani (1997) found 23 species, where eight species were common on both areas: *D. tomentosus* (Choisy) Petrongari & Sim.-Bianch., *E. aurigenius*, *E. glomeratus* Nees & Mart., *I. aprica* House, *I campestris* Meisn., *I. procurrens* Meisn., *J. prostrata* and *J. sphaerostigma*. In Serra do Ouro Branco State Park, Rodrigues-Lima (2017) listed 25 species, which eight were common to PNSC: *D. tomentosus, E. aurigenius, I. aprica, I. delphinioides, I. langsdorffii* Choisy, *I. procumbens, J. prostrata* and *J. sphaerostigma*. These two last cited areas have most similarities of species in comparison to Serra da Canastra National Park. The resemblance in composition of species in these localities of Minas Gerais is probably associated to similarity of physiognomies, due to formation of Espinhaço Range which they are all continuous or disjunct part of it.

The surroundings areas have been suffering the impacts of farming, agriculture and tourism which might causes fragmentation and destruction of habitats with probable loss of species. To comply with the standards of "Sistema Nacional de Unidades de Conservação da Natureza" (MMA/SNUC 2000), there are buffer zones that subject the human activities to specific rules and restrictions in order to minimize negative impacts in surroundings of PNSC. In these areas occurs 10 species, which five of them were found growing at weed environment, one was found in riparian forest and four are typical of Cerrado (table 1).

Only one record of weed species was found inside the Park (*J. sphaerostigma*) near to the car traffic. This region has strong tourism activities due to visit at famous canyons and several waterfalls at Rio Grande in Capitólio count. It is situated at PNSC boundary far from all official access to this Conservation Unit, so there is not any orientation or environmental education to visitors as usually occurs in all access entries to Park.

The Serra da Canastra National Park is a well preserved area. We concluded that human impacts in this protected area are low to studied group of plants, although the tourism explored in the region. It is strongly important the action of the environmental education promoting by ICMBio with volunteers. To maintain the diversity of species and in order to preserve the environment, it is also important to regularize the Babilônia plate, area legally belonging to the Park.

Table 1 – Species of surroundings areas of PNSC.

***Distimake cissoides* (Lam.) A.R. Simões & Staples
***Distimake macrocalyx* (Ruiz & Pav.) Simões & Staples
***Ipomoea cairica* (L.) Sweet
***Ipomoea nil* (L.) Roth
****Ipomoea rupestris* Sim.-Bianch. & Pirani
*****Ipomoea sidifolia* Schrad.
***Ipomoea triloba* L.
****Jacquemontia blanchetii* Moric.
****Jacquemontia cataractae* Krapov.
****Jacquemontia sphaerocephala* Meisn.

*Weed species

** Typical of Cerrado

***Found in riparian forest

Conclusion

Based on personal preliminary survey it was expected 23 species of Covolvulaceae in PNSC. After studying all the material collected there, we found that the number of species was correct, but some of them were re-identified: *Bonamia eustachioi* was initially identified as *B.* aff. *sericea*; *Ipomoea* sp was recognized as *I. pohlii*; *Evolvulus* sp was considered is this study as *E. cressoides*; *E. goyazensis* was initially considered as *E. tomentosus*; *Merremia digitata* Spreng. was reidentified and updated to *Distimake maragniensis* (Choisy) Petrongari & Sim.-Bianch. and *M. tomentosa* (Choisy) Hallier f. was just updated to *D. tomentosus* (Choisy) Petrongari & Sim.-Bianch.

The material identified as *I. delphinioides* was recognized as *I. campestris*; and after this event we collected *I. delphinioides* in PNSC, as a new record of occurrence. *Jacquemontia sphaerostigma* was collected after this preliminary checklist and was concluded the new record to PNSC. *Ipomoea langsdorffii* was included in species list after analyzing the material borrowed from another herbarium and was constated its occurrence in studied area. *Ipomoea*

sidifolia and *Jacquemontia sphaerocephala* does not occur in the Park, only in surroundings areas. The first one was found in riparian forest and the last one is a species typical of Cerrado. The non-weed species found in surroundings of Serra da Canastra National Park (*I. rupestris*, *I. sidifolia*, J. *blanchetii*, *J. cataractae*, *J. sphaerocephala*) might be found in the Park in the future. The protected area might suffer the risk of invasion of the weed species of the surroundings (*D. cissoides*, *D. macrocalyx*, *I. nil*, *I. cairica*, *I. triloba*) in the case of the lack of supervision of agriculture and farmer by the responsible institution, the uncontrolled tourism and the environmental miss awareness.

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Figure 2 – a. Holotype of *I. pohlii*, labeled as *Herbarium Martii*; b. Isotype material (*Pohl s.n.)*.

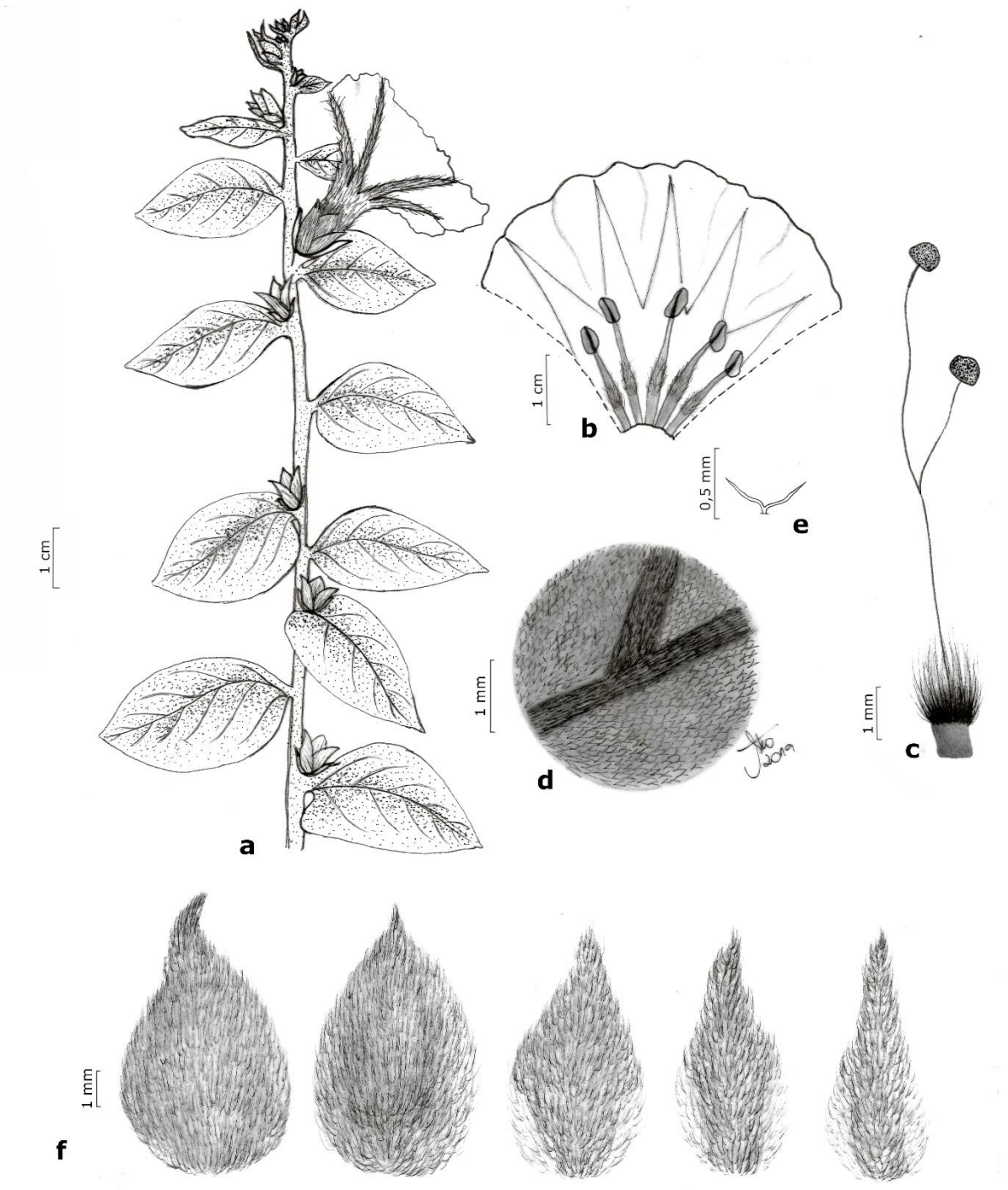

Figure 3 – a-f. *Bonamia eustachioi* – a. habit; b. corolla opened longitudinally showing androecium; c.pistil; d. leaf indumentum; e. forked trichome; f. sepals (*Faria & Ribeiro 4444*; drawing by Stephanie Oliveira).

Figure 4 – a-e. *Distimake maragniensis* – a. habit; b. indumentum with stellate trichomes; c. sepals; d. pistil; e. opened corolla showing androecium. f-g. *Evolvulus aurigenius* var. *aurigenius* – f. opened corolla showing androecium; g. pistil. h. *E. cressoides* – habit. i-k. *E. goyazensis* – i. inflorescence; j. pistil; k. detail of stigma. l. *E. pterygophyllus* – inflorescence. (a-e. *Nakajima & Romero 1704*; f-g. *Romero & Nakajima 1432*; h. *Kojima & Bianchini 25*; i. *Romero et al. 4807*; j-k. *Romero et al. 2267*; l. *Kojima & Bianchini 21*; drawing by Klei R. Souza).

Figure 5 – a-b. *Ipomoea langsdorffii* – a. flower; b. leaf. c-d. *I. pinifolia* – c. capsule; d. seed. e-h. *I. pohlii* – e. habit; f. sepals; g. opened flower showing androecium and pistil; h. detail of stigmas. i. *Jacquemontia prostrata* – inflorescence. j-n. *J. sphaerostigma* – j. inflorescence; k. indumentum with glandular, forked and 3-branched trichomes; l. stigmas; m. capsule; n. seed. (a-b. *Kojima & Bianchini 19;* c-d. *Nakajima et al. 3225*; e-i. *Duarte 167; Duarte 163; Pacheco et al. 452*; i. *Romero et al. 1756*; j-n. *Kojima & Bianchini 24*; drawing by Klei R. Souza).

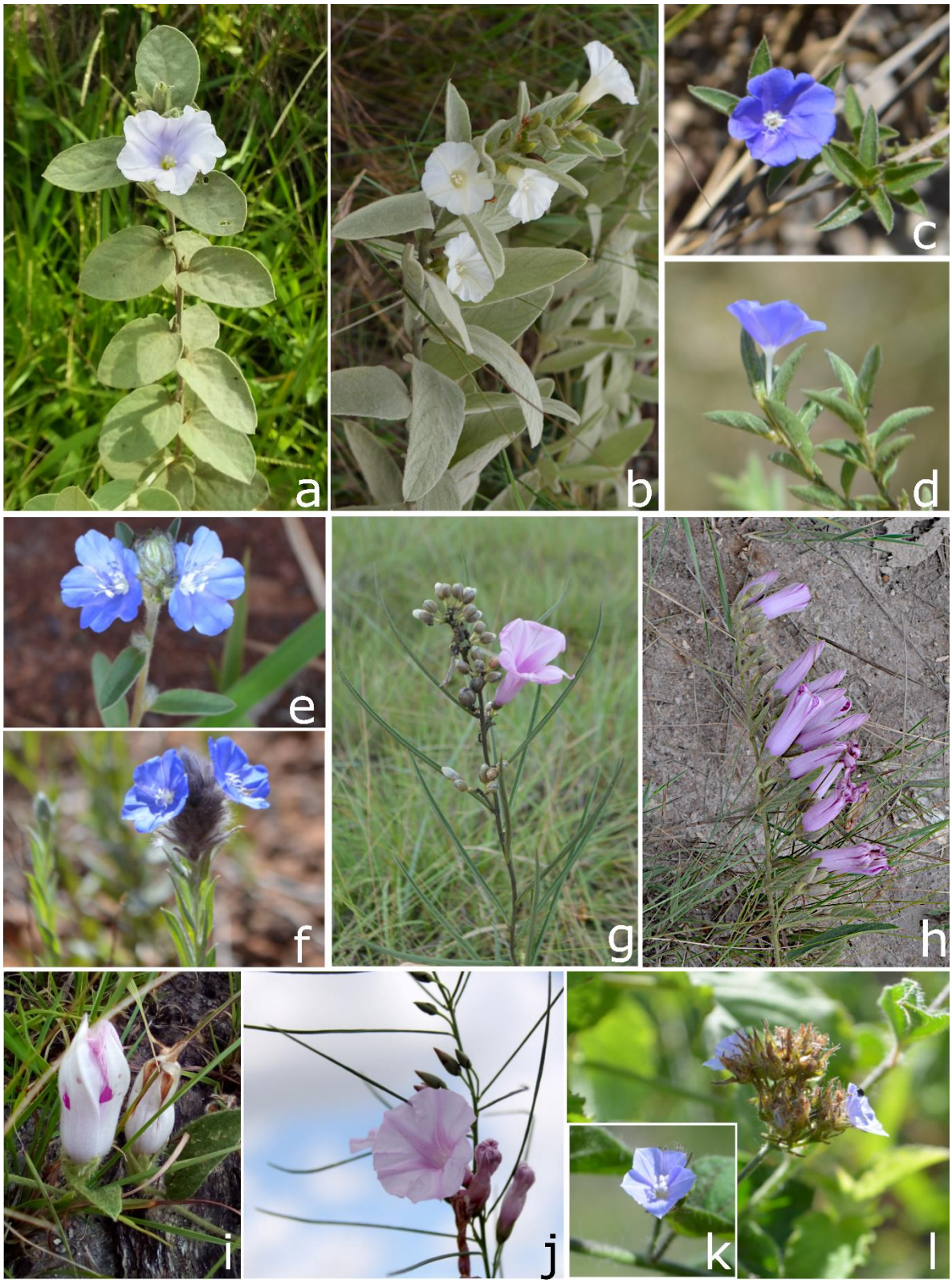

Figure 6 – a. *Bonamia eustachioi* – habit; b. *Distimake tomentosus* – habit; c-d. *Evolvulus cressoides* – c. flower in frontal view; d. flower in lateral view; e. *E. glomeratus* – inflorescence; f. *E. pterygophyllus* – inflorescence; g. *Ipomoea aprica* – habit; h. *I. delphinioides* – habit; i. *I. langsdorffii* – inflorescence; j. *I. pinifolia* – inflorescence; k-l. *Jacquemontia sphaerostigma* – k. flower; l. inflorescence. (Photographs: a. J. Faria; b-h, k-l: R.S. Bianchini; i. R.K. Kojima; j: H. Moreira).

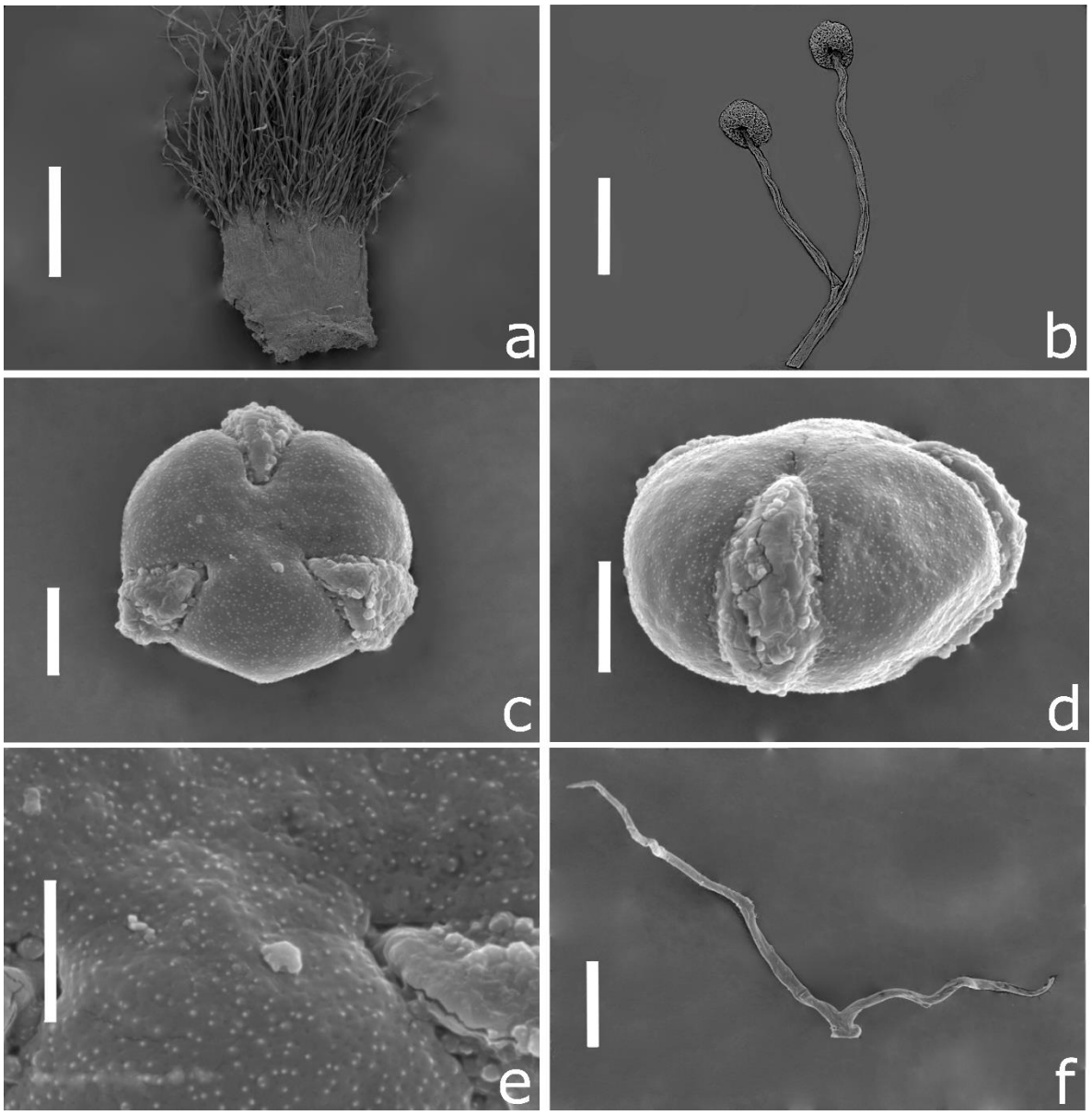

Figure 7 – a-f. Scanning electron micrographs of *Bonamia eustachioi* – a. ovary; b. stigmas; c. pollen grain in polar view; d. pollen grain in equatorial view; e. detail of pollen grain ornamentation; f. forked trichome. (*Romero et al. 6307*). Scales: 1 µm (a, b); 10 µm (c, d); 5 µm (e); 100 µm (f).

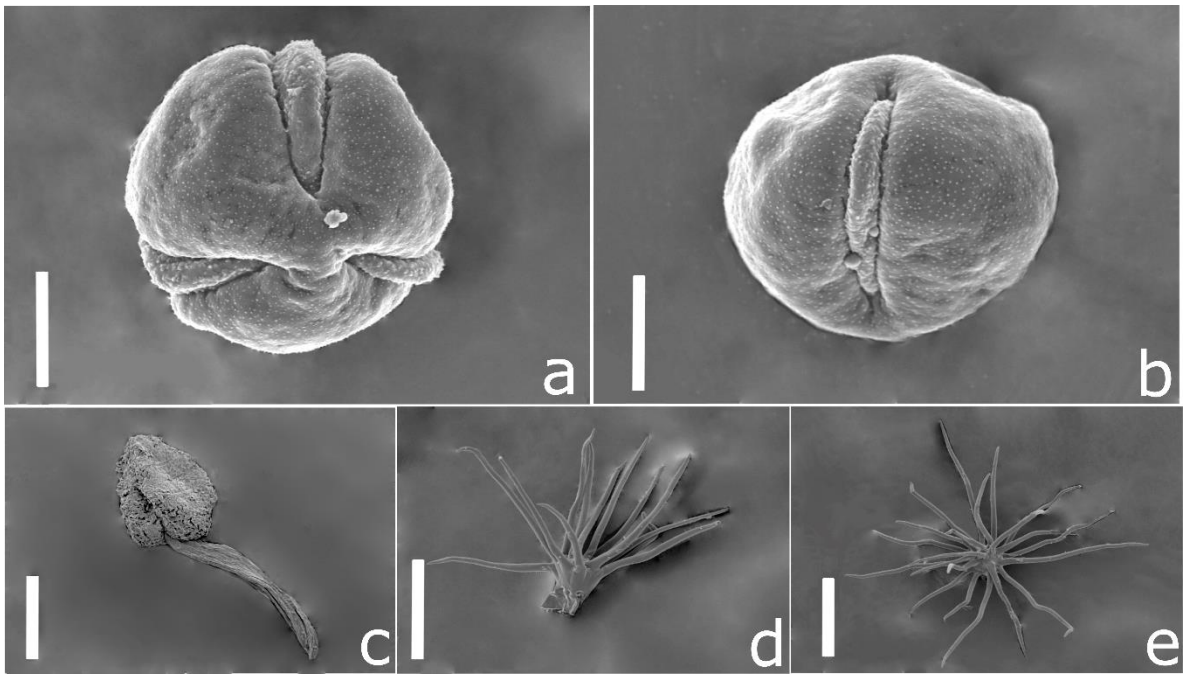

Figure 8 – a-e. Scanning electron micrographs of species of *Distimake*. a-c. *D. maragniensis* – a. pollen grain in polar view; b. pollen grain in equatorial view; c. stigmas. d-e. *D. tomentosus* – d. stellate trichome in lateral view; e. stellate trichome in frontal view. (a-c. *Nakajima et al. 2254*; d-e. *Kojima & Bianchini 23*). Scales: 20 µm (a, b); 500 µm (c); 200 µm (d, e).

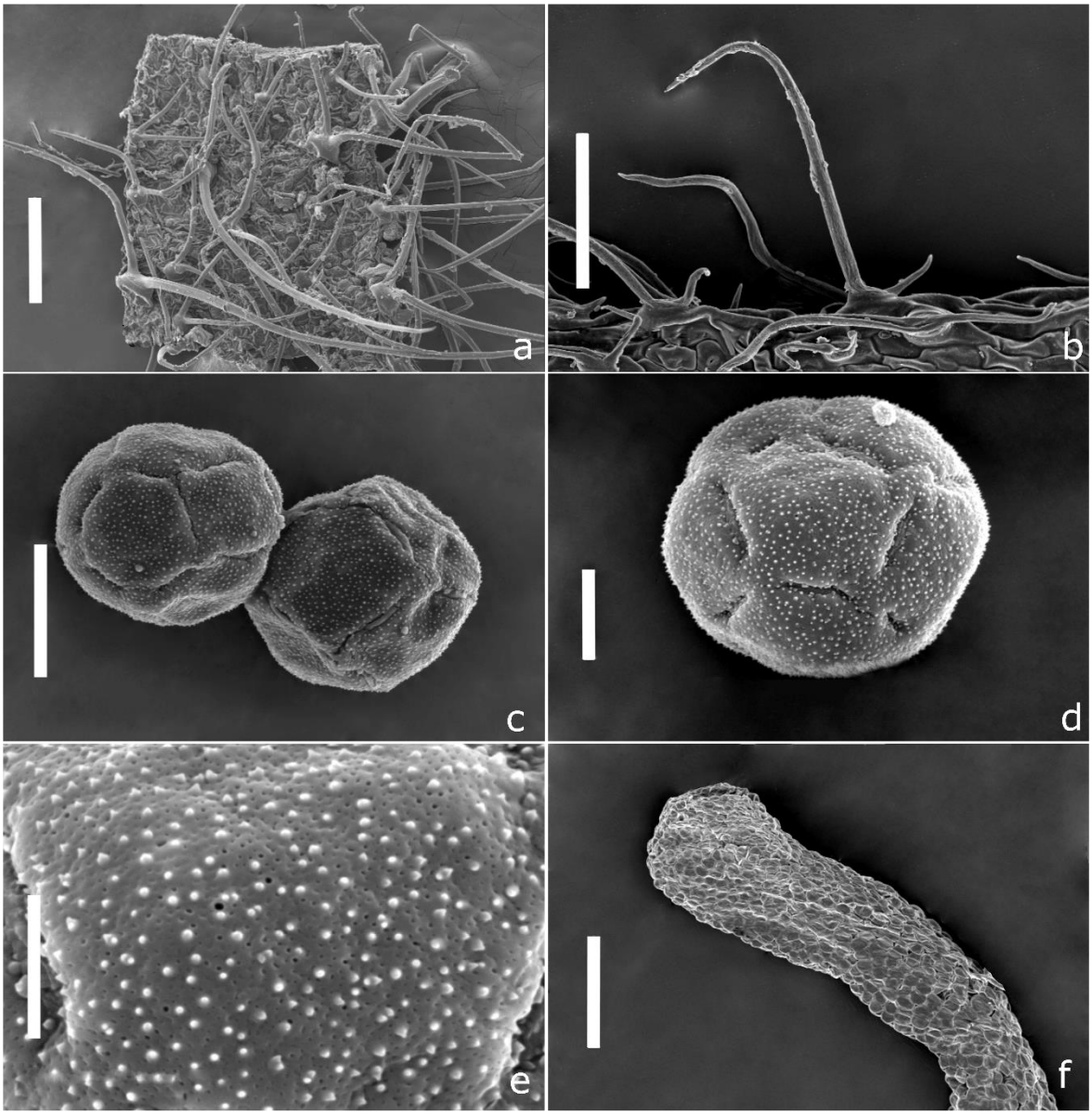

Figure 9 – a-f. Scanning electron micrographs of species of *Evolvulus*. a. *E. aurigenius* – indumentum with malpighiaceous trichomes. b, f. *E. cressoides* – b. detail of malpighiaceous tricome in lateral view; f. stigma. c-e. *E. lagopodioides* – c. pollen grains; d. pollen grain in general view; e. detail of pollen grain ornamentation. (a. *Romero et al. 1613*; b,f. *Kojima & Bianchini* 25; c-e. *Romero et al. 2175*). Scales: 200 µm (a); 100 µm (b, f); 20 µm (c); 10 µm (d); 5 µm (e).

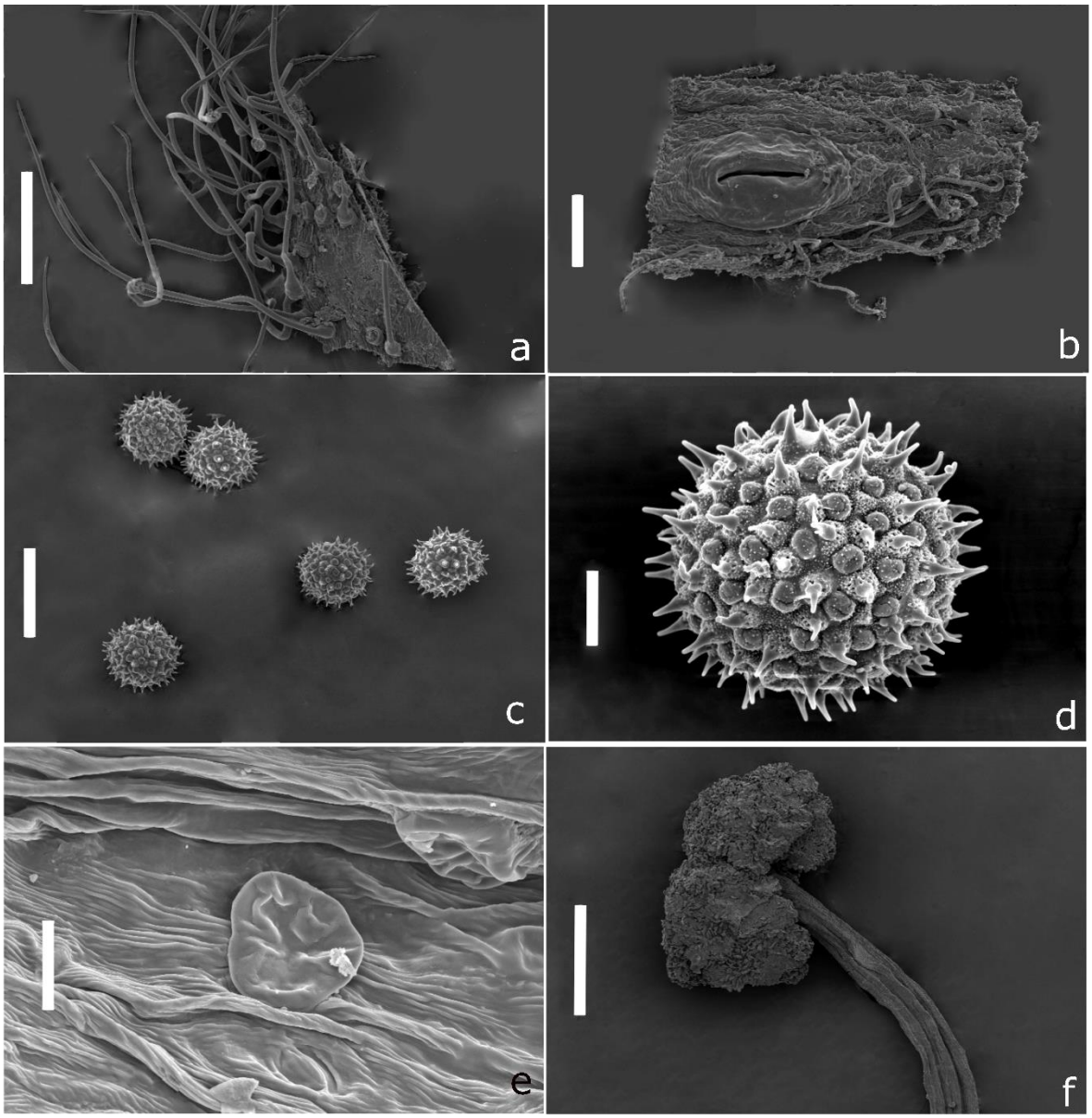

Figure 10 – a.f. Scanning electron micrographs of species of *Ipomoea*. a. *I. argentea* – indumentum. b. *I. fiebrigii* – extrafloral nectary. c-d. *I. pohlii* – c. pollen grains; d. pollen grain in general view. e. *I. procurrens* – glandular trichome. f. *I. verbasciformis* – stigmas. (a. *Mota 137*; b. *Romero et al. 4796*; c-d. *Romero et al. 452*; e. *Kojima & Bianchini 14*; f. *Romero et al. 1917*). Scales: 500 µm (a, f); 200 µm (b); 100 µm (c); 20 µm (d, e).

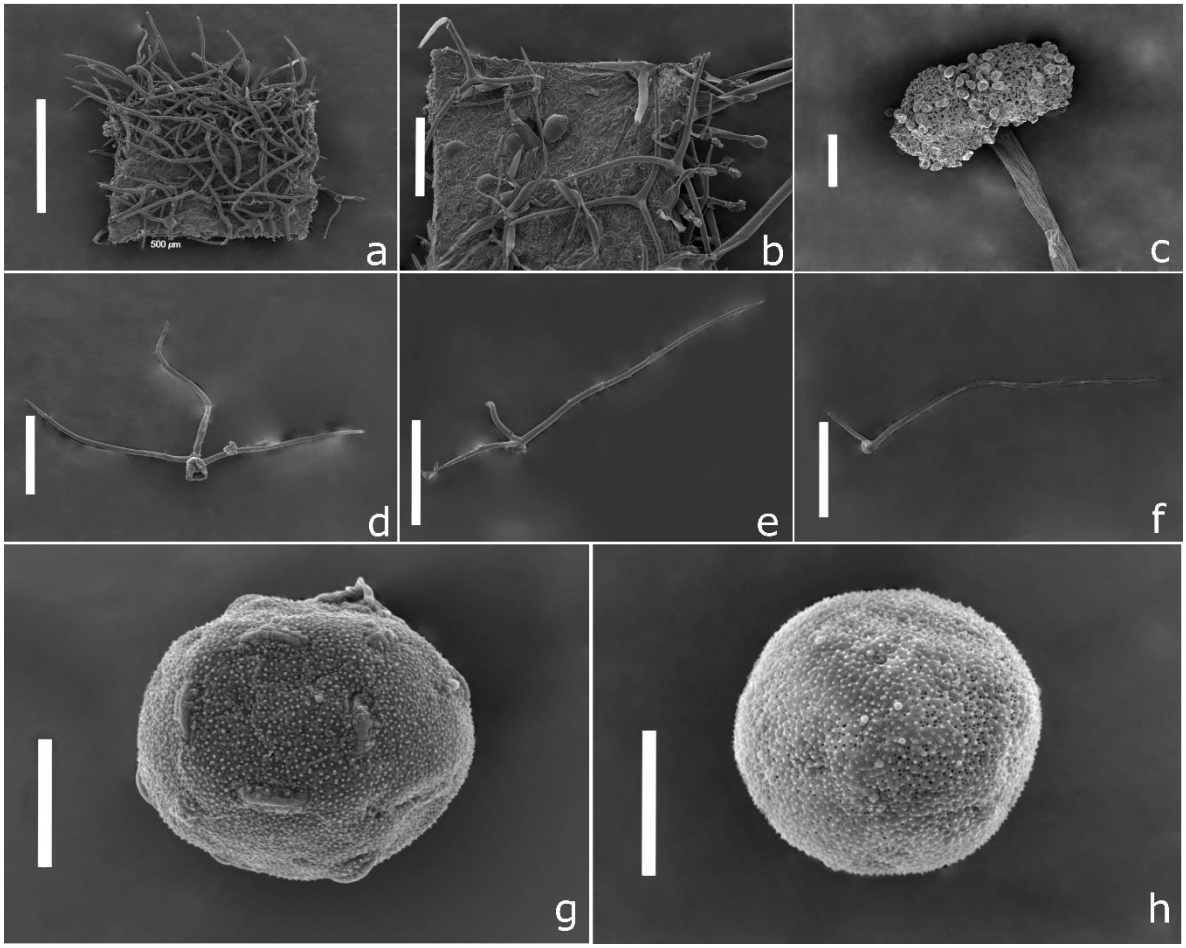

Figure 11 – a-h. Scanning electron micrographs of species of *Jacquemontia*. a, d, g. – *J. prostrata* – a. indumentum; d. 3-branched trichome; g. pollen grain in general view. b-c, e-f, h. *J. sphaerostigma* – b. indumentum; c. stigmas; e. 3-branched trichome; f. forked trichome; h. pollen grain in general view. (a, d, g. *Romero et al. 1756*; b-c, e-f, h. *Kojima & Bianchini 24*). Scales: 500 µm (a, e, f, h); 200 µm (b, c, d); 20 µm (g).

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Appendix 1. Examined materials of Minas Gerais and other localities.

Bonamia eustachioi A.L.C.Moreira & Kojima

Examined material: BRAZIL. MINAS GERAIS: Delfinópolis, Condomínio de Pedra, 20º20'38"S, 46º51'14"W, 17.V.2003, *R.L. Volpi et al. 696* (HUFU, SP). Estrada para "Casinha Branca Trilha Muro de Pedras", 20º20'38"S, 46º51'14"W, 12.III.2003, *R.A. Pacheco et al. 532* (HUFU, SP). Estrada para Casa Branca, Fazenda Paraíso, 20º20'38"S, 46º51'14"W, 10.IV.2002, *R. Romero et al. 6307* (HUFU, SP).

Additional examined material: BRAZIL. BAHIA: Igaporã, Margem da estrada de Caetité para Bom Jesus da Lapa, 21.V.2015, fl. and fr. *J.E.Q. Faria & A.R.O. Ribeiro 4444* (SP, UB). MINAS GERAIS: Gouveia, 18º27' 16"S, 43º44'27"W, 5.IV.1998, fl. *V.C. Souza et al. 20887* (ESA, SP). Margem da rodovia descendo de Gouveia para Presidente Juscelino, próximo à lanchonete Chupa cabra, Cerrado rupestre, 18°35'40"S, 43º57'50"W, 1024 m, 7.III.2017, fl. *J.E.Q. Farias & C. Proença 7229* (BHCB, CEN, HDJF, RB, SP, UB). Jaboticatubas, Serra do Cipó, Caminho para o Capão dos Palmitos, 19º30'49"S, 43º44'42"W, 31.V.1991, fl. *R.S. Bianchini CFSC12747* (SPF).

Distimake maragniensis (Choisy) Petrongari & Sim.-Bianch.

Examined material: BRAZIL. MINAS GERAIS: Sacramento, Estrada São Roque de Minas - Sacramento, próximo ao Córrego dos Passageiros, 13.V.1995, fl., *R. Romero et al. 2230* (HUFU, SP). São Roque de Minas, Estrada São Roque de Minas-Sacramento, após o Parque, 28.VII.1993, fl., *R. Simão Bianchini & S. Bianchini 442* (HUFU, SP); estrada para o Retiro das Pedras, próximo à divisa do parque, 23.II.1997, fl., *R. Romero et al. 3971* (HUFU). 9.I.1998, fl., *R. Romero et al. 4861* (HUFU, SP). 21.IV.1997, fl., *R. Romero et al. 4220* (HUFU, SP); guarita de Sacramento, 9.I.1995, fl., *R. Romero et al. 1610* (ESA, HUFU, SP); 14.VII.1995, fl., *J.N. Nakajima et al. 1179* (HUFU); mata próxima a Cachoeira dos Rolinhos., 23.II.1997, fl., *R. Romero et al. 3997* (HUFU, SP); próximo à torre de observação, estrada para Sacramento - São Roque de Minas, 11.I.1998, fl., *R. Romero et al. 5014* (HUFU); estrada São Roque de Minas-Sacramento, próximo à guarita de Sacramento, 21.III.1998, fl., *P.T. Sano et al. 7* (SPF); estrada São Roque de Minas - Sacramento, 60km, 22.II.1997, fl., *J.N. Nakajima et al. 2254* (HUFU, SP); guarita de Sacramento, cerca de 1km, 15.IV.1997, fl., *J.N. Nakajima et al. 2302* (HUFU, SP); estrada para a garagem das Pedras, 23.III.1996, fl., *J.N. Nakajima et al. 1704* (HUFU, SP).

Additional examined material: BRAZIL. MINAS GERAIS: Carrancas, Serra da Canastra, 12.III.2013, fl., *M. Sobral et al. 15411* (HUFSJ, SP). Datas, Rodovia Datas-Serro, morro do Coco, 1300-1330m s.n.m., 8.I.1988, fl., *R. Simão-Bianchini et al. CFCR 11681* (SPF). Diamantina, Estr. Diamantina-Conselheiro da Mata. Ca. 13 km de Diamantina, 19.III.1989, fl., *A.L. Dokkedal et al. CFCR 12119* (SPF). Diamantina, Estrada entre Diamantina e Conselheiro Mata, km 185-186, próximo à entrada do Sítio Pica-Pau, campo rupestre com cerrado arenoso adjacente., 8.VII.2001, fl., *V.C. Souza et al. 25395* (ESA). Diamantina, platô de Guinda, próximo ao antigo leito da estrada de ferro, 22.III.1989, fl., *R. Mello-Silva & J.R. Pirani CFCR 1210* (SPF). Diamantina, próximo ao antigo leito da estrada de ferro próximo à Guinda, 9.I.1988, fl., *R. Simão et al. CFCR 11760* (SPF). Ibiá, 2.III.1989, fl., *B.M.T. Walter et al. 49* (IBGE). Perdizes, Fazenda Boa Vista (Ronan Afonso Borges) 935 m.s.n.m., 29.IV.1993, fl., *L.A. Martens 539* (SPF). Santana do Riacho, Estrada da Usina, 3.V.1986, fl., *R. Simão et al. CFSC 9692* (SPF). Santana do Riacho, Serra da Lapinha, maciço NW da Serra do Cipó, próximo da localidade da Lapinha, a ca. 50 km da Rodovia BH-Conceição do Mato Dentro, 27.III.1991, fl., *J.R. Pirani et al. CFCR 12126* (SPF). Santana do Riacho, Serra do Cipó: Estrada da Usina, ca. De 2,5 km do início, ao logo da rodovia BH-Conceição do Mato Dentro, 14.IV.1987, fl., *V.C. Souza CFSC 10081* (SPF). Uberaba, Fazenda Santa Juliana, a 300 metros da BR 050, na altura do km 50, 31.I.2002, fl., *G.C. Oliveira 108* (HUFU). Uberlândia, Bacia do Rio Uberabinha, Ponto vereda Duratex, 4.XII.2014, fl., *P.K.B. Hemsing & J.C. Aguilar 551* (HUFU). Uberlândia, Estação Ecológica do Panga, 22.V.1992, fl., *Feep 151* (SPF). Unaí, Fazenda Dois Irmãos, 19.VI.2004, fl., *C. Proença et al. 2797* (HUFU). SÃO PAULO: Mogi Guaçu, Martinho Prado, 15.X.1980, fl. and fr., *W. Mantovani 1187* (SP). Mogi Guaçu, Matinho Prado, 23.VI.1980, fl. and fr., *W. Mantovani 809* (SP). Mogi Guaçu, Pádua Sales, 8.IV.1980, fl. and fr., *W. Mantovani 598* (SP).

Distimake tomentosus (Choisy) Petrongari & Sim.-Bianch.

Examined material: BRAZIL. MINAS GERAIS: Delfinópolis, Fazenda Água da Serra, Trilha "Escada de Pedras", 10.III.2003, fl., *R.A. Pacheco et al. 486* (HUFU); fazenda Zé Antunes, escada de Pedras, 26.XI.2003, fl., *R. Romero et al. 6981* (HUFU); Claro, 27.II.2000, fl., *A.C.B. Silva & S.A.P. Godoy 263* (HUFU); região da Serra da Canastra, Trilha do Macaco, Floresta Estacional Semidecidual, 19.II.2011, fl., *L.S. Kinoshita et al. 11-207* (UEC); Serra da Gurita, próximo à estrada Delfinópolis-Sacramento, 8.I.1996, fl., *V.C. Souza et al. 9853* (HUFU, SP, SPF); Claro, 3.V.2001, fl., *A.C.B. Silva 925* (SPF); região da Serra da Canastra,

26.V.2011, fl., *L.S. Kinoshita et al. 11-378* (UEC). São Roque de Minas, 12.I.1994, fl., *A.M. Giulietti et al. CFCR 13545* (ESA); estrada para cachoeira dos Rolinhos, 15.V.1999, fl. and fr., *M.A. Farinaccio 314* (HRCB, SPF); estrada para Cachoeira dos Rolinhos, 26.IX.1995, fl., *R. Romero et al. 2836* (HUFU); 18IV.1997, fl., *J.N. Nakajima et al. 2363* (HUFU); Vale dos Cândidos, próximo ao córrego das Posses, 27.VI.1997, fl., *R. Romero et al. 4286* (HUFU); Vale dos Cândidos, 22.VIII.1997, fl., *J.N. Nakajima et al. 2733* (HUFU); 16.X.1997, fl., *R. Romero et al. 4700* (HUFU); 18.IV.1992, fl., *N.M. Castro 303* (HUFU); estrada para Cachoeira dos Rolinhos, 14.V.1995, fl., *R. Romero et al. 2285* (HUFU); Cerrado próximo à entrada do Parque, 26.VII.1993, fl., *R. Simão Bianchini & S. Bianchini 434* (SP); Ca. 1 km da cidade em direção à Serra da Canastra. Campo Cerrado, 12.I.1994, fl., *A.M. Giulietti et al. CFSC 13545* (SPF); estrada São Roque de Minas, 21.III.1995, fl., *R. Romero et al. 2088* (BHCB, HUFU, SP); estrada da cachoeira dos Rolinhos, 21.III.1996, fl., *J.N. Nakajima & R. Romero 1697* (HUFU); estrada para o Retiro das Pedras, próximo a divisa do parque, 23.II.1997, fl., *R. Romero et al. 3953* (HUFU); estrada para a cachoeira dos Rolinhos, 15.XII.1999, fl., *M.A. Farinaccio et al. 314* (HUFU); trilha para cachoeira do Ricardo e do Sonho, 14.II.2018, fl., *R.K. Kojima & R.Simão-Bianchini 23* (SP).

Additional examined material: Examined material: BRAZIL. MINAS GERAIS: Alpinópolis, Furnas - Faz. Salto, 23.III.1975, fl. and fr., *F.R. Martins 9* (UEC); 22.III.1975, fl. and fr., *F.R. Martins 43* (UEC, SP); 2.I.1998, fl., *R. Simão Bianchini & S. Bianchini 1217* (SP, FAU, CTES). Baependi, 3.V.2002, fl., *F.M. Ferreira 36* (ESA). Barroso, Mata do Baú, 22.III.2003, fl., *L.C.S. Assis & G.E.P. Silva 770* (CESJ, SP). Berilo, 30.IV.1991, fl., *M.G.C. & S.T.S. 228* (SP). Botumirim, 23.III.2000, fl., *J.R. Pirani et al. 4601* (SPF); Contrafortes orientais da Serra da Canastra, 29.IX.1997, fl., *A. Rapini et al. 357* (HUFU, SP, SPF). Brumadinho, 21.I.1994, fl., *L.A. Martens 609* (SPF). Buenópolis, Estrada para Serra do Cabral km 11, 23.X.2007, fl. and fr., *F.N.A. Mello et al. 142* (HUFU, SP); 11.I.1998, fl., *J.R. Pirani et al. 3892* (SPF). Cabeceira Grande, Região da ponte sobre o Rio Preto, a 29km do entrocamento BsB/Unaí/Palmital. Divisa DF/MG. 850m alt. 16º02'15"S; 47º18'34"O, 14.II.2002, fl., *B.M.T. Walter et al. 5030* (CEN, SP). Capitólio, 19.III.2007, fl., *P.O. Rosa et al. 476* (HUFU). Capitólio, 21.III.2007, fl., *P.O. Rosa et al. 562* (HUFU); Região de Furnas, Paraíso Perdido, estrada após Paraíso Perdido, ca. de 2 km a frente, 7.XI.2007, fl., *P.H.N. Bernardes et al. 274* (HUFU); trilha do Paraíso Perdido, ca. de 5 km da MG 05012.VII.2006, fl., *A.A. Arantes et al. 1873* (HUFU); estrada para Gabi Exploração I, 22.V.2007, fl., *P.H.N. Bernardes et al. 194* (HUFU). Carmo do Rio Claro, 3.XI.1990, fl., *M.J.O. Campos* (HRCB13354). Carrancas, Cachoeira da Fumaça. Cerrado com características de campo

rupestre, 14.IV.1996, fl. and fr., *F.R.S. Pires 441* (CESJ, SP); 9.XII.1983, fl., *H.F. Leitão Filho et al. 15446* (UEC); Vargem Grande, 11.XI.1997, fl., *A.O. Simões et al. 21* (UEC); fazenda Grão-Mogol, 6.X.1998, fl., *L.S. Kinoshita et al. 98-208* (UEC). Carrancas, 9.X.1997, fl., *K. Matsumoto et al.* (UEC); 1100m, 2.VII.1987, fl. and fr., *H.F. Leitão et al. 19420* (UEC). Chapada Granja, 23.III.1993, fl., *G.L. Esteves & C. Kameyama 2495* (ESA, SP). Costa Sena, 12.II.1998, fl., *P.T. Santo et al. 839* (SPF). Couto de Magalhães de Minas, 17.VII.2017, fl., *V.C. Souza 40822* (ESA). Curvelo, 5.IV.1998, fl., *V.C. Souza et al. 20864* (ESA). Delfinópolis, Estrada para Casinha Branca, Próximo à entrada da Fazenda Águas da Serra, 12.III.2003, fl., *R.L. Volpi et al. 553* (HUFU); 7.XII.2002, fl., *R.L. Volpi et al. 422* (HUFU); Estrada para Gurita, 9.III.2003, fl., *R. Romero et al. 6690* (HUFU); Estrada para Sacramento, ca. 6 Km de Delfinópolis. Fazenda Kilombo do Rio Grande. Campo rupestre, 9.I.1996, fl., *V.C. Souza et al. 9914* (ESA); 23.IX.2000, fl., *A.C.B. Silva 721* (ESA); 5.V.2000, fl., *A.C.B. Silva 438* (ESA, SP); 10.IV.2002, fl., *R. Romero et al. 6312* (HUFU); 13.IV.2002, fl., *R.L. Volpi et al. 119* (HUFU); Fazenda José Antunes, Trilha da Escada de Pedras, 11.X.2002, fl., *R. Romero et al. 6421* (HUFU); 9.XI.2005, fl., *J.N. Nakajima et al. 4009* (HUFU); Fazenda José Antunes, Estrada para Paraíso Perdido, 5.XII.2002, fl., *R.L. Volpi et al. 329* (HUFU); Trilha Escada de Pedras, 5.XII.2002, fl., *R.L. Volpi et al. 392* (HUFU); 15.V.2003, fl., *R.L. Volpi et al. 625* (HUFU); 14.IX.2004, fl., *R. Romero et al. 7098* (HUFU); 14.IX.2004, fl., *J.N. Nakajima et al. 3851* (HUFU). Diamantina, 2.VIII.1989, fl., *R. Simão-Bianchini 95* (CESJ, SP, SPF); 1200m alt, 14.IV.1990, fl., *Goro Hashimoto 20473* (GHSP, SP); 8.XII.1997, fl., *L.R. Lima et al. 14* (SPF); Estrada Gouveia-Curvelo, ca. 15km de Gouveia, 18º33'37"S, 43º50'07"W, 1057 metros, 23.IX.2008, fl., *P.O. Rosa et al. 1132* (HUFU, SP); Estrada Diamantina - Biri-Biri, 5.VI.1985, fl., *Maria Amélia V. da Cruz 84* (SP); 14.VII.1996, fl., *L.R. Parra et al 143* (SPF); 14.I.1998, fl., *J.R. Pirani et al. 4001* (SPF). Entre Jaboticatubas e S.J. Del Rey, Serra do Cipó, 10.II.1991, fl., *M.M. Arbo et al. 4810* (SPF). Felixlândia, Fazenda Santa Cruz. Cerrado, 14.I.1999, fl., *A.A. Azevedo* (BHCB, SP). Formoso, PARNA Grande Sertão Veredas, 16.II.1999, fl., *R.C. Mendonça et al. 3770* (SPF). Furnas, 16.XI.1977, fl., *N.D. Cruz et al. 6201* (UEC). Gouveia, 14.III.1999, fl., *V.C. Souza & J.P. Souza 22279* (ESA). Grão Mogol, 16.VI.1990, fl., *R. Simão-Bianchini et al. CFSC 13170* (SPF); 14.X.1988, fl., *R.M. Harley et al. 25013* (SPF). Itacambira, Estrada Itacambira-Juramento, ca. 9km de Itacambira. 1100m.s.m. 16º58'07,0"S; 43º32'04,6"W, 23.II.2002, fl., *V.C. Souza et al. 28219* (ESA, SP). Itumirim, Serra da Bocaina, alt. 800-900m, 29.VI.1987, fl., *G.J. Shepherd et al. 19019.* (UEC). Jaboticatubas, MG-020, Km 56, ca. 6 Km de Jaboticatubas. Cerrado, 11.I.1996, fl., *V.C. Souza et al. 10174* (ESA); 4.IV.2017, fl., *V.C.*

Souza 40590 (ESA); 6.III.1972, fl., *A.B. Joly et al.* (SP); Km 110 ao longo da rodovia Lagoa Santa - Conceição do Mato Dentro - Diamantina16.II.1973, fl., *M. Sazima & J. Semir 3842* (UEC); Km110 ao longo da rodovia Lagoa Santa-Conceição do Mato Dentro-Diamantina, 16.II.1973, fl., *M. Sazima & J. Semir 3842* (UEC, SP); Km113 ao longo da rodovia Lagoa Santa-Conceição do Mato Dentro-Diamantina. Alt. 1080m, 15.IV.1972, fl., *A.B. Joly et al.* (UEC, SP3828). Joaquim Felício, Serra do Cabral. 17o43'48,1"S, 44o10'25,0"W. Campo rupestre, 13.III.1999, fl., *V.C. Souza & J.P. Souza 22099* (ESA); Serra do Cabral. 17º43'44,5"S, 44º10'33,8"W. Campo rupestre, 13.III.1999, fl., *V.L. Souza & J.P. Souza 22005* (ESA, SP); 13.II.1988, fl., *W.W. Thomas et al. 5962* (SPF). Lagoa Santa, Bairro Campinho, área remanescente de cerrado no final da Rua Julio C. Lacerda, em ramal saindo da MG-010; elevação próxima do pequeno Cruzeiro, 20.II.2015, fl. and fr., *J.R. Pirani 6563* (SPF); Estrada Lagoa Santa, Conceição do Mato Dentro, 25.IX.2002, fl., *K. Yamamoto et al. C132* (UEC); proximidades da cidade, ambiente de cerr, 24.IX.2002, fl., *K. Yamamoto et al. 02-01* (UEC). Lavras, Em cerrado, próximo à cidade, 9.XII.1980, fl., *H.F. Leitão Filho et al. 11782* (UEC); 9.XII.1980, fl., *H.F. Leitão Filho et al. 11861* (UEC). Moeda, 4.VIII.1987, fl., *I.R. Andrade et al 206* (BHCB, SP).Montes Claros, 22.VIII.1995, fl., *G. Hatschbach et al. 63246* (ESA); ca 30Km. Estrada para Juramento. Campo Rupestre, 15.V.1977, fl., *P.E. Gibbs et al. 5138* (UEC). Ouro Branco, 12.VIII.1980, fl., *H.C. Lima et al. 1516* (SPF). Paracatú, Cerrado, .I.1995, fl., *L.V. Costa* (BHCB 26205, SP). Paraopeba, Reserva do Horto Florestal, 5.IV.1965, fl., *J. Elias de Paula 50* (SP). Patrocínio, 14.VII.1998, fl., *F.T. Farah 318* (ESA). Patrocínio, 25.VIII.1999, fl., *F.T. Farah 1108* (ESA); 24.III.1994, fl., *G. Ceccantini 290* (SPF). Perdizes, Divisa com João Alonso, Unidade de Conservação do Galheiro-CEMIG. Cerrado, 24.V.1994, fl., *E. Tameirão Neto & M.S. Werneck* (BHCB, SP); 6.III.2003, fl., *S. Mendes et al. 447* (SPF). Sabará, Serra da Soledade, Cerrado pedregoso, 27.VIII.2001, fl., *V.C. Souza et al. 26916* (ESA). Sacramento, 30.I.1998, fl., *R.C. Vieira 91* (SPF). Santana de Pirapama, 17.II.1971, fl., *L. Krieger 10075* (ESA, SPF); Serra do Cipó, Início da trilha da Senhorinha, 27.II.2009, fl., *D.C. Zappi 1626* (SPF). Santana do Riacho, IV.1985, fl. and fr., *P.M. Andrade & M.A. Lopes* (BHCB, SP8888). Santana do Riacho, Serra do Cipó, caminho para o morro do Calcáreo, 25.I.1990, fl., *R. Simão-Bianchini* (SP); ao longo da rodovia Belo Horizonte-Conceição do Mato Dentro. Mãe D'água (Vale do Córrego Véu da Noiva), 12.I.1981, fl., *L. Rossi et al.* (SP); Cerrado. Na estrada para Lapinha, 18.II.1982, fl., *A.M. Giulietti et al.* (SP32445); 4.V.1986, fl., *R. Simão et al. CFSC 9709* (SPF); 7.IX.1987, fl., *R. Simão et al. CFSC 10457* (SPF); 27.I.1990, fl., *R. Simão et al. CFSC 11686* (SPF); Serra do Cipó, 25.I.1990, fl., *R. Simão CFSC 11649a* (SPF); 3.V.1986, fl., *R. Simão* (SPF42483);

7.V.1987, fl., *R. Simão & V.C. Souza CFSC 10089* (SPF); 14.IV.1987, fl., *V.C. Souza CFSC 10074* (SPF); 21.II.1984, fl., *M. Venturelli* (HRCB4299); 11.III.1990, fl., *V.C. Souza & F.A. Vitta CFSC 11758* (SPF); 25.III.1991, fl., *J.R. Pirani et al. CFSC 12028* (SPF); 10.IV.1995, fl., *M. Sztutman et al. CFSC 13972* (SPF); 14.XII.1985, fl., *R. Simão et al. CFSC 9457* (SPF); 13.II.1982, fl., *A.M. Giulietti et al. CFSC 7898* (SPF); 27.III.1991, fl., *J.R. Pirani et al. CFSC 12160* (SPF); 11.XII.2006, fl., *M.F. Santos et al. 110* (SPF); 24.III.1986, fl., *C. Kameyama & D.C. Zappi CFSC 9648* (SPF); 1.V.1993, fl., *V.C. Souza & C.M. Sakuragui 3372* (ESA, SP). São João del Rey, 0.III.1970, fl., *L. Krieger* (ESA); Torre de transmissão, Serra do Lenheiro, 11.III.2010, fl. and fr., *M. Sobral 13084* (HUFSJ, SP). São Sebastião do Paraíso, Termópolis, 10.VII.1993, fl. and fr., *R. Simão-Bianchini & S. Bianchini 385* (SP); Serra do Chapadão, 4.VIII.1989, fl., *A.M.G.A. Tozzi & C. Tozzi 23073* (UEC). Tiradentes, Serra São José, 3.XI.1990, fl., *E. Tameirão Neto 581* (BHCB, SP). Uberaba, 25.III.1989, fl., *Goro Hashimoto 4905* (SP, GHSP). Uberlândia, 22.V.1992, fl., *Feep 164* (SPF); Reserva Ecológica do Panga, 4.II.1998, fl., *A.M.C. Carvalho 92* (SPF); Estação Ecológica do Panga, 15.III.2007, fl., *F.P. Araújo* (UEC175860); Região da Represa de Furnas, Morro atrás da pousada do Rio Turvo, 7.XII.2005, fl., *R. Romero et al.* (HUFU); Paraíso Perdido, 16.II.2006, fl., *R. Romero et al. 7599* (HUFU); Estrada depois do paraíso Perdido, em direção ao pardão, 16.II.2006, fl., *R. Romero et al. 7653* (HUFU). SÃO PAULO: Franco da Rocha, Parque Estadual do Juquery, campo cerrado, 2.II.2001, fl., *J.B. Baitello 914* (SPSF). Pedregulho, 28.I.1993, fl., *E.E. Macedo* (SPSF16573); Parque Estadual das Furnas do Bom Jesus. Núcleo Santa Luzia. Cerrado, 2.V.1995, fl., *E.E. Macedo et al. 26A* (SPSF); solo arenoso com pedras, 14.III.2006, fl., *E.E. Macedo* (SPSF37899); Cerrado. Trilha do Chalé, 19.II.2013, fl., *M. Pastore et al. 235* (SPSF). Região da Represa de Furnas, Estrada depois do Paraíso Perdido em direção ao paredão, 8.XII.2005, fl., *J.N. Nakajima et al. 4127* (HUFU).

Evolvulus aurigenius Mart. var. *aurigenius*

Examined material: BRAZIL. MINAS GERAIS: São Roque de Minas, guarita de Sacramento, 06.III.1994, fl., *R. Romero & J.N. Nakajima 1432* (HUFU); 09.I.1995, fl., *R. Romero et al. 1613* (HUFU).

Additional examined material: BRAZIL. MINAS GERAIS: Carrancas, Fazenda Grão-Mogol, 6.X.1998, fl., *L.S. Kinoshita et al. 98-199* (UEC). Lima Duarte, P.E. Serra do Ibitipoca, 1650m, 11.III.2004, fl., *R.C. Forzza et al. 3183* (RB, SP, K); P.E. Serra do Ibitipoca, 1650m, 11.III.2004, fl., *R.C. Forzza et al. 3183* (RB, SP, K). Morro do Pilar,

Serra do Cipó, 25.III.1989, fl., *G. Hashimoto 20637* (GHSP, SP); 25.III.1989, fl., *G. Hashimoto 20636* (GHSP, SP). Poços de Caldas, Campo do Saco, 2.III.1982, fl., *H.F. Leitão et al. 1875* (UEC); -46.3353, -21.502, 16.X.1980, fl., *F.R. Martins et al. 296* (UEC). SÃO PAULO: Campos do Jordão, PECJ, 14.III.1981, fl., *Windisch 3037* (HRCB); Parque Estadual, trilha do rio Sapucaí, no campo, 27.I.1992, fl., *S. Xavier & E. Caetano 274* (SPSF). Pedregulho, Parque Estadual das Furnas do Bom Jesus. Cerrado. Próximo à trilha do Chalé, 19.II.2013, fl., *M. Pastore et al. 239* (SPSF).

Evolvulus aurigenius Mart. var. *macroblepharis* (Mart.) Hassl.

Examined material: BRAZIL. MINAS GERAIS: Delfinópolis, trilha do Cemitério, próximo ao Vale da Gurita, 5.I.2018, fl., *M. Pastore et al. 766* (SP). São Roque de Minas, estrada para a Serra da Chapada, 08.I.1998, fl., *R. Romero et al. 4795* (HUFU); Estrada para a Cachoeira dos Rolinhos, 14.V.1995, fl., *R. Romero et al. 2298* (HUFU).

Additional examined material: BRAZIL. GOIÁS: Caldas Novas, Rio Corumbá, 1.IV.1988, fl., *G. Hashimoto 20621* (GHSP, SP). MINAS GERAIS: Antônio Carlos, Fazenda Borda do Campo, 20.II.1949, fl. and fr., *L. Krieger 1279* (SP). Belo Horizonte, Serra Taquaril, 23.III.1933, fl., *H.L. Mello-Barreto 2309* (BHCB, SP); 23.III.1933, fl., *H.L. Mello-Barreto 2311* (SP); 10.II.1927, fl., *F.C. Hoehne 18497* (SP). Brumadinho, Retiro das Pedras, 12.XII.1997, fl., *J.R. Stehmann 2324* (HRCB, BHCB, SP). Carmo da Cachoeira, 02.I.1996, fl., *J.P. Souza et al. 302* (ESA). Poços de Caldas, 17.VI.1938, fl., *J.E. Rombouts 46* (SP); 18.I.19-, fl., *F.C. Hoehne 2825* (SP); Campo do Saco, 30.XI.1982, fl., *H.F. Leitão et al. 1765* (UEC); 7.II.1983, fl., *J. Sermir & W.H. Stubblebine 1940* (UEC); 27.VIII.1980, fl., *J.Y. Tamashiro et al. 127* (UEC); 5.XI.1980, fl., *A.C. Gabrielli et al. 346* (UEC); 19.XI.19080, fl., *W.H. Stubblebine et al. 523* (UEC); 30.XI.1981, fl., *H.F. Leitão et al. 1395* (UEC); Morro do Ferro, 30.XI.1981, fl., *H.F. Leitão et al. 1411* (UEC). Santana do Riacho, 11.I.2008, fl., *J.G. Rando 529* (ESA, SPF); Serra da Lapinha, Maciço NW da Serra do Cipó, 27.III.1991, fl., *J.R. Pirani et al. CFSC 12159* (SPF); Fazenda Serra do Cipó, 28.I.1990, fl., *R. Simão-Bianchini CFSC 11708* (SPF); ao longo da rodovia BH-Conceição do Mato Dentro. Alto do Palácio, 27.I.1986, fl., *H.L. Wagner et al. CFSC 9569* (SPF). Serra de Lavras, 980 m alt. 11 km S de Lavras, caminho a Poço Bonito, 11.V.1990, fl., *M.M. Arbo et al. 3896* (SPF). Serra do Ouro Branco, 12.V.1990, fl., *M.M. Arbo et al. 3937* (SPF). SÃO PAULO: Franco da Rocha, Parque Estadual do Juquery, base do Morro do Pato, campo cerrado, 27.II.2001, fl.,

J.B. Baitello 1144 (SPSF). Rodovia São José dos Campos- Caraguatatuba, 29.IV.1966, fl., *J. Mattos 13618* (SP).

Evolvulus aurigenius Mart. var. *meissnerianus* Ooststr.

Examined material: BRAZIL. MINAS GERAIS: Delfinópolis, Região da Serra da Canastra, Trilha do Macaco, Floresta Estacional Semidecidual.,19.II.2011, fl., *L.S. Kinoshita et al. 11-221* (UEC); Delfinópolis, Claro, 27.II.2000, fl., *A.C.B. Silva & S.A.P. Godoy 252* (SPF). São Roque de Minas, estrada do Chapadão Diamante, 18.III.1995, fl., *J.N. Nakajima et al. 842* (HUFU); Km 10, estrada para Sacramento, 22.II.1994, fl., *R. Romero & J.N. Nakajima 662* (HUFU).

Additional examined material: BRAZIL. GOIÁS: Municípios de Chapadão do Céu e Mineiros, Parque Nacional das Emas, 52º39'-52º10', 17º49'-18º28', 7.IV.1999, fl., *M.A. Batalha 3252* (SP). MINAS GERAIS: Aiuruoca, 13.III.1989, fl., *L. Krieger & M. Brugger 24399* (SP). Baependi, Parque Estadual da Serra do Papagaio, 27.XII.2015, fl., *J.G.F. Mendonça et al. 171* (CESJ, SP). Belo Horizonte, Serra da Mutuca, 16.XI.1938, fl., *F. Markgraf & A.C. Brade 3556* (BHCB, RB, SP); Distrito de Casa Branca. Estrada entre a BR-040 e Casa Branca. Canga., 16.I.1994, fl., *C.M. Sakuragui et al. CFSC 13894* (K, ESA, SP, SPF). Carrancas, Caminho para a serra de Bicas, campo arenoso próximo a bifurcação na estrada, 6.XI.1999, fl., *A.O. Simões et al. 980* (UEC). Diamantina, 2.XI.1937, fl., *H.L. Mello-Barreto 9324* (BHCB, SP); COPASA, 14.II.2001, fl., *J.A. Lombardi 4267* (BHCB, SP); Morro de Cruz, 14.IV.1995, fl., *G. Hashimoto 20644* (GHSP, SP); Estrada para Biribiri, 2.VIII.1989, fl., *R. Simão-Bianchini 93* (SP, SPF); Próximo ao antigo leito da estrada de ferro próximo à Guinda, 9.I.1988, fl., *R. Simão et al. CFCR 11779* (SPF); Estrada para Conselheiro da Mata, km 192, 4.II.1987, fl., *S.J. Mayo et al. CFCR 10433* (SPF); Estrada Diamantina-São João da Chapada, 14.I.1998, fl., *R.C. Forzza et al. 635* (SPF). Moeda, Serra da Moeda, 15.XI.1987, fl., *S.F.O. Gomes* (BHCB, SP11591); 15.XI.1987, fl., *S.F.O. Gomes 11591* (SP, BHCB). Santana de Pirapama, Serra do Cipó, Trilha da Senhorinha, primeiro platô., 9.III.2009, fl., *D.C. Zappi 1973* (SPF). Santana do Riacho, 14.XII.1985, fl., *N.S. Chukr et al. CFSC 9456* (SPF, UEC).

Evolvulus cressoides Mart.

Examined material: BRAZIL.MINAS GERAIS: Capitólio, 17.II.2018, fl. and fr., *R.K. Kojima & R.Simão-Bianchini 25* (SP). São Roque de Minas, estrada São Roque de Minas - Sacramento. Cerca de 32km da sede administrativa, 9.XII.1994, fl., *J.N. Nakajima & R. Romero 744* (HUFU); Torre de observação, estrada para Sacramento - São Roque de Minas, 11.I.1998, fl., *R. Romero et al. 5008* (HUFU); Próximo a torre de observação, estrada para Sacramento - São Roque de Minas, 11.I.1998, fl., *R. Romero et al. 5010* (HUFU); 23km da sede, 19.IV.1994, fl., *J.N. Nakajima et al. 307* (HUFU).

Additional examined material: BOLIVIA. SANTA CRUZ: Velasco, Parque Nacional Noel Kempff. 250m alt, 13.VI.1994, fl., *E. Gutiérrez et al. 1419* (LPB, MO, SP). BRAZIL. DISTRITO FEDERAL: Brasília, Cristo Redentor, 11.I.1990, fl. and fr., *M. Pereira Neto & F.C.A. Oliveira 536* (FAU, IBGE, SPF). GOIÁS: Caldas Novas, Rio Quente, 31.III.1988, fl., *G. Hashimoto 20620* (GHSP, SP); estrada de acesso a UHE-Corumba, 12.II.1993, fl., *T.A.B. Dias et al. 412* (SP). Cidade Eclética, 10.III.1974, fl. and fr., *E.P. Heringer 13155* (HB, SP). Corumbá de Goiás, Serra dos Pirineus, 30.XI.1965, fl., *H.S. Irwin et al. 10750* (HST, SP, UB). Estrada Brasília, para Anápolis, 8.XII.1965, fl., *R.P. Belém 1915* (UB). Goiânia, Estr. Velha para Guapo, 16.XII.1975, fl., *A.L. Peixoto 747* (RB); 1936, fl., *A.C. Brade 15399* (RB). Guara, Vicente Pires, 27.II.1848, fl. and fr., *A.F.M. Glaziou 21805* (BM, K, P). Estr. S. Luis de M. Belos - Corrego do Ouro, 3.III.1978, fl., *H. Magnago 70* (RB). Estrada S. Luiz de M. Belos Corrego de Ouro, 3.III.1978, fl., *H. Magnago 318834* (RB). MINAS GERAIS: Alpinópolis, 1.II.1998, fl., *R.S. Bianchini & S. Bianchini 1215* (SP). Arredores de Diamantina, caminho a Mendanha, Ca. 1100 m alt., 14.II.1991, fl., *M.M. Arbo et al. 5099* (SPF). Brumadinho, Serra da Calçada (Serra da Moeda), Retiro das Pedras: 1400 m.s.n.m., 28.XII.1989, fl., *L.A. Martens 250* (SPF). Caeté, nº 6186 de Comissão Rondon, XI.1915, fl., *F.C. Hoehne 7885* (SP); nº 6186 de Comissão Rondon, fl., *A. Loefgreen 18322* (SP); XI.1915, fl., *F.C. Hoehne 6186* (SPF). Capitólio, Região de Furnas, Estrada depois do Paraíso Perdido, 22.III.2007, fl., *P.H.N. Bernardes et al. 98* (HUFU); 23.V.2007, fl., *P.H.N. Bernardes et al. 231* (HUFU). Delfinópolis, Estrada para Sacramento, ca. 6 Km de Delfinópolis. Fazenda Kilombo do Rio Grande. Campo rupestre, 9.I.1996, fl., *V.C. Souza et al. 9909* (ESA); Fazenda Santa Bárbara, 22.XII.1999, fl., *A.C.B. Silva 160* (RB, SPF). Itacambira, Estrada Itacambira - Juramento, ca. 9 km de Itacambira. Campo rupestre. 1100 m.s.m., 23.II.2002, fl., *V.C. Souza et al. 28231* (ESA). Jaboticatubas, Serra do Cipó, 11.III.1969, fl., *G. Eiten & L.T. Eiten 11074* (SP); Km 115, 15.IV.1972, fl., *A.B. Joly et al. 1525* (SP); Km 113, 15.IV.1972, fl., *A.B. Joly et al. 1485* (SP); Km 113, 15.IV.1972, fl., *A.B. Joly et al. 1469*

(SP); Estrada não-pavimentada para Lagoa Santa, saindo da MG-010; área remanescente de cerrado às margens da estrada, 20.II.2015, fl., *J.R. Pirani 6587* (SPF, SP). Montes Claros, Serra do Catuny, 10.XI.1938, fl., *F. Markgraf 3292* (BHCB, RB, SP). Santana do Pirapama., Serra do Cipó (Serra da Lapa); Distrito de São José da Cachoeira. Trilha da Senhorinha. Campo rupestre, 19.II.2007, fl., *V.C. Souza et al. 32821* (ESA). Santana do Riacho, Serra do Cipó, 14.IV.1987, fl., *V.C. Souza CFSC 10073* (CTES, F, MBM, K, SP, SPF); 1.II.1987, fl. and fr., *D.C. Zappi CFSC 9965* (F, K, MBM, RB, SP, SPF, UB, UEC); Estrada da Usina, 22.II.1986, fl., *N.S. Chukr et al. CFSC 9616* (K, MBM, SP, SPF, UB); 8.V.1987, fl., *R. Simão et al. CFSC 10148* (SP, SPF); Estrada Santana do Riacho - Lapinha, ca. 7 km após Santana do Riacho. Campo rupestre. 1100 m.s.m., 1.III.2002, fl., *V.C. Souza et al. 28672-A* (ESA). São Tomé das Letras, Morro do Gavião, 2.XI.1984, fl., *I. Cordeiro et al. CFCR 5800* (SPF). Uberlândia, 24.I.1957, fl., *A. Macedo 4890* (SP). Região da Represa de Furnas, Estrada depois do Paraíso Perdido em direção ao paredão, 8.XII.2005, fl., *R. Romero et al. 7424* (HUFU); 16.II.2006, fl., *E.K.O. Hattori et al. 481* (HUFU); Estrada depois do Paraíso Perdido, 25.X.2006, fl., *J.N. Nakajima et al. 4193* (HUFU). Reserva de Furnas, 20.II.1978, fl., *G.J. Shepherd et al. 7004* (RB, UEC). SÃO PAULO: Franca, 11.IV.1920, fl., *G. Gehrt 4025* (SP); 17.I.1893, fl. and fr., *A. Loefgren & G. Edwall CGG 2188* (SP, SPF). Pedregulho, Linha Mojiana, 1.IV.1946, fl., *K. Massuda 20463* (GHSP); 2.V.1995, fl., *W. Marcondes-Ferreira et al. 1106* (SP). São José do Barreiro, Serra da Bocaina, 24.I.1998, fl., *L. Freitas & M. Sazima 157* (SP). Near Villa Franca, .VI.1834, fl., *L. Riedel 2314* (K); VI, fl., *L. Riedel 2314* (K).

Evolvulus glomeratus Nees & Mart.

Examined material: BRAZIL. MINAS GERAIS: Sacramento, Estrada São Roque de Minas - Sacramento. Próximo a torre de observação.11.XII.1994, fl., *J.N. Nakajima & R. Romero 764* (HUFU, SP). São Roque de Minas, Estrada São Roque de Minas - Sacramento, próximo a torre de observação, 22.XI.1996, fl., *R. Romero & J.N. Nakajima 3795* (HUFU); final da estrada para a Fazenda do Fundão, 22.II.1997, fl., *J.N. Nakajima et al. 2245* (HUFU); Estrada para a Serra da Chapada., 8.I.1998, fl., *R. Romero et al. 4808* (HUFU); Guarita de Sacramento, 6.XII.1994, fl., *R. Romero & J.N. Nakajima 1441* (HUFU); 18.XI.1995, fl., *R. Romero et al. 3048* (HUFU).

Additional examined material: BRAZIL. BAHIA: Boninal, BA 148, -41.5256-12.34767, 21.I.2002, fl., *A.O. Simões et al. 1143* (UEC). Macajuba, Fazenda Sta. Luzia Velha.,

29.XII.1949, fl., *D.F. Glassauer 450* (SPSF). MINAS GERAIS: 13 km NW de Congonhas do Norte, caminho a Gouveia, 13.II.1991, fl., *M.M. Arbo et al. 5007* (SPF). 20 km de Diamantina, na estr. para Medanha., 2.XII.1984, fl., *B. Stannard et al. CFCR 6676* (SPF). 7 km de itacambira a leste da cidade, na estrada para Montes Claros.1200 m alt., 29.XI.1984, fl., *B. Stannard et al. CFCR 6550* (SPF). Almenara29.II.2004, fl., *J.A. Lombardi et al. 5693* (BHCB, SP). Belo Horizonte, XI.1977, fl., *J.M. Ferrari a683* (BHCB); Campus da UFMG, 25.XI.1989, fl., *M.T. Freitas 16883* (BHCB, SP); 5.IV.1999, fl., *J.A. Lombardi & P.O. Morais 2664* (BHCB, SP); IX.1978, fl. and fr., *J.M. Ferrari 679* (BHCB, SP). Botumirim, 20.XI.1992, fl. and fr., *R. Mello-Silva et al. 742* (CTES, SP, SPF); Estrada entre Cristália e Botumirim (7 km antes de Botumirim). 851 m.s.m., 8.XI.2002, fl., *F.F. Mazine et al. 642* (ESA). Buenópolis, Curimataí, 18.XI.1992, fl., *R. Mello-Silva et al. 622* (SP, SPF). Caldas, bairro Taquari, Reserva Morro Grande, 5.III.2008, fl., *S.A. Nicolau et al. 3936* (SP). Carmópolis de Minas, E.E. da Mata do Cedro, 4.IV.2004, fl. and fr., *L. Echternacht & T. Dornas 375* (BHCB, SP). Carrancas, Serra de Carrancas 12.III.2013, fr., *M. Sobral 15407* (HUFSJ, SP); Fazenda Água Limpa, 11.XI.1997, fl., *K. Matsmoto et al. 529* (UEC); Cachoeira da Fumaça, 7.X.1998, fl., *L.S. Kinoshita et al. 98-528* (UEC). Chapada do Norte, Rodovia Oscár Von Bentzen Rodrigues, entre os municípios de Berilo e Chapada do Norte., 18.II.2015, fl., *J.R. Pirani 6514* (SPF). Congonhas do Norte, Serra Talhada (setor nordeste da Serra do Cipó), ca. 6 km SW da estrada Congonhas do Norte - Gouveia, entrada a 3,7 km NW de Congonhas do Norte, estrada pelo alto da serra em local denominado localmente Retiro dos Pereiras., SPF, 4.II.2009, fl., *J.G. Rando 697* (SPF); 4.II.2009, fl., *L.M. Borges et al. 354* (SPF). Conselheiro Mata, 4.VI.1985, fl., *F. de Barros 1106* (SP). Diamantina, 14.I.1998, fl., *J.R. Pirani et al. 3966* (BHCB, F, SP, SPF); Biribiri, 27.XI.1992, fl., *J.R. Stehmann 20773* (BHCB, SP); Conselheiro Mata, 10.I.1987, fl., *T.S.M. Grandi et al. 2296* (BHCB, SP); Arranca Rabo, 2.XI.1937, fl., *H.L. Mello-Barreto 9318* (BHCB, SP). Diamantina,Gouveia, João Vaz 18.XI.1998, fl., *L.M.P. Paula et al. 35* (BHCB, SP); Campus II da UFVJM 1296m alt 23.XI.2005, fl., *S.C.P. Nunes & U.R. Nunes 144* (DIA, SP); 7 Km de Diamantina em direção a Curvelo. Campo rupestre., 6.VII.1996, fl., *V.C. Souza et al. 11984* (ESA); Estrada para Araçuaí, ca. 2km de Diamantina. Campo rupestre. 1300 m. s. m., 25.II.2002, fl., *V.C. Souza et al. 28391* (ESA); 11 km de Diamantina em direção a Milho Verde, 8.I.2003, fl., *A.O. Araújo et al. A-232* (ESA); estrada para Milho Verde, ca. 7 km de Diamantina, 1004 m alt., 8.I.2003, fl., *A.O. Araújo et al. A-238* (ESA); Próximo ao distrito de Mendanha e o Rio Jequitinhonha. Cerrado com solo arenoso na beira de afloramento rochoso., 18.XII.2003, fl., *V.C. Souza et al. 29636* (ESA); 12.I.2007, fl., *A.P. Savassi-*

Coutinho et al. 990 (ESA); Morro de Cruz, 14.IV.1995, fl., *G. Hashimoto 20643* (GHSP, SP); 1200m alt., 12.IV.1990, fl., *G. Hashimoto GHSP 20615* (GHSP, SP); Terreno baldio no campus II da UFVJM, 11.IV.2016, fl., *J.E.Q. Faria 5627* (HDJF, SP); 5.IV.2016, fl., *J.E.Q. Faria 5592* (HDJF, SP); 18.V.2008, fl., *F.N.A. Mello et al. 261* (HUFU, SP); Serra do Espinhaço, 28.I.1969, fl., *H.S. Irwin et al. 22744* (NY, SP, UB); Parque Estadual Biribiri, Cachoeira da Sentinela, 10.II.2014, fl., *M. Verdi et al. 6769* (RB, SP); 10.II.2014, fl., *M. Verdi et al. 6766* (RB, SP); Serra dos Cristais, 2.X.1997, fl., *A. Rapini et al. 382* (SP, SPF); 30.I.2000, fl., *R.C. Forzza & R. Mello Silva 1494* (SP, SPF); km 685 da rodovia BR 367, 23.I.2007, fl., *J.R. Pirani et al. 5671* (SP, SPF); Estrada para Gouveia, 11.XII.2011, fl., *M.R.V. Zanata et al. 1123* (SP, UB); Nos arredores da cidade, 10.XII.2011, fl., *M.R.V. Zanata et al. 1119* (SP, UB); Platô do Morro do Cruzeiro, campo rupestre, 10.I.1995, fl., *N.S. Ávilla CFCR 15413* (SPF); Estrada para Conselheiro da Mata.25.II.1987, fl., *D.C. Zappi et al. CFCR 10402* (SPF); Próximo ao antigo leito da estrada de ferro próximo à Guinda, 8.I.1988, fl., *R. Simão et al. CFCR 11741* (SPF); 27.I.1986, fl., *R. Simão et al. CFCR 9284* (SPF); São João da Chapada, Estrada Sopa - São João da Chapada, 10 km da praça de Sopa., 22.I.2012, fl., *K. Drequeceler et al. 2* (SPF); Início da Estrada para Conselheiro da Mata, 17.XII.1985, fl., *R. Simão et al. CFCR 8731* (SPF); Estrada para Conselheiro da Mata, 19.XI.1984, fl., *B. Stannard et al. CFCR 6164* (SPF); 22.III.1989, fl., *R. Mello-Silva & J.R. Pirani CFCR 12216* (SPF). Diamantina, 18.V.1990, fl., *M.M. Arbo et al. 4398* (SPF); Estrada para a gruta do Salitre, 1.VIII.1989, fl., *R. Simão-Bianchini 69* (SPF); Estrada Diamantina-São João da Chapada, 19.V.1990, fl., *V.C. Souza et al. 1534* (SPF); Bairro da Cazuza, cachoeira da Toca, 16.II.1991, fl., *M.M. Arbo et al. 5193* (SPF); Curralinho 16.IV.2011, fl., *R. Mello-Silva et al. 3429* (SPF); Estrada Diamantina-Curvelo, a 5 km de Diamantina 19.III.1989, fl., *C.F. Justo et al. CFCR 12118* (SPF); Estrada para São João Da Chapada, perto de Sopa, 23.XI.1985, fl., *J.R. Pirani et al. CFCR 8628* (SPF); Estrada para Conselheiro da Mata, a 6 km da estr. Diamantina-Curvelo, 18.XI.1984, fl., *B. Stannard et al. CFCR 6121* (SPF); Estrada Diamantina-Extração, 20.XI.1984, fl., *R.M. Harley et al. CFCR 6228* (SPF); Estrada Conselheiro da Mata-Diamantina, km 182, 29.I.1986, fl., *N.L. Menezes et al. CFCR 9384* (SPF); Fazenda Contagem, 13.XII.1980, fl., *N.L. Menezes et al. CFCR 579* (SPF); Estrada Diamantina-Conseleiro Mata, 2.III.1999, fl., *S. Crespo et al. 15* (UEC); BR 259, Afloramento rochoso a cerca de 12 km da cidade de Diamantina, próximo a placa de Altitude 1380m, sentido Diamantina - Gouveia, 19.XII.1998, fl., *L.Y.S. Aona et al. 98/61* (UEC); BR 259, Afloramento rochoso a cerca de 12km da cidade de Diamantina, próximo a placa de Altitude de 1380m, sentido Diamantina - Gouveia, 19.XII.1998, fl., *L.Y.S. Aona et al. 98/66* (UEC);

Estrada Diamantina - Medanha., 10.XII.1992, fl., *H.F. Leitão et al. 27867* (UEC); Estrada Diamantina-Conseleiro Mata, 2.III.1999, fl., *S. Crespo et al. 39* (UEC); Estrada para Biribiri., 8.XII.1992, fl., *H.F. Leitão et al. 27390* (UEC); Cadeia do Espinhaço - Estrada para Conselheiro Mata., 3.III.2002, fl., *L.D. Meireles et al. 937* (UEC). Entre Rios de Minas, Fazenda da Pedra, 12.VI.1980, fl., *P.L. Krieger 8024* (SPF). Estr. Diamantina-Curvelo, a 17 km de Diamantina, 1370m alt., 1.XI.1981, fl., *N.L. Menezes et al. CFCR 2626* (SPF). Estr. Grão-Mogol-Montes Claros, 16.IV.1981, fl., *L. Rossi et al. CFCR 1009* (SPF). Estrada Datas-Serro, Km 430, 19.III.1989, fl., *C.F. Justo et al. CFCR 12140* (SPF). Estrada Diamantina-Medanha, Km 584-585, 16.XII.1985, fl., *R. Simãio et al. CFCR 8789* (SPF). Estrada para Diamantina-Conselheiro da Mata, Km 185, 9.IX.1989, fl., *V.C. Souza & N.L. Menezes CFCR 12316* (SPF). Francisco Sá, Na estrada para Grão-Mogol, 11 km de Francisco Sá. Serra do Calixto, 26.XI.1984, fl., *R.M. Harley et al. CFCR 6418* (SPF). Gouveia, 13.III.1995, fl., *V.C. Souza et al. 8542* (ESA); 5.IV.1998, fl., *V.C. Souza et al. 20919* (ESA); Estrada Gouveia - Congonhas do Norte, ca. 6 Km da estrada Gouveia - Curvelo. Campo rupestre, bastante perturbado pelo fogo., 14.III.1999, fl., *V.C. Souza & J.P. Souza 22289* (ESA); km 60 on road to Curvelo, 11.IV.1973, fl. and fr., *W.R. Anderson 8618* (NY, SP); km 60 on road to Curvelo, 11.IV.1973, fl. and fr., *W.R. Anderson et al. 8632* (NY, SP, UB); 1269 m alt.19.VI.2010, fl., *F.O. Souza-Buturi et al. 334* (SP); Fazenda Contagem6.II.2009, fl., *R. Mello-Silva & M.G. Sajo 3145* (SPF); BR-259, 20 km SW de Gouveia, caminho a Curvelo, 20.V.1990, fl., *M.M. Arbo et al. 4470* (SPF). Grão Mogol, 10.XII.2011, fl., *M.R.V. Zanata et al. 1108* (SP, UB); 15.IV.1981, fl., *I. Cordeiro et al. CFCR 923* (K, SPF); Vale do Rio Itacambiruçu, 14.VI.1990, fl. and fr., *R.S. Bianchini et al. CFCR 12975* (SP, SPF); Trilha da Tropa, 11.XII.1989, fl. and fr., *T.R.S. Silva et al. CFCR 12434* (SP, SPF); 7.I.1986, fl., *I. Cordeiro et al. CFCR 9037* (SPF); Vale do rio Itacambiruçú, 4.IX.1985, fl., *M.L. Kawasaki et al. CFCR 8353* (SPF); 4.IX.1985, fl., *M.L. Kawasaki et al. CFCR 8408* (SPF); A montante do Córrego Jambeiro, 1.XII.2004, fl., *R.S. Oliveira et al. 75* (SPF). Juramento, Pau d'Alho, 4.XII.2004, fl., *G. Hatschbach & E. Barbosa 78812* (SPF). Lavras, 10.XII.1980, fl., *H.F. Leitão et al. 11950* (UEC); Próximo a cidade. Sapé da Serra., 9.XII.1980, fl., *H.F. Leitão et al. 11791* (UEC); Estrada de acesso à retransmissora da Cemig., 7.XII.1983, fl., *H.F. Leitão et al. 15279* (UEC). Mocambinho, planta verde, na seca, 28.VIII.1983, fl., *H. Saturnino 643* (EPAMG, SP); Estrada para Mocambinho, km 18 após trevo denominado de Furados, 18.II.1987, fl., *M. Brandão 11960* (EPAMG, SP). Morro do Ferro, Pico do Gavião, 15.I.1994, fl., *V.C. Souza et al. 5090* (SPF). Pedra Azul, 6 km ao sul da cidade na estrada para Jequitinhonha, 20.X.1988, fl., *R.M. Harley et al. 25225* (SPF). Pedro Lessa, ca 5 KM de

Trinta Réis, 13.III.1995, fl., *V.C. Souza et al. 8439* (ESA, SP, SPF). Piumhi, Topo da Serra do Andaime, 14.II.1998, fl., *R.Romero et al. 5171* (SP, UEC). Poços de Caldas, 15.IV.1960, fl., *G. Hashimoto 20724* (GHSP, SP); 9.I.1919, fl., *F.C. Hoehne 2678* (SP, SPF); Fazenda da Pedra, 9.I.1919, fl., *F.C. Hoehne s.n.* (SPF). Presidente Kubitschek, Estrada para Conceição do Mato Dentro-Diamantina, Km 43315.XII.1985, fl., *R. Simão et al. CFCR 8730* (SPF). Rodovia Datas-Serro, próximo ao antigo leito da estrada de ferro próximo à Guinda, 8.I.1988, fl., *R. Simão et al. CFCR 11732* (SPF). Santana do Pirapama, 23.III.1982, fl., *J.R. Pirani et al. CFSC 8038* (K, SP, SPF). Santana do Riacho, RPPN Brumas do Espinhaço e Ermo do Gerais, 28.I.2013, fl., *F.M. Fernandes et al. 363* (BHZB, SP). Santo Antônio do Itambé, estrada para o Pico de Itambé, 12.III.1995, fl., *V.C. Souza et al. 8378* (ESA, SP, SPF). São Tomé das Letras, Pico do Gavião22.II.1999, fl., *R. Mello-Silva et al. 1614* (K, RB, SP, SPF). Serra do Cabral, Joaquim Felicio, 10.V.1978, fl., *J.S. Silva 455* (SP). Serro, Boa Vista de Lages. 3,8 km na estrada entre a rodovia Datas-Serro (BR-259) e Boa Vista de Lages., 13.I.2014, fl., *R. Mello-Silva 3670* (SPF); road to Diamantina, 25.II.1968, fl., *H.S. Irwin et al. 20835* (SP, UB). Toledo, 7.III.1952, fl., *A.S. Pires 74252* (SP). Turvo, 24.IV.1926, fl., *F.C. Hoehne & A. Gert 17468* (SP). Uberlândia, 20.I.1989, fl. and fr., *S.M.S. Verardo CESJ 23936* (CESJ, SP, SPF); 3.V.1990, fl., *S.M.S. Verardo 23936* (SPF). Verdelândia, Junto a marca do Km 86 da estrada Jaiba/Verdelândia., 20.X.2001, fl., *J.A. Lombardi et al. 4479* (UEC). 20 Km S de Diamantina. Serra na estrada para Conselheiro da Mata., 17.V.1977, fl., *P.E. Gibbs et al. 8180* (UEC). Área próximo ao Hotel Presidente.2.XII.1982, fl., *H.F. Leitão et al. 1904* (UEC). Estrada entre Araxá e Uberaba, Km 381.22.II.1978, fl., *G.J. Shepherd et al. 7221* (UEC). Mun. próximo à divisa com a Bahia, limite do Mun. Pedra Azul e André Fernades, BR-116. Km 38. 29.I.1980, fl., *J. Sermir 10915* (UEC), Sentido Guapé, cerrado, 20.XI.2008, fl., *R.T. Queiroz et al. 1310* (UEC). Arroio do Sal, Praia Azul., 4.XI.2009, fl., *J. Cordeiro et al. 3234* (SPSF). RIO GRANDE DO SUL: Quaraí, Fazenda Rosada., 11.XI.2009, fl., *E. Barbosa et al. 2560* (SPSF). 9.XII.1983, fl., *H.F. Leitão et al. 15448* (UEC).

Evolvulus goyazensis Dammer

Examined material: BRAZIL. MINAS GERAIS: Sacramento, Estrada para o Retiro das Pedras, 14.V.1995, fl., *R. Romero et al. 2267* (HUFU, SP). São Roque de Minas, Estrada para o retiro das Pedras, 21.III.1996, fl., *J.N. Nakajima & R. Romero 1676* (HUFU); 18.IV.1997, fl., *J.N. Nakajima et al. 2385* (HUFU, SP); próximo à divisa do parque,

23.II.1997, fl., *R. Romero et al. 3954* (HUFU); Estrada para a Serra da Chapada, 8.I.1998, fl., *R. Romero et al. 4807* (HUFU); Estrada para a Cachoeira dos Rolinhos, 9.I.1998, fl., *R. Romero et al. 4870* (HUFU); 20.IV.1994, fl., *R. Romero et al. 993* (HUFU).

Additional examined material: BRAZIL. GOIÁS: Barra do Rio Torto com o Rio Paranauá, 14.II.1895, fl., *A.F.M. Glaziou 21802* (K, P, R, RB). Teresina, rodovia para Alto Paraíso, 1.XII.1992, fl., *G. Hatschbach 58361* (MBM, SP). MINAS GERAIS: Região da Represa de Furnas, Morro atrás da pousada do Rio Turvo., 7.XII.2005, fl., *R. Romero et al. 7323* (HUFU). Morro Grande, 1100m alt., 26.XII.1949, fl., *A.P. Duarte 2358* (RB, SP).

Evolvulus lagopodioides Meisn.

Examined material: BRAZIL.MINAS GERAIS: Sacramento, Chapadão do Diamante, 11.V.1995, fl., *R. Romero et al. 2175* (HUFU, SP). São Roque de Minas, Trilha do córrego da Fazenda, 20.III.1996, fl., *R. Romero & J.N. Nakajima 3369* (HUFU); Chapadão do Diamante, após a antena, 9.VII.1996, fl., *J.N. Nakajima et al. 1911* (HUFU); Estrada para o Retiro das Pedras, próximo à divisa do parque, 23.II.1997, fl., *R. Romero et al. 3951* (HUFU); Chapadão do Diamante, 18.IV.1997, fl., *J.N. Nakajima et al. 2323* (HUFU); 27.VI.1994, fl., *J.N. Nakajima & R. Romero 389* (HUFU, SP); Morro próximo a sede administrativa, 19.II.1997, fl., *R. Romero et al. 3823* (HUFU); Estrada do Chapadão Diamante, 18.III.1995, fl., *J.N. Nakajima et al. 816* (HUFU, SP).

Additional examined material: BRAZIL. DISTRITO FEDERAL: Brasília, 18.VI.1996, fl. fr., *C. Proença & S.M.S. Almeida 1443* (SP, UB); Faz. Água Limpa, 1.IV.1976, fl., *J.A. Ratter & S.G. da Fonseca 2856* (K, SP, UB); 31.I.1991, fl., *A. Freire-Fierro & A.M.S.F. Vaz 3034* (SPF, SP); morro a margem direita do córrego Cabeça de Viado, 8.IV.1980, fl., *E.P. Heringer et al. 4265* (IBGE, K, SP); 27.VIII.1964, fl., *H.S. Irwin & T.R. Soderstrom 5644* (SP, UB); 24.IV.1978, fl., *E.P. Heringer 17059* (FAU, IBGE, SP); Península Norte, 15.XII.1982, fl., *E.P. Heringer 18491* (FAU, IBGE, R, SP); Chapada da Contagem, 22.VI.1982, fl., *T.B. Croat 53636* (K, SP, UB); Área do Cristo Redentor, 25.VIII.1988, fl. and fr., *M. Pereira Neto 67* (FAU, IBGE, SP); 30.I.1980, fl., *H.L. Cesar 131* (SP, UB). fl., *H.L. Cesar 131* (SP, UB). BAHIA: Cocos, Faz. Trijunção, 15.V.2001, fl., *M.L. Fonseca et al. 2661* (IBGE, SP). GOIÁS: Alto Paraiso de Goiás, Chapada dos Veadeiros, 8.II.1987, fl., *J.R. Pirani et al. 1779* (K, SPF, SP); 20.V.1994, fl., *M.A. Silva et al. 1928* (IBGE, SPF, SP); 14.III.1995, fl., *T.B. Cavalcanti et al. 1328* (CEN, SPF, SP). Cavalcante, Chapada dos Veadeiros, 1513 m, 22.III.2012, fl., *L.M. Borges et al. 574* (RB, SPF, SP). Chapada dos

Veadeiros, road from Alto Paraiso to Teresina, 30.V.1994, fl., *S. Bridgewater et al. 219* (K, SP); ca. 65 km due North of Brasilia, 21.XII.1968, fl., *R.M. Harley & G.M. Barroso 11363* (K, SP). Cristalina, 12.III.1989, fl., *T.B. Cavalcanti et al. 408* (CEN, SPF, CEN); estrada para Paracatu, 4.II.1987, fl., *J.R. Pirani et al. 1501* (K, SPF, SP); 4.II.1987, fl., *J.R. Pirani et al. 1581* (K, SPF, SP); 23.III.1963, fl., *E.P. Heringer 9221* (SP); 23.III.1963, fl., *E.P. Heringer 922* (SP). Pirenópolis, 18.III.2006, fl., *P.G. Delprete et al. 9575* (K, RB, SPF, SP); V.1936, *O.H. Leonardos 70239* (RB, SP). Catalão, Área de influência Indireta do AHE Serra do Facão, Goiás/Minas Gerais, 5.IV.2008, fl. and fr., *A.A. Arantes SF 959* (HUFU, SP). Corumbá de Goiás, Pontes Pirineus, 26.V.1968, fl.*E. Onishi et al. 84* (RB, SP, UB). Goiânia, 10.II.1988, fl., *J.R. Pirani et al. 2086* (NY, SPF, SP). Vila Terezinha, 3.VII.1978, fl., *S.C. Silva 33* (RB, SP). fl., *L. Riedel SP959* (K, SP). Entre les Sources du Rio Torto et campos Sobradinho, 21.II.1896, fl., *A.F.M. Glaziou 21798* (K, P, SP). MINAS GERAIS: Guarda Mor, Serra dos Pilões, 31.I.1990, fl., *M.M. Arbo et al. 3280* (HRCB, SP). Patrocínio, Morro das Pedras, 29.I.1970, fl., *H.S. Irwin et al. 25611* (SP, UB). Uberlândia, Reserva Ecológica do Panga, 20.III.198-, fl., *I. Schiavini 102* (SPF). fl., *L.H. Soares & Silva 1037* (UB, SPF, SP).

Evolvulus pterygophyllus Mart. var. *pterygophyllus*

Examined material: BRAZIL. MINAS GERAIS: São Roque de Minas, Estrada para Cachoeira dos Rolinhos, 14.V.1995, fl., *R. Romero et al. 2288* (HUFU).

Additional examined material: BOLIVIA. SANTA CRUZ: Velasco, Parque Nacional Noel Kempff Mercado, along trail beteen camp. Huanchaca 2 y La Palmera, 15.V.2010, fl., *J.R.I. Wood et al. 26771* (K, SP). BRAZIL. DISTRITO FEDERAL: Brasília, 8.III.1965, fl., *L.B. Smith a35* (SP, UB); 14.IV.1983, fl., *M.A. Alves 99* (HEPH, SP). Brasília, Faz. água Limpa, 23.VIII.2006, fl. and fr., *J.C.M. Lima & C.V. Silva 140* (SP, UB); Área de preservação da Caesb, Chapada da Contagem, 25.VI.1992, fl. and fr., *T.A.B. Dias & G.P. Silva 215* (CEN, SP); PN de Brasília, 21.II.2004, fl., *C.R. Martins 244* (SP, UB); Estação Ecológica Jardim Botânico, 5.IV.2005, fl. and fr., *I.N.C. Azevedo et al. 353* (HEPH, SP); Estação Florestal Cabeça de Veado, 15.IV.1985, fl., *A.E. Ramos & P.E.A.M. Oliveira 372* (HEPH, SP); 5.II.1992, fl., *M. Barros et al. 2285* (IBGE, SP, UB); Chapada da Contagem, 17.VIII.1964, fl., *H.S. Irwin & T.R. Soderstrom 5251* (SP, UB); Paranoá, 13.XII.1965, fl., *H.S. Irwin et al. 11248* (SP, UB); Águas Emendadas, 8.IV.1975, fl., *E.P. Heringer 14520* (IBGE, SP, UB); 24.III.1976, fl., *E.P. Heringer 15481* (IBGE, SP, UB); Taguatinga, 20.I.1977, fl., *E.P.*

Heringer 16722 (IBGE, SP); Parque Nacional de Brasília, 5.II.1992, fl., *M. Barros s.n.* (HRCB). Gama, Reserva Ecológica, SP, UB, 4.IV.2001, fl., *B.M. Gomes et al. 277* (SP, UB). BAHIA: Caravelas, Entre os rios do Macaco e Massangano, formações e moitas e herbáceas inundadas e não inundadas, sobre cordões arenosos, 5.VII.2007, *H.M. Dias et al. 170* (RB, SP). Rio de Antônio Estrada para Pico das Almas, 6.I.2000, *A.B. Marcon 238* (HUEFS, SP). Rio de Contas, 6.II.1988, fl., *R. Kral et al. 1497* (HUEFS, SP); Estrada para Mato Grosso, 17.IV.2009, fl., *R.M. Harley et al. 55938* (HUEFS, SP). GOIÁS: Chapada dos Veadeiros, ca. 30 km N of Veadeiros, elev. 1000m alt., 16.III.1969, fl., *H.S. Irwin et al. 24483* (K, SP); 18.II.1967, *A.P. Duarte 10704* (RB, SP). Alto Paraíso de Goiás, RPPN Cara Preta, 14.I.2007, fl., *C.V. Silva et al. 82* (SP); 13.VII.2007, fl., *C.V. Silva & R. Sebastiani 146* (SP). Anápolis, 11.III.1978, fl., *H. Magnago et al. 180* (HRB, RB, SP). Luziania, 26.III.1982, fl., *E.P. Heringer 18288* (K, SP). On the caminho de Nene. Between the cith of Zacharia Ferreira and the city, 23.III.1828, fl., *W.J. Burchell 6780* (K, SP). Paraíso de Goiás, Beria de GO -118, sentido Alto Paraíso de Goiás - Terezina, 14.III.2007, fl., *J.F.B. Pastore et al. 1840* (HUEFS, SP). Planaltina de Goiás, 20.III.2003, fl., *M.L. Fonseca et al. 4408* (IBGE, SP). São Domingos, 22.I.2009, fl., *A. Rapini et al. 1809* (HUEFS, SP). Teresina de Goiás, 30.II.1988, fl., *T.B. Cavalcanti et al. 67* (SPF, SP). MATO GROSSO: General Carneiro, Moruri, VII.1963, fl. and fr., *T. Hartman 8* (SP). Santo Antônio do Leverger, 15.II.1997, fl., *M.C.M. Amorozo 281* (HRCB). São Félix do Araguaia, 15.III.1997, fl., *V.C. Souza et al. 14221* (ESA, SP). MATO GROSSO DO SUL: Corumbá, 17.VIII.1984, fl., *A. Pott 1323* (CPAP, SP). MINAS GERAIS: Chapadão Diamante, 11.V.1995, fl. and fr., *R. Romero et al. 2175* (SP). Delfinópolis, Serra Preta, Trilha Chora Mulher, 6.VIII.2009, fl., *R. Morokaw et al. 240* (UEC). Montalvânia, APA do Rio Pandeiros, 19.IX.2006, fl. and fr., *F. Marino et al. 142* (BHCB, SP). Santana de Pirapama, 15.II.2007, fl., *D.C. Zappi 700* (SPF). Uberlândia, 20.I.1989, fl. and fr., *S.M. Martins a39* (HUFU, SPF, SP); 20.III.1989, fl., *I. Schiavini 102* (HUFU, SPF, SP); Faz. Pinusplan, 6.V.2002, fl., *G.C. Oliveira 555* (HUFU, SP); 31.I.2002, fl., *G.C. Oliveira 417* (HUFU, SP); 20.I.1989, fl., *S.M.S. Verardo 23960* (SP, HUFJF); 28.II.2002, fl., *G.C. Oliveira 269* (HUFU, SP).

Evolvulus pterygophyllus Mart. var. *puberulus* Meisn.

Examined material: MINAS GERAIS: São Roque de Minas, Torre de observação, estrada para Sacramento - São Roque de Minas, 11.I.1998, *R. Romero et al. 5002* (HUFU, SP);

Guarita de Sacramento, 06.XII.1994, *R. Romero & J.N. Nakajima 1464* (HUFU); 14.II.2018, fl., *R.K. Kojima & R.Simão-Bianchini 21* (SP).

Additional examined material: BRAZIL. BAHIA: Abaíra, Serra do Atalho, 18.IV.1994, fl., *E. Melo et al. 1002* (HUEFS, SP). MINAS GERAIS: Uberlândia, Estiva, 24.II.2002, fl., *G.C. Oliveira 225* (HUFU, SP). Uberlândia, 28.II.2002, fl., *G.C. Oliveira 269* (HUFU, SP). PIAUÍ: Guaribas, 28 III.2007, fl., *R. Barros et al. 2925* (HUEFS, SP). SÃO PAULO: Pedregulho, P.N. Furnas do Bom Jesus, 18.III.1994, fl., *W. Marcondes-Ferreira et al. 792* (HRCB, SP, SPF, UEC).

Ipomoea acutisepala O'Donell

Examined material: BRAZIL. MINAS GERAIS: São Roque de Minas, Torre de observação, estrada para Sacramento - São Roque de Minas, 11.I.1998, fl., *R. Romero et al. 5001* (HUFU); Estrada São Roque de Minas - Sacramento, garagem de Pedras, 09.XII.1994, fl., *J.N. Nakajima & R. Romero 738* (HUFU).

Additional examined material: ARGENTINA. MISIONES: San Ignácio, 14.I.1946, fl., *G.J. S 1812* (LIL, SP); 3.XI.1947, fl., *G.J. Schwartz 5098* (LIL, P, SP); 4.XI.1947, fl., *G.J. S 5099* (LIL, SP); 5.XI.1949, fl., *G.J. S 5121* (LIL, SP); 19.XI.1948, fl., *G.J. S 6605* (LIL, SP); 19.II.1948, fl. and fr., *A.G. Schultz 7167* (CTES, LIL, SP). Candelaria, 2.XII.1946, fl., *A.G. Schultz 3530* (LIL, SP). BRAZIL. PARANÁ: Campo Largo, Rio Papagaio, 20.XII.1953, fl., *G. Hatschbach 3674* (LIL, MBM, RB, SP). Castro, 22.XI.1990, fl., *A.C. Cervi & A. Dunaiski 3229* (SP, UPCB). Caxambú, 16.I.1949, fl., *M.A. Palacios et al. 4147* (LIL, SP). Colombo, 14.XII.1983, fl., *A. Bidá et al. 174* (SP, UPCB). Curitiba, Uberaba, 19.I.1953, fl., *G. Hashimoto 4974* (GHSP, SP). Estrada do Marmeleiro, 21.II.1971, fl., *G. Hatschbach 26439* (MBM, RB, SP). Guarapuava, 9.XII.1969, fl., *G. Hatschbach 23450* (MBM, RB, SP). Jaguariaíva, BR151, 26.XI.2005, fl., *T.B. Cavalcanti et al. 3675* (CEN, SP); 28.XII.2000, fl., *M.K.F. Souza et al. 43254* (SP, UPCB). Oficinas, 29.III.1904, fl., *P. Dusén 4058* (R, SP). Palmas, BR 280, 1250 m alt., 28.I.1985, fl. and fr., *A. Krapovickas & C.L. Cristóbal 39719* (ARIZ, CTES, K, LIL, SP). Palmeira, 16.I.1951, fl., *W. Martins 4368* (LIL, MBM, SP). Piraby, 26.XII.1903, fl., *P. Dusén 2965* (LIL, R, SP). Ponta Grossa, 23.XII.2004, fl., *P.B. Schwardsburd & R. Nagata 417* (SP, UPCB); XII.1969, fl., *L. Krieger 8098* (CESJ, SP); 24.XII.1971, fl., *L. Krieger 11365* (CESJ, SP); 5.XII.1994, fl., *K.G. Kissmann 287943* (SP). Porto Vila Velha, a 21 km SE de Ponta Grossa, 20.II.1948, fl., *G. Tessmann 2967* (LIL, SP). São José dos Pinhais, 12.XII.1969, fl., *G. Hatschbach 23169* (MBM, RB, SP). Vila Velha,

Rodovia do Café, 24.VI.1978, fl., *P. Occhioni 8434* (RFA, SP). Vila Velha, 12.I.1988, fl., *A. Krapovickas & C.L. Cristóbal 40802* (CTES, ARIZ, SP). RIO GRANDE DO SUL: Passo do Socorro, 27.XII.1951, fl., *B. Rambo 51633* (LIL, SP). Vacaria, 8.I.1988, fl., *A. Zanin et al. 105* (ICN, SP). Vacaria, 23.XII.1982, fl., *A. Krapovickas& A. Schinini 38237* (CTES, SP); 25 km NE, 5.XII.1971, fl., *J.C. Lindeman & J.F.M. Valls 716* (CTES, SPF, SP). SANTA CATARINA: Araranguá, Curralinhos, 7.XII.1944, fl., *R. Reitz 870* (RB, SP). Caçador, SC 451, 10.I.2012, fl., *P.P.A. Ferreira et al. 814* (ICN, SP). Campos Novos, 23.X.1974, fl., *E. Santos et al. 3453* (R, SP); 20.XII.1962, fl., *R. Reitz & R.M. Klein 14262* (R, SP); 23 km W, 5.II.1990, fl., *A. Krapovickas & C.L. Cristóbal 43574* (CTES, LIL, SP). Cerro Negro, 7 km de Campo Belo do Sul, 14.I.1988, fl. and fr., *A. Krapovickas & C.L. Cristóbal 42007* (CTES, ARIZ, LIL, SP). Irani, 15.XII.1964, fl., *L.B. Smith & R.M. Klein 13961* (R, SP); 28.XII.1963, fl., *R. Reitz & R.M. Klein 16463* (R, SP). Joaçaba, 24.XII.1956, fl., *L.B. Smith & R. Reitz 9149* (R, SP). Lajes, BR 2, I.1964, fl., *B.C. Teixeira & A.R. Teixeira 38* (SP). Mafra, 27.I.1953, fl., *R. Reitz 5370* (LIL, SP). Ponte Alta do Sul, Curitibanos, 5.XII.1962, fl., *R.M. Klein 3234* (R, SP). Porto União, 17.XII.1956, fl., *L.B. Smith & R. Reitz 8632* (K, R, SP). São Joaquim, 12.XII.1988, fl., *G. Hashimoto 4990* (GHSP, SP); São Sebastião do Arvoredo, 11.I.1992, fl., *G. Hashimoto 20664* (GHSP, SP). Três Barras, 26.II.1948, fl., *A. Mattos & L. Laboriau 63218* (LIL, RB, SP). Xanxerê, 3.I.1957, fl., *L.B. Smith & R. Reitz 9828* (R, SP). SÃO PAULO: Capão Bonito, 9XII1966, fl., *J. Mattos & N. Mattos 14867* (SP); 9.XII.1966, fl., *J. Mattos & N. Mattos 14867* (SP). 1816, fl., *A. Saint Hilaire 1525* (P, SP).

Ipomoea aprica House

Examined material: BRAZIL. MINAS GERAIS: São Roque de Minas, 16.II.2000, fl., *R.C. Mota 129* (BHCB); 16.XII.1998, fl., *M.A. Farinaccio 260* (HRCB, SPF); Cachoeira Casca D'Anta, Estrada para parte de cima, 12.I.1996, fl., *R. Romero et al. 3269* (HUFU); 12.I.1995, fl., *R. Romero et al. 1784* (HUFU). Parte de cima da Cachoeira Casca D'Anta, 17.IV.1997, fl., *R. Romero et al. 4144* (HUFU); Estrada para a Serra da Chapada, 8.I.1998, fl., *R. Romero et al. 4802* (HUFU); 11.II.2018, fl. and fr., *R.K. Kojima & R.Simão-Bianchini 10* (SP); 12.II.2018, fl., *R.Simão-Bianchini & R.K. Kojima 2190* (SP); São José do Barreiro, Serra da Babilônia, 3.I.1998, fl., *R.S. Bianchini & S. Bianchini 1213* (CTES, ARIZ, R, SP, SPF, UEC). **Additional examined material:** BOLIVIA. PARAGUAY: Amambay, Cerro Corá, 14.XII.1999, fl., *M.S. Ferrucci et al. 1445* (CTES, SP). BRAZIL. DISTRITO FEDERAL: Brasília, Reserva Biológica de Águas Emendadas, 24.I.1978, fl., *H.C. Lima et al. 253* (RB,

SP); Bacia do Rio São Bartolomeu, 27.XII.1979, fl., *E.P. Heringer et al. 2982* (IBGE, K, NY, SP); 28.I.1966, fl., *H.S. Irwin et al. 12089* (ARIZ, NY, SP, UB); 2.II.1966, fl., *H.S. Irwin et al. 12189* (UB, NY, SP); 15 km lago Paranoá, 25.II.1970, fr., *H.S. Irwin et al. 26625* (ARIZ, NY, SP, SPF, UB). Centro Geográfico do Brasil, 21.I.1978, fl., *A.H. Gentry 21435* (MO). Quebrada dos Neri, 1.III.1992, fl., *E. Melo & F. Franca 611* (CEN). GOIÁS: Água Quente, 6.I.2001, fl., *R.S. Bianchini 1498* (SP). Caldas Novas, 12.I.1981, fl., *N.L. Menezes CFCR 643* (K, SP, SPF); 20.XII.1951, fl., *A. Macedo 3532* (LIL). Catalão, 25 km N, 21.I.1970, fl., *H.S. Irwin et al. 25015* (ARIZ, NY, SP, UB). Corumbá de Goiás, Serra dos Pirineus, 21.I.1968, fl., *H.S. Irwin et al. 18935* (UB). Cristalina, 7.II.2002, fl., *A.O. Simões et al. 1196* (UEC); Serra dos Cristais, 3.IV.1973, fl. and fr., *W.R. Anderson et al. 8062* (UB); 2.III.1966, fl., *H.S. Irwin et al. 13310* (ARIZ, NY, UB, UEC). Divisa com MG, Área de influência Direta do AHE Serra do Facão, 25.I.2008, fl. and fr., *A.A. Arantes et al. SF 779* (HUFU, SP). Entre Catalão e Cristalina, 30.I.1990, fl., *M.M. Arbo et al. 3085* (CTES, HRCB). Estrada Luziânia-Vianópolis, 14.III.1978, fl., *H. Magnago 241* (HRB, RB). Niquelândia, 23.I.1972, fl., *H.S. Irwin et al. 34880* (NY, SP, UB). Rio Corumbá, 18.I.1967, fl., *E.P. Heringer 11290* (UB). Serra dos Pirineus, estrada para Niquelândia, 22.I.1968, fl., *H.S. Irwin et al. 18975* (ARIZ, NY, SP, UB). fl., *A.F.M. Glaziou 21788* (K). MINAS GERAIS: Belo Horizonte, Jard. Bot., 31.I.1932, fl., *H.L. Mello-Barreto 67* (RB); Serra do Curral, 1955, fl., *J. Vidal V154* (R); 28.I.1934, fl., *H. Monteiro Filho 657* (RBR); 29.I.1934, fl., *H. Monteiro Filho 758* (RBR); 30.XII.1952, fl. and fr., *L. Krieger 2196* (CESJ, SP); 28.XII.1932, fl., *H.L. Mello-Barreto 2361* (BHCB, SP); 18.I.1933, fl., *H.L. Mello-Barreto 2365* (BHCB, SP, SPF); Barreiro, 31.I.1933, fl., *H.L. Mello-Barreto 2367* (BHCB, R, RB, SP); Serra do Taquaril, 29.III.1933, fl. and fr., *H.L. Mello-Barreto 2370* (BHCB); Morro do Candido, II.1934, fl., *A.J. Sampaio 6621* (R, SP); Faz. Baleia, 19.I.1943, fl., *A.P. Viegas & MB* (IAC7216). Brumadinho, 31.I.1989, fl. and fr., *L.A. Martens 29* (SPF); 15.I.1990, fl. and fr., *L.A. Martens 357* (SPF). Caeté, 28.III.1957, fl., *E. Pereira & G.F.J. Pabst 2707* (HB, RB); 24.I.1921, fl., *F.C. Hoehne* (SP5099). Caminho para Santana do Riacho, 11.II.1991, fl., *M.M. Arbo et al. a4912* (CTES, K, SPF). Carandaí, Hermilo Alves, I.1960, fl., *A.P. Duarte 5071* (HB). Corinto a 25km, 3.III.1970, fl., *H.S. Irwin et al. 26842* (UB). Delfinópolis, Estrada para Sacramento, ca. 6 Km de Delfinópolis. Fazenda Kilombo do Rio Grande, campo rupestre., 9.I.1996, fl., *V.C. Souza et al. 9906* (ESA). Entre São José de Almeida e Conceição do Mato Dentro, 10.II.1991, fl., *M.M. Arbo et al. 4819* (CTES, SPF, SP). Francisco Sá, 3.I.1991, fl., *S. D'Angelo Neto 254* (SPF). Francisco Sá, 31 km NE, 11.II.1969, fr., *H.S. Irwin et al. 23036* (ARIZ, NY, SP, SPF, UB). Gouveia, 5.II.1985, fl., *R.M. Oliveira 5743* (BHCB);

14.III.1999, fl., *V.C. Souza & J.P. Souza 22280* (ESA, SP); 23.I.1998, fl., *J.P. Lemos Filho* (BHCB 40325, SP). In campis glareosis pr. Riepo Fosedo, I.1825, fl., *L. Riedel 1368* (NY). Jaboticatubas, Serra do Cipó, 16.I.1985, fl., *A.H. Gentry et al. 49583* (MO). Lagoa Santa, 27.I.1934, fl., *H. Monteiro Filho 643* (RBR); 18.XII.1948, fl., *M.A. Palacios et al. 3282* (LIL, R). Nova Lima, Morro do Chapéu, 12.I.1983, fl., *P.M. Andrade 4607* (BHCB); Serra da Mutuca, II.1945, fl., *L.O. Williams & V. de Assis 5710* (R, G); Mutuca, fl., *J. Badini* (OUPR24900). Ouro Branco, 8.III.1995, fl., *V.C. Souza et al. 7901* (ESA). Ouro Branco, 16.I.1994, fl., *A.M. Giulietti et al. CFCR 13766* (K, SP, SPF). Ouro Preto, Cachoira do Campo, 25.II.1978, fl. and fr., *J. Badini* (OUPR24375); Santo Antônio do Leite, 25.II.1978, fl., *J. Badini & M.A. Zurlo* (OUPR24376); Santo Antônio do Leite, 29.XII.1976, fl. and fr., *J. Badini* (OUPR24907); Rodrigo Silva, 25.II.1978, fl., *J. Badini* (OUPR24377). Paraopeba, 5.III.1987, fl., *F.A. da Silveira 80* (VIC). Paraopeba, 14.I.1965, fl., *W. Handro 89* (SP). Perdizes, 5.I.1995, fl., *E. Tameirão Neto & M.S. Werneck 1413* (BHCB, SP). Santana do Riacho, Serra do Cipó, 13.I.1951, fl., *J.M. Pires & A. Black 2759* (IAN); ca. 850 m. alt., II.1953, fl., *J. Vidal II 6331* (R, SP); II.1953, fl. and fr., *J. Vidal II 6371* (R, SP); II.1953, fl. and fr., *J. Vidal II 6379* (R, SP); 6.III.1958, fl. and fr., *E.P. Heringer & A. Castellanos* (HB32898, R). São Julião, Serra do Ouro Branco, 22.XII.1888, fl., *A.F.M. Glaziou* (R45692). Serra da Anta, Paracatu a 7 km, 4.II.1970, fl., *H.S. Irwin et al. 26036* (ARIZ, NY, SP, UB). Serra das Araras, VI.1840, fl., *Gardner 5034* (BM). Serra do Lenheiro, 10.I.1889, fl., *A.F.M. Glaziou 17710* (K, R). Sete Lagoas, Ipeaco, 11.III.1969, fl. and fr., *J.B. Silva 288* (PAMG, SP). Tapira, 6.XII.1977, fl., *H.F. Leitão Filho et al. 6600* (UEC). Unaí, ca de 500m a oeste do portão central da UHE Queimados, 25.III.2002, fr., *G. Pereira-Silva et al. 6196* (CEN, SP). 22 km NE de São José de Almeida, Caminho a Santana do Riacho, 11.II.1991, fl., *M.M. Arbo et al. 4912* (SPF). 28 km de Paracatu, camino a Guarda Mor, 31.I.1990, fl., *M.M. Arbo et al. 3187* (CTES, HRCB). 1840, fl., *P. Claussen 1762* (BM, K). XI.1892, fl. and fr., *A.F.M. Glaziou 19671* (K). Serra do Cipó, 6.III.1958, fl., *E.P. Heringer 22224* (R). SÃO PAULO: Franco da Rocha, 23.II.2001, fl., *J.B. Baitello 1073* (SP, SPSF); P.E. Juqueri, 9.I.2003, fl., *J.B. Baitello & F.S. Peres 1332* (SPSF); 9.I.2003, fl., *J.B. Baitello & F.S. Peres 1398* (SPSF).

Ipomoea argentea Meisn.

Examined material: BRAZIL. MINAS GERAIS: São Roque de Minas, 16.II.2000, fl., *R.C. Mota 137* (BHCB, SP); Garagem de Pedras, 12.I.1995, fl., *R. Romero et al. 1772* (HUFU); Arredores do Parque Nacional da Serra da Canastra, 12.I.1994, fl., *A.M. Giulietti et al. CFCR*

13609 (SPF); São José do Barreiro, Serra da Babilônia, 3.I.1998, fl., *R.S. Bianchini & S. Bianchini 1210* (ARIZ, SP, SPF, UEC).

Additional examined material: BRAZIL. DISTRITO FEDERAL: Brasília, Parque Nacional de Brasília 47º56'00.5",15º44'06.4", 1.III.2015, fl., *C.R. Martins 1526* (SP). MATO GROSSO: Chapada dos Guimarães, II.1986, fl., *F.H. Caetano* (HRCB6581). MINAS GERAIS: Baependi, Toca dos Urubus, 13.III.2004, fl., *F.M. Ferreira et al. 661* (CESJ, SP). Barroso, Mata do Baú, 4.II.2003, fl., *L.C.S. Assis et al. 651* (CESJ, SP). Belo Horizonte, Campus da UFMG. Educação Física, 17.III.1982, fl., *T.S.M. Grandi 916* (BHCB); 10.III.1933, fl., *H.L. Mello-Barreto 2333* (BHCB, R, SP); 12.III.1936, fl. and fr., *H.L. Mello-Barreto 5166* (BHCB, RB, SP); 5.II.1991, fl., *E.M. Bacariça 110* (BHCB, SP). Belo Horizonte, Freitas, 17.I.1933, fl. and fr., *H.L. Mello-Barreto 2331* (LIL, R, SP); 25.I.1919, fl., *A. Gehrt 3132* (SP, SING). Campina Verde, 6.II.1944, fl., *A. Macedo 249* (BM, MO, SP). Carmópolis de Minas, E.E. da Mata do Cedro, 23.I.2005, fl., *L. Echternacht et al. 810* (BHCB, SP). Entre-Rios de Minas, II.1970, fl. and fr., *L. Krieger 8039* (CESJ, RB, SP); III.1970, fr., *L. Krieger 8230* (CESJ, SP, SPF). Gouveia, Margem da rodovia Curvelo-Gouveia, ponto do córrego do Tigre, 16.III.2016, fl., *J.E.Q. Faria & T.J.O. Otoni 5513* (HDJF, SP, UB). Jequitaí, 91.5 km NE of Pirapora towards Montes Claros, to the right of BR 365 on outcrop of quartzite and canga with extensive gravelly gentle slopes, with open cerrado vegetation. 880 m., 27.I.1991, fl., *N.P. Taylor et al. 1449* (SPF). Matozinhos, 2.II.2007, fl., *G.Q. Freire et al. 251* (PMSP). Serra do Taboão, Campos do Meio, 3.I.1980, fl., *A.B. Rocha* (SPF79985). Sete Lagoas, Faz. Santa Rita, 26.I.1970, fl., *J.B. Silva 446* (PAMG, SP). SÃO PAULO: Pedregulho, Parque Estadual das Furnas do Bom Jesus, Cerrado, Próximo à trilha do Chalé, 19II.2012, fl., *M. Pastore et al. 234* (SPSF).

Ipomoea campestris Meisn.

Examined material: BRAZIL. MINAS GERAIS: São Roque de Minas, morro após o córrego dos Passageiros, I.1998, fl., *R. Romero et al. 4956* (HUFU); estrada São Roque de Minas - Sacramento, I.1995, fl., *R. Romero; et al. 1738* (HUFU).

Additional examined material: BRAZIL. MINAS GERAIS: Curvelo-Corinto, 2.X.1965, fl., *A.G. Ferreira & M. Marques 50* (SP); 2.X.1965, fl., *A.G. Ferreira & M. Marques 33* (SP). Indianópolis, 2.XI.1985, fl., *I.S. Gottsberger 14-21185* (SP, ULM). Santana do Riacho, Serra do Cipó, 3.XI.1972, fl., *A.B. Joly & J. Semir CFSC 3572* (SP); 2.II.1987, fl., *D.C. Zappi & F.A. Vitta CFSC 9997* (SP, SPF); km 114 ao longo da rodovia Belo Horizonte-Conceição

do Mato Dentro, 13.XII.1985, fl., *R. Simão et al. CFSC 9434* (SPF, SP); km 106 ao longo da rodovia Belo Horizonte-Conceição do Mato Dentro, 2.II.1987, fl., *D.C. Zappi & F.A. Vitta CFSC 9997* (SPF); 13.XII.1987, fl., *N.L. Menezes et al. CFSC 10839* (SPF, SP); Serra da Bandeirinha, 22.X.1997, fl., *A. Rapini & R.C. Forzza 427* (SPF). Serra do cipó, Estrada Lagoa Santa - Conceição do Mato Dentro, km 113, 12.XII.1995, fl., *N.M. Castro 384* (HUFU). SÃO PAULO: Pirassununga, Fazenda Santa Tereza de Bela Cruz, no Cerrado, 12.III.1953, fl., *D.B. Pickel* (SPSF 05135).

Ipomoea delphinioides Choisy

Examined material: BRAZIL. MINAS GERAIS: Delfinópolis, 13.II.2018, fl., *R.K. Kojima & R.Simão-Bianchini 17* (SP).

Additional examined material: BRAZIL. MINAS GERAIS: Itabirito, 16.X.1993, fl., *W.A. Teixeira 23272* (BHCB, SP); Parque Nacional do Itatiaia, -22 311313, -44 700116, 30.I.2015, fl., *R. Simão-Bianchini & S. Bianchini 2071* (SP). Lavras Novas, 25.I.1986, fl., *I. Cordeiro et al. CFCR9193* (SPF). Lima Duarte, Parque Nacional do Ibitipoca, 21.I.1987, fl., *H.C. de Souza 11275* (BHCB, SP); Trilha para o Pico do Pião, ca. De 500m após a Prainha, 25.I.2010, fl., *R. Mello-Silva et al. 3228a* (SPF). Ouro Preto, área da CVRD, região de Potreiro, 5.I.2006, fl., *S.G. Rezende & M.S. Mendes 1151* (BHZB, SP). Poços de Caldas, 15.I.1919, fl. and fr., *F.C. Hoehne 2850* (SP). Santa Bárbara, Serra do Caraça, 14.IV.1933, fl., *H.L. Mello-Barreto 2336* (SP). São Tomé das Letras, Morro do Gavião, 2.XI.1984, fl., *I. Cordeiro et al. CFCR 5796* (SP, SPF). Serra da Moeda, 15.XI.1987, fl., *R.P. Fonseca 11665* (BHCB, SP); 15.II.1987, fl., *J.M. Borges 11604* (BHCB, SP). Serra do Itabirito, 14.XI.1987, fl., *M.C. Leal 11527* (BHCB, SP). Tiradentes, Águas Santas, Trilha das Águas Santas, 4.XII.2012, fl., *M. Sobral et al. 15218* (ESA, HUFSJ, SP). Turvo, 24.IV.1926, fl., *F.C. Hoehne & A. Gehrt 17537* (SP). SÃO PAULO: Franco da Rocha, Parque Estadual do Juquery, campo limpo após queimada, 24.X.2002, fl., *J.B. Baitello 1241* (SPSF). Itapetininga, Estação Experimental, cerrado., 14.XI.1997, fl., *L.C. Souza 146* (SPSF). Itapeva, Estação Ecológica, início da trilha, 29.X.2008, fl., *J.B. Baitello et al. 2202* (SPSF); trilha da Vila, 25.XI.2008, fl., *R. Ciello Filho et al. 854* (SPSF); Estação Experimental, Trilha do Canyon-Afloramento, 23.VI.2009, fl., *R. Ciello Filho et al. 911* (SPSF); Trilha do poço da Peroba-Lajeado, 22.IX.2009, fl., *O.T. Aguiar et al. 1291* (SPSF); entrada para a Trilha do Lajeado, 11.V.2010, fl. and fr., *C.R. Lima et al. 274* (SPSF). São Caetano do Sul, 10.X.1944, fl., *G. Hashimoto 4963* (GHSP, SP). São Paulo, Butantã, 5.XII.1918, fl. and fr., *F.C. Hoehne 2606* (SP).

Ipomoea fiebrigii Hassl. ex O'Donell

Examined material: BRAZIL. MINAS GERAIS: São Roque de Minas, 21.XI.1998, fl., *M.A. Farinaccio 183* (HRCB); Estrada São Roque - Sacramento, próximo à nascente do rio das Velhas, 22.XI.1996, fl., *R. Romero & J.N. Nakajima 3817* (HUFU); Estrada para a Serra da Chapada, 8.I.1998, fl., *R. Romero et al. 4796* (HUFU).

Additional examined material: BRAZIL. GOIÁS: Alto Paraiso de Goiás, 3.II.1979, fl., *Gates & Estabrook 106* (CEN, NY, SP); 15.VII.1987, fl., *C.B. Toledo et al. 121* (SP, SPF); Estrada para Colinas, 900m alt., 7.II.1987, fl., *J.R. Pirani et al. 1765* (K, SP, SPF).

Ipomoea langsdorffii Choisy

Examined material: BRAZIL. MINAS GERAIS: Delfinópolis, 13.II.2018, fl., *R.K. Kojima & R.Simão-Bianchini 19* (SP). São Roque de Minas, 16.II.2000, fl., *R.C. Mota 151* (BHCB); 19III1996, fl., *R. Romero & J.N. Nakajima 3326* (HUFU).

Additional examined material: BRAZIL. GOIÁS: À esquerda do Rib. Dourado, próximo à sua cabeceira, 29.1.1969, fl., *J.A. Rizzo & A. Barbosa 3384* (UFG). Alto Paraíso de Goiás, P.N. Chapada dos Veadeiros. 1100 m alt.7.2.1987, fl., *J.R. Pirani et al. 1715* (K, SPF); 1100 m alt., 7.2.1987, fl., *J.R. Pirani et al. 1715* (K, SPF). Chapadão do Céu, Parque Nacional das Emas, divisa dos estados de Mato Grosso do Sul, Goiás e Mato Grosso., 4.7.2008, fl., *C. Aoki 226* (CGMS, SP). Faz. São Bento, Bords du Rio dos Couros, dans le campo, 13.1.1895, fl., *A.F.M. Glaziou 21786* (K, R). MINAS GERAIS: Belo Horizonte, Cruzeiro do Sul, 28.XII.1932, fl., *H.L. Mello-Barreto 2312* (LIL, BHCB, R, RB, SP). Betim, 10.2.1955, fl., *L. Roth 2279* (CESJ); 10.2.1955, fl., *L. Roth 2279* (CESJ). Caeté, 24I.1924, fl., *F.C. Hoehne 5085* (SP); 24.I.1924, fl., *F.C. Hoehne 5085* (SP). Caixa D'água do Vital, .2.1896, fl., *A. Silveira & H. Mapel 538* (R). Datas, 10.I.1988, fl., *R. Simão et al. CFCR 11814* (SP, SPF). Fazenda Borda do Campo, 10.II.1949, fl., *L. Krieger & L. Roth 1282* (SP). Moeda, 20.2.1990, fl., *T.S.M. Grandi et al.* (BHCB695); Serra da Moeda/GR3 12.1.2009, fl., *F.F. Carmo 4184* (BHCB). Paraopeba, 9.II.1957, fl., *E.P. Heringer 5492* (SP, UB). São João del Rey, 16.II.1985, fl. and fr., *L. Krieger et al. 20369* (CESJ, SP). Serra do Itabirito, 9II1968, fl., *H.S. Irwin et al. 19706* (ARIZ, NY, SP, UB). Sítio de João Ayres, 1888, fl., *W. Bello 237* (R).

Ipomoea pinifolia Meisn.

Examined material: BRAZIL. MINAS GERAIS: Delfinópolis, Trilha do Zé Carlinho, subida para Serra do Cemitério, 9.X.2002, fl., *J.N. Nakajima et al. 3225* (HUFU, UB); Fazenda José Antunes, Trilha da Escada de Pedras, 11.X.2002, fl., *R. Romero et al. 6412* (HUFU, UB); Condomínio de Pedras, 28.XI.2003, fl., *R. Romero et al. 7019* (HUFU); Chapadão da Babilônia, 26.VI.1997, fl., *J.N. Nakajima et al. 2590* (HUFU, SP); Claro, 30.VI.2000, fl., *A.C.B. Silva 508* (SPF).

Additional examined material: BRAZIL. DISTRITO FEDERAL: Brasília, 20 km S, Parque Municipal do gama, 4.IX.1964, fl., *H.S. Irwin & T.R. Soderstrom 5918* (NY, SP, UB); APA de Cafuringa, região do Cantigueiro II, Sítio Flor das Águas, 3.VI.2011, fl., *C. Proença et al. 3789* (UB, SP); Chapada da Contagem, 11.I.1966, fl., *H.S. Irwin et al. 11570* (ARIZ, NY, SP, UB); Córrego Cabeça de Veado, 3.VIII.1976, fl., *J.A. Ratter et al. 3344* (SP, UB, UEC); Cristo Redentor, 14.II.1990, fl., *M. Pereira Neto & E.C. Lopes 592* (ARIZ, IBGE, SPF, SP); Res. Ecol. IBGE, 15.IX.1989, fl., *B.A.S. Pereira 1380* (ARIZ, IBGE, SPF, SP). Parque do Gama, 12.VII.1976, fl., *P.H. Davis 60114* (SP, UEC). Parque do Gama, 12.VII.1976, fl., *P.H. Davis 60149* (SP, UEC). GOIÁS: Alto Paraiso de Goiás, 14.VII.1987, fl., *S. Romaniuc Neto et al. 443* (SP, SPF); 20.XI.1987, fl., *M.C.H. Mamede et al. 31* (HUFU, SPF); 30.XI.1988, fl., *T.B. Cavalcanti et al. 38* (K, MBM, F, SPF, SP); 15.VII.1987, fl., *C.B. Toledo et al. 121* (SP, SPF); 19.XI.1987, fl., *A.A.A. Barbosa & N.M. Castro 208* (HUFU, SP, SPF); 8.III.1989, fl., *T.B. Cavalcanti et al. 397* (BHCB, CEN, SP, SPF); 27.I.1991, fl., *A. Freire-Fierro et al. 3003* (SPF, SP); Parque Nacional da Chapada dos Veadeiros, morro da Baleia, 14º07'52"S, 47º40'8"W, 1346 m, 27.XI.2014, fl., *M. Verdi et al. 7370* (RB, SP). Campinaçu, 7.X.1995, fl., *T.B. Cavalcanti et al. 1834* (CEN, SP). Catalão, Área de influência indireta do AHE Serra do Falcão, 5.IV.2008, fl., *A.A. Arantes et al. SF955* (ARIZ, HUFU, SING, SP). Cavalcante, Serra do Tombador, 19.IV.2013, fl., *J. Cordeiro et al. 4904* (BHCB, HUEFS, MBM, RB, SP, UFG). Chapada dos Veadeiros, 25.III.1971, fl., *H.S. Irwin et al. 33150* (ARIZ, NY, SP, UB); 9.XII.1988, fl. and fr., *M. Pereira Neto 149* (IBGE, SP, UEC); 24.III.1971, fl., *H.S. Irwin et al. 33104* (ARIZ, NY, SP, UB); 22.III.1969, fl. and fr., *H.S. Irwin et al. 24889* (ARIZ, NY, SP, UB). Goiás Velho, Serra Dourada, 17.III.1989, fl., *T.B. Cavalcanti et al. 456* (CEN, NY, SP); 19.I.1966, fl. and fr., *H.S. Irwin et al. 11768* (ARIZ, NY, SP, UEC). Minaçu, 10.III.1992, fl., *T.B. Cavalcanti et al. 1129* (CEN, SP); 22.VI.1995, fl., *T.B. Cavalcanti et al. 1448* (CEN, CESJ, SP); 28.I.1997, fl., *M.C. Assis et al. 391* (CEN, SP, SPF, UEC). Mossâmedes, Encostas da Serra Dourada, 29.XI.2003, fl., *B.R. Silva et al. 1172* (RB, SP, SPF); Serra Dourada, 6.III.1985, fl., *G. Hashimoto 20432* (GHSP, SP);

16º05'10.6"S, 50º11'10.6"W, 5.XI.2012, fl., *L.M. Borges & B. Loeuille 967* (SP, SPF); Fazenda Retiro, 13.V.2017, fl., *E.F. Duarte & S.O. Loures 105* (HURB, SP). Niquelandia, 22.XI.1997, fl., *M.L.M. Azevedo et al. 1172* (SPF, SP); 27.IV.1995, fl., *M.L. Fonseca 233* (IBGE, SPF, SP); 14.IV.1996, fl., *F.C.A. Oliveira et al. 534* (SPF, SP); 15.IV.1992, fl., *B.M.T. Walter et al. 1350* (CEN, SP); 25 km L, 21.I.1992, fl., *G. Hatschbach et al. 56286* (MBM, SP); 8 km S, 23.I.1972, fl. and fr., *H.S. Irwin et al. 34852* (ARIZ, NY, SP, SPF, UB). Pirenópolis, P.E. Serra dos Pirineus, 4.II.2011, fl., *M.A. Silva et al. 7290* (IBGE, SP); Serra dos Pirineus, Morro da Cruz, 29.VII.2006, fr., *R.S. Bianchini 1590* (SP). Serra dos Pirineus, 2.XII.1965, fl., *H.S. Irwin et al. 10920* (ARIZ, NY, SP, UB); Rio Corumbá, 13.I.1968, fl. and fr., *H.S. Irwin et al. 18552* (ARIZ, NY, SP, UEC). Teresina de Goiás, 30.XI.1988, fl., *T.B. Cavalcanti et al. 70* (MBM, F, SPF, SP). MINAS GERAIS: Franca, Sacramento, 3.VIII.1984, fl., *R.C. Vieira & N.M. Castro 276* (HUFU, SPF, SP).

Ipomoea pohlii Choisy

Examined material: BRAZIL. MINAS GERAIS: São Roque de Minas, próximo à Cachoeira dos Rolinhos, 21.XI.2002, fl., *P.C. Duarte et al. 163* (HUFU, SP); 21.XI.2002, fl., *R. Romero et al. 6633* (HUFU, SP); 21.XI.2002, fl., *P.C. Duarte et al. 167* (HUFU, SP); 21.XI.2002, fl., *R.A. Pacheco et al. 452* (HUFU, SP).

Additional examined material: BRAZIL. BAHIA: Chapadão ocidental da BA, 15 km SW. de Correntina, 25.IV.1980, fl., *R.M. Harley et al. 21765* (K, NY, SPF, SP). Correntina, 2.III.1991, fl., *L.G. Viollati et al. 191* (SP, UB); ca. 46.3 km W de Correntina na estrada para Brasília, 16.II.2000, fl., *L.P. de Queiroz et al. 6097* (HUEFS, SP); Rodovia para Inhaúmas, 28.IV.1980, fl., *R.M. Harley et al. 21902* (ARIZ, K, CEPEC, SP); 36 km SW, 2.II.1963, fl., *A. Krapovickas 30171* (CTES, SP). Jaborandi, Gatos, 24.I.2005, fl., *W. Ribeiro* (SP373723). São Desedério, 18.I.2001, fl., *A.M. Miranda et al. 3787* (HST, SP). São Desidério, 20.III.1981, fl., *S.B. Silva 230* (CEPEC, HRB, RB, SP). Barreiras, 10.III.1979, fl., *G. Hatschbach 42032* (ARIZ, MBM, SP). GOIÁS: Posse, 8.III.2001, fl., *M.L. Fonseca et al. 2509* (IBGE, SP); Faz. Araças, 7.III.2001, fl., *M.A. Silva et al. 4889* (CEN, IBGE, SP, SPF); Serra Geral, 20.V.1983, fl., *J.A. Rizzo & Heleno 10298* (SP, UFG); 6 km S, Serra Geral de Goiás, Rio da Prata, 5.IV.1966, fl., *H.S. Irwin et al. 14381* (ARIZ, NY, SP, UB). São Domingos, 6kmW da BR 020, 19.I.1967, fl., *C.L. Cristóbal & A. Krapovickas 692* (CTES, SP).

Ipomoea procumbens Mart. ex Choisy

Examined material: BRAZIL. MINAS GERAIS: Delfinópolis, 13.II.2018, fl., R.K. *Kojima & R.Simão-Bianchini 18* (SP). São Roque de Minas, 11.II.2018, fl. R.K. *Kojima & R.Simão-Bianchini 9* (SP); estrada de terra para vilarejo do São João Batista do Glória, 12.II.2018, fl. R.K. *Kojima & R.Simão-Bianchini 11* (SP); estrada para Sacramento, após o Curral de Pedras, 18.III.1995, fl., *J.N. Nakajima et al. 869* (HUFU); morro próximo a sede administrativa, 7.XII.1994, fl., *J.N. Nakajima & R. Romero 631* (HUFU); mata próxima à cachoeira Casca d'Anta., 12.XII.1996, fl., *L.S. Kinoshita & J.L.A. Moreira 96150* (UEC); 14.III.1990, fl., *H.C. de Souza* (SP287483); 14.III.1990, fl., *H.C. de Souza 17982* (BHCB, SP); Morro após a nascente do rio São Francisco, 20.III.1996, fl., *R. Romero & J.N. Nakajima 3363* (HUFU).

Additional examined material: BRAZIL. MINAS GERAIS: Belo Horizonte, Serra do Taquaril, 23.III.1933, fl., *H.L. Mello-Barreto 2394* (RB, SP). Datas, Estrada Datas-Serro km 430, 19.III.1989, fl., *A. Salatino et al. CFCR 12142* (SPF). Delfinópolis, Fazenda Zé Antunes, Trilha para Cachoeira Triângulo, 6.XII.2002, fl., *J.N. Nakajima et al. 3355* (HUFU). Diamantina, 20.III.1993, fl., *G.L. Esteves & C. Kameyama 2482* (SP); 17.XII.1985, fl., *R. Simão et al. CFCR 8771* (SPF). Indianópolis, Fazenda Bela Tanda, 4.III.1986, fl., *G. Gottsberger & J. Doring 32-4386* (SP, NY). Joaquim Felício, Serra do Cabral, estrada para Franciso Dumont, a 3 km da Ponte sobre o Córrego da Onça. 900 m.s.m., 25.III.2000, fl., *J.R. Pirani et al. 4649* (SPF). Lagoa Dourada, 8.III.1995, fl., *V.C. Souza et al. 7977* (ESA). Minas Novas, 23.III.1993, fl., *G.L. Esteves & C. Kameyama 2493* (SP); Buriti, 23.III.1993, fl., *G.L. Esteves & C. Kameyama 2493* (SP). Ouro Branco, Serra do Ouro Branco, 9.III.2005, fl., *L.R. Lima et al. 365* (SPF). Ouro Preto, Falcão, 18.III.1989, fl., *R. Simão-Bianchini 170* (SPF); Serra das Lavras Novas, sul de Ouro Preto, Estrada Real, ca. 1 km da pousada Canto da Serra (localidade de Venda do Campo), grande morro ao lado da estrada, 27.III.2001, fl., *M. Groppo & M. Ulwin 679* (SPF). Santana do Riacho, 10III.1995, fl., *V.C. Souza et al. 8116* (ESA); 10.III.1995, fl., *V.C. Souza et al. 8230* (ESA). São João da Chapada, 2 km N of São João da Chapada. Elev. 1200 m, 25.III.1970, fl., *H.S. Irwin et al. 28310* (SPF). Serra do Cipó, III.1990, fl., *G.M. Faria* & *M. Mazucato* (HRCB16083). 27III.1987, fl., *Dac et al.* (UEC41344). SÃO PAULO: Franco da Rocha, Parque Estadual do Juquery, 17.III.2003, fl., *J.B. Baitello & F.S. Peres 1479* (SPSF). São José do Barreiro, Serra da Bocaina, Morro da Boa Vista, 24.III.2009, fl., *M. Sugiyama et al. 1661* (PMSP, SP, UEC).

Ipomoea procurrens Meisn.

Examined material: BRAZIL. MINAS GERAIS: Sacramento, Estrada São Roque de Minas - Sacramento, próximo ao Córrego dos Passageiros, 13.V.1995, fl., *R. Romero et al. 2224* (HUFU). São Roque de Minas, 8.I.1998, fl., *R. Romero et al. 4830* (HUFU); 6.XII.1994, fl., *R. Romero & J.N. Nakajima 1442* (HUFU); Guarita de Sacramento, 9.I.1995, fl., *R. Romero et al. 1584* (HUFU); estrada para Sacramento, 12.II.2018, fl., *R.K. Kojima & R.Simão-Bianchini 14* (SP); 14.II.2018, fl., *R.K. Kojima & R.Simão-Bianchini 22* (SP); Estrada para o vilarejo de São João Batista, 12.II.2018, fl., *R.Simão-Bianchini & R.K. Kojima 2191* (SP).

Additional examined material: BRAZIL. MINAS GERAIS: Aiuruoca, 13.III.1989, fl., *L. Krieger & M. Brugger 24396* (CESJ, SP). Brasilândia de Minas, 6.I.2001, fl., *S.M. Soares 346* (BHCB, SP). Campo do Saco, 13.I.1991, fl., *L.S.K. Gouvea et al. 717* (UEC). Indianópolis, 2.III.1986, fl., *G.K. Gottsberger et al. 117* (SP, ULM); 4.III.1986, fl., *G.K. Gottsberger & J. Döring 31* (SP, ULM). Ituiutaba, 15.XII.1946, fl., *A. Macedo 13* (R, SP). Lagoa Dourada, 8.III.1995, fl., *V.C. Souza et al. 7976* (ESA). Morro das Pedras, 26km NE of Patrocínio, 29.I.1970, fl., *H.S. Irwin et al. 25559* (ARIZ, NY, SP, SPF, UB). Paracatú, 4.II.1970, fl., *H.S. Irwin et al. 25995* (ARIZ, NY, SP, UB); 4.II.1970, fl., *H.S. Irwin et al. 25995* (ARIZ, NY, SP, UB); 5.III.1989, fl., *R.C. Mendonça et al. 1288* (IBGE, SP). Patos, 19.VI.1936, fl., *H.L. Mello-Barreto 5162* (SP). Patrocínio, Faz. Grão de Ouro, 28.II.1989, fl., *M. Pereira Neto et al. 187* (IBGE). Poços de Caldas, 31I.1919, fl., *F.C. Hoehne 2964* (SP); 13.I.1919, fl., *F.C. Hoehne 2822* (SP). Uberlândia, Estação Ecológica do Panga, 1.III.2013, fl., *F.F. Deus* (HUFU66708); 16III.2017, fl., *P.K.B. Hemsing et al.* (HUFU). Estrada entre Piumhi e Araxá, 35 Km de Piumhi, 21.II.1978, fl., *G.J. Shepherd et al. 7113* (UEC). SÃO PAULO: Pedregulho, Parque Estadual das Furnas do Bom Jesus, estrada de Santan Luzia, 27.I.1993, fl., *E.E. Macedo 61* (SPSF); cerrado, 8.III.2006, fl., *E.E. Macedo* (SPSF37853). São José do Barreiro, 19.II.2013, fl., *M. Pastore et al. 233* (PMSP, SPSF).

Ipomoea verbasciformis (Meisn.) O'Donell

Examined material: BRAZIL. MINAS GERAIS: São José do Barreiro, Estrada para Babilônia, 3.I.1998, fl., *R. Simão-Bianchini & S. Bianchini 1203* (SPF). São Roque de Minas, 20.XI.1998, fl., *M.A. Farinaccio 165* (HRCB); Estrada para a Fazenda do Fundão, 19.IV.1997, fl., *R. Romero et al. 4200* (HUFU); Estrada São Roque de Minas - Sacramento, morro após a nascente do rio São Francisco, 18.III.1995, fl., *J.N. Nakajima et al. 806* (HUFU); Morro após o Vale do São Francisco, 11.I.1995, fl., *R. Romero et al. 1703* (HUFU);

17.III.1995, fl., *R. Romero et al. 1917* (HUFU); 21.II.1994, fl., *J.N. Nakajima & R. Romero 163* (HUFU); 20III.1996, fl., *R. Romero & J.N. Nakajima 3348* (HUFU); 10.IV.2010, fl., *G.O. Romão et al. 2628* (ESA); Base do morro do córrego dos Peixes, 24.III.1996, fl., *J.N. Nakajima & R. Romero 1731* (HUFU).

Additional examined material: BRAZIL. GOIÁS: Alto Paraíso de Goiás, Chapada dos Veadeiros, 9.II.1987, fl., *S. Romaniuc Neto 631* (SP, UB). MINAS GERAIS: Camanducaia, 15.III.1976, fl., *H.F. Leitão Filho 1849* (SP, UEC). Ituiutaba, 6.XI.1948, fl., *A. Macedo 1329* (SP). Poços de Caldas, 9.I.1919, fl., *F.C. Hoehne 2689* (SP). São João Del Rei, BR-265, Rio das Mortes, 5.II.2013, fl., *M. Sobral et al. 15380* (HUFSJ, SP).

Jacquemontia prostrata Choisy

Examined material: BRAZIL. MINAS GERAIS: São Roque de Minas, Estrada São Roque de Minas - Sacramento, morro após o córrego dos Louros, 12.I.1995, fl., *R. Romero et al. 1756* (HUFU, SP).

Additional examined material: BRAZIL. MINAS GERAIS: Caeté, Serra da Piedade, BR 381. Nas margens da estrada para o Santuário Nossa Senhora da Piedade, 21.IX.2010, fl., *R. Simão-Bianchini & F.F. do Carmo 1820* (SP); BR 381. Nas margens da estrada para o Santuário Nossa Senhora da Piedade, 21.IX.2010, fl., *R. Simão-Bianchini & F.F. do Carmo 1820* (SP); BR 381, nas margens da estrada para o Santuário Nossa Senhora da Piedade, 21.IX.2010, fl., *R. Simão-Bianchini & F.F. do Carmo 1820* (SP). Congonhas do Norte, Proxímo à Extrema 1154m alt., 23.IV.2004, fl., *A.B. Amaral et al. 18* (DIA, SP). Datas, Rodovia Datas-Serro. Morro do Coco. 1300-1330m s.n.m., 1.I.1988, fl., *R. Simão et al. CFCR 11812* (SPF); Estr. Datas-Serro km 430., 19.III.1989, fl., *A.L. Dokkedal et al. CFCR 12141* (SPF). Delfinópolis, 24.III.2000, fl., *A.C.B. Silva 380* (ESA). Itabirito, ca. 10km da cidade em direção a Belo Horizonte, 14.X.1995, fl., *J.P. Souza et al. 172* (ESA, SP). Jaboticatubas, 11.I.1996, fl., *V.C. Souza et al. 10151* (ESA); 5.III.1972, fl., *A.B. Joly et al. 1119* (SP); Serra do Cipó, 21.III.1940, fr., *H.L. Mello-Barreto 10728* (SP, SPF, JBBH). Morro do Pilar, Parque Nacional da Serra do Cipó, acesso pelo km 123 da rodovia MG 010, lado direito, sentido Morro do Pilar, 12.XI.2007, fl., *M.A. Pena 1A* (SPF); 1 km após o entrocamento para Conceição do Mato Dentro, 14.II.1996, fl., *N. Roque et al. 170* (SPF). Ouro Branco, 11.X.1992, fl., *V.C. Souza & C.M. Sakuragui 2012* (ESA); Serra de Ouro Branco, 12.V.1990, fl., *M.M. Arbo 3907* (SPF); em afloramento rochoso, 10.III.2005, fl., *L. Monguilhott et al. 106* (SPF); 9.III.2005, fl., *L.R. Lima et al. 361* (SPF); 24.VII.1987, fl., *J.R.*

Pirani et al. CFCR 11185 (SPF); Estr. para Serra do Ouro Branco 9km., alt. 1330m., 8.I.1982, fl., *N. Hensold et al. CFCR 2734* (SPF). Ouro Preto, Serra de Antônio Pereira, 20.III.2008, fl., *M.C.T.B. Messias et al. 1868* (OUPR, SP); 12.XII.2007, fl., *M.C.T.B. Messias et al. 1676* (OUPR, SP). Santa Bárbara, Serra do Caraça, Campo de Flora, elev. 1500m., 22.V.1997, fl., *R. Mello-Silva et al. 1351* (SPF). Santana de Pirapama, Serra do Cipó, Vilarejo Inhame, trilha para o topo da Serra a partir da porteira azul na estrada vilarejo, 19.XI.2007, fl., *L.M. Borges 244* (SPF); trilha para a serra da Senhorinha, até o cume da serra, acessada pela estrada do Vilarejo Inhames ao povoado de São José da Cachoeira, próximo ao vilarejo Inhames, 22XII.2014, fl., *G.M. Antar 663* (SPF); Serra do Cipó, 11.XI.2009, fl., *D.C. Zappi et al. 2324* (HRCB, SP, SPF). Santana do Riacho, RPPN Brumas do Espinhaço e Ermo do Gerais, 19.IV.2012, fl. and fr., *J. Ordones et al. 1910* (BHZB, SP); 5.VII.1996, fl., *V.C. Souza et al. 11729* (ESA); 1.V.1993, fl., *V.C. Souza & C.M. Sakuragui 3335* (ESA); Serra do Cipó, próximo à bifurcação do Morro do Pilar, 5.VII.2001, fl., *V.C. Souza et al. 25087* (ESA, SP); 6.III.1972, fl., *A.B. Joly et al. CFSC 1286* (IBGE, SP); 145 km N. Belo Horizonte, Serra do Cipó, 14.II.1968, fl., *H.S. Irwin & D.C. Wasshausen 19979* (NY, SP, SPF, UB); Alto do Palácio, 2.VI.1991, fl., *R.S. Bianchini & S. Bianchini CFSC 12774* (SP, SPF); Serra do Cipó, 11.X.1986, fl. and fr., *N.S. Chukr et al. CFSC 9906* (SP, SPF); 6.IX.1980, fl. and fr., *E. Forero et al. 7884* (SP, SPF); 7.XI.1980, fl., *I. Cordeiro et al. CFSC 6705* (SP, SPF); 9.IX.1987, fl., *R. Simão et al. CFSC 10505* (SP, SPF); Mata do Juquinha, 30.III.2012, fl., *G.C.T. Ceccantini et al. 3610* (SPF); Serra do Cipó, Km 118 da rodovia MG 010. Próximo à estátua do Juquinha., 7.IX.2007, fl., *M.A. Pena 515* (SPF); Km 118 da rodovia MG 010, próximo à estátua do Juquinha, 8.VII.2007, fl., *M.A. Pena 421* (SPF); 7.VII.2007, fl., *M.A. Pena 369* (SPF). 29.V.2007, fl., *M.A. Pena 218* (SPF); 29.V.2007, fl., *M.A. Pena 230* (SPF); Trilha para a Cachoeira da Capivara, 5.VII.2012, fl., *G.M. Antar 65* (SPF); Afloramento rochoso em frente à estátua do Juquinha, 7.II.2012, fl., *M. Escaramai 17* (SPF); Km 124 ao longo da rodovia BH-Conceição do Mato Dentro, 16.XII.1985, fl., *N.S. Chukr CFSC 9485* (SPF); Km 132 ao longo da rodovia BH-Conceição do Mato Dentro, 2.V.1986, fl., *R. Simão et al. CFSC 9669* (SPF); Km 137 ao longo da rodovia BH-Conceição do Mato Dentro, 20.V.1989, fl., *R. Simão-Bianchini et al. CFSC 11494* (SPF); Km 109 ao longo da rodovia BH-Conceição do Mato Dentro, 1.II.1987, fl., *D.C. Zappi & F.A. Vitta CFSC 9962* (SPF); Km 112 ao longo da rodovia BH-Conceição do Mato Dentro, solo arenoso, 1.IX.1986, fl., *D.C. Zappi & C. Kameyama CFSC 9859* (SPF); Km 123 ao longo da rodovia BH-Conceição do Mato Dentro, 20.VI.1997, fl., *D.C. Zappi & C. Kameyama CFSC 10204* (SPF); Km 118 ao longo da rodovia BH-Conceição do Mato Dentro, Córrego 2 pontinhas, 2.V.1986, fl., *R.*

Simão et al. CFSC 9660 (SPF); Km 124 ao longo da rodovia BH-Conceição do Mato Dentro, córrego 3 pontinhas, 20.V.1989, fl., *R. Simão-Bianchini et al. CFSC 11496* (SPF); Rodovia BH-Conceição do Mato Dentro km 143, aprox. 7km além da bifurcação para Morro do Pilar, Fazenda Capão Redondo, 30.VIII.1988, fl., *C. Kameyama et al CFSC 11196* (SPF); Serra do Cipó, Serra das Bandeiras, elev. 1400-1500m., 27.VII.1991, fl., *A.M. Giulietti et al. CFSC 12506* (SPF); Km 128 ao longo da rodovia BH-Conceição do Mato Dentro, campo rupestre, 14.XII.1985, fl., *R. Simão et al. CFSC 9471* (SPF); 2km acima da entrada para a estrada da Usina, 6.IX.1987, fl., *R. Simão CFSC 10429* (SPF); Km 125 ao longo da rodovia BH-Conceição do Mato Dentro, 8.XII.1981, fl., *N. Hensold et al. CFSC 7735* (SPF); Km 110 ao longo da rodovia BH-Conceição do Mato Dentro, 16.II.1982, fl., *W. Montovani et al. CFSC 7771* (SPF); Santana de Pirapama. Fazenda Inhame (Serra Mineira), Serra do Cipó, 22.III.1982, fl., *J.R. Pirani et al. CFSC 8105* (SPF); Km 135 ao longo da rodovia BH-Conceição do Mato Dentro, 31.VII.1982, fl., *J.D. Pinheiro & G.L. Esteves CFSC 8567* (SPF); Alto do Morro, lado esquerdo do brejo, 15.II.1988, fl., *V. Piliackas et al. CFSC 10900* (SPF); Alto do Palácio, 27.I.1986, fl., *I. Cordeiro et al. CFSC 9570* (SPF); Serra do Cipó: Usina, ao longo da rodovia BH-Conceição do Mato Dentro, 8.V.1987, fl., *R. Simão et al. CFSC 10140* (SPF); Km 134 ao longo da rodovia BH-Conceição do Mato Dentro, 23.X.1982, fl., *J. Diacui et al. CFSC 9063* (SPF); km 128, Alto do Palácio ao longo da rodovia BH-Conceição do Mato Dentro, 13.IV.1987, fl., *V.C. Souza CFSC 10063* (SPF); elev. 1380m., 24.III.1991, fl., *J.R. Pirani et al. CFSC 11901* (SPF); Estrada da Usina, ca. De 2,5km do início, ao logo da rodovia BH-Conceição do Mato Dentro, 14.IV.1987, fl., *V.C. Souza CFSC 10080* (SPF); rodovia BH-Conceição do Mato Dentro MG 010, km 125, 5.I.1992, fl., *M.T.V.A. Campos et al. CFSC 12861* (SPF); 25.VII.1986, fl., *S.A.P. Godoy et al. CFSC 9842* (SPF); 4.V.1986, fl. and fr., *R. Simão et al. CFSC 9716* (SPF). Santa Luzia, Serra do Cipó, 2.II.1934, fl. and fr., *A. Sampaio 6731* (BHCB, SP, SPF). Serra do Espinhaço, Serra do Itabirito, 9.II.1968, fl. and fr., *H.S. Irwin & D.C. Wasshausen 19604* (NY, SP, UB). 7km NE de Catedral Mota, caminho a Conceição do Mato Dentro, Serra do Cipó, 8.II.1991, fl., *M.M. Arbo et al. 4658* (SPF).

Jacqueontia sphaerostigma (Cav.) Rusby

Examined material: BRAZIL. MINAS GERAIS: Capitólio, 17.II.2018, fl. and fr., *R.K. Kojima & R.Simão-Bianchini 24* (SP).

Additional examined material: BRAZIL. ESPÍRITO SANTO: Linhares, 11.V.1999, fl., *D.A. Folli 3418* (PMSP). MINAS GERAIS: Baependi, Toca dos Urubus, 26.II.2005, fl. and fr., *F.M. Ferreira 854* (CESJ, SP). Belo Horizonte, fl., *H.L. Mello-Barreto 2379* (BHCB, SP, SPF). Buenópolis, Curimataí, 40 km E de BR-135, entre Buenópolis e Joaquim Felício,

21.V.1990, fl., *M.M. Arbo et al. 4537* (SPF). Est. Ecológica UFMG, 30.V.1990, fl., *E. Tameirão Neto et al. 56* (BHCB, SP). Miguel Burnier, 27.I.1921, fl., *F.C. Hoehne 5156* (SP, SPF). Pompéu, 3.III.2000, fl., *J.F. Macedo 3878* (PAMG, SP). Santana do Riacho, Serra do Cipó: Morro do Calcáreo, ao longo da rodovia BH-Conceição do Mato Dentro, 8.V.1987, fl., *R. Simão et al. CFCS 10114* (SPF); Afloramento Calcário próximo à Cardeal Mota, 7.IX.1987, fl., *R. Simão et al. CFCS 10456* (SPF); Fazenda Serra do Cipó, próx. à casa, 28.I.1990, fl., *R. Simão-Bianchini CFCS 11705* (SPF). Sete Lagoas, 10.V.1984, fl., *L. Helena 892* (PAMG, SP). Campo rupestre nas proximidades de Diamantina, 10.VII.1987, fl., *M. Brandão 12556* (PAMG, SP). SÃO PAULO: Anhanguera, Parque Anhanguera Área proposta para Refúgio da Vida Silvestre, 15.III.106, fl., *E.H.P.Barreto 1115* (PMSP). Paraíba, Areia (Escola), 12.IX.1944, fl., *Dr. Jayme et al. 640* (SPSF). São Paulo, 14.VI.2011, fl., *F.G. Pereira 285* (PMSP).

Capítulo 2

Bonamia eustachioi (Convolvulaceae), a new species from Brazil associated to environment of rocky Cerrado

Capítulo em formato de artigo a ser submetido e adequado às normas da revista Brittonia

Bonamia eustachioi (Convolvulaceae), a new species of Brazil from rocky Cerrado and Caatinga

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Abstract: Bonamia eustachioi is a new species of Convolvulaceae from Bahia and Minas Gerais states, and endemic to the Cerrado domain. It is described, illustrated and its morphological characters and relationships with other species are discussed**.** Comparisons of the new species material were made based on a study of plants in the field and analyses of the specimens available in the herbaria ALCB, BHCB, CEN, ESA, HDJF, K, NY, HUEFS HUFU, RB, SP, SPF and UB. The species is an erect to decumbent subshrub, greenish or rust colored of rare occurrence. Illustrations and a table of morphological comparisons with similar species are provided, two of them of other genera (**B. rosiewisae**, **B. linearifolia**, **B. austinii**, **B. eustachioi**, **Distimake tomentosus**, and **Jacquemontia cephalantha**).

Keywords:–Brazilian savanna, conservation, Solanales, taxonomy.

Introduction

The genus *Bonamia* Thouars (Convolvulaceae) comprises about 65 species (Staples, 2019). It has a broad distribution occurring in the northern and southern America, Africa, Madagascar, southern and southeastern Asia, and Australia (Wood, 2013). In Brazil, *Bonamia* is represented by 17 species and one variety (Flora do Brazil 2020, ongoing). It is a genus scarcely represented in the herbaria and the species is poorly known.

The genus was delimited by having herbaceous habit, rarely climbing or subshrubs (Myint & Ward, 1968), free or partially free stlyles (Fig. 1), non-accrescent sepals, dehiscent fruits, and ovate, obovate, or ovate-cordate cotyledons (Austin & Staples, 1985; Breteler, 1992). After this, several new species were described (Wood, 2013; Johnson, 2014; Moreira, et al., 2017, 2018, 2019).

The pollen grains are monads and it is a clearly euripalynous genus having two major distinct pollen types – (1) polar grains with 3-colpate apertures and (2) apolar grains with 12-32 pantocolpate apertures (Hallier, 1897; Moreira et al., 2019b). The genus is subdivided in five pollen types according to sections in *Bonamia* (*Bonamia* sect. *Bonamia*; *Bonamia* sect. *Breweria* (R.Br.) Myint; and *Bonamia* sect. *Trichantha* Myint). pollen grains vary in the pattern of exine ornamentation and the number of apertures (Moreira et al., 2019b).

The delimitation of the genus due to euripalynous condition has been subject to discussion over the years (Myint & Ward, 1968; Austin & Staples, 1985), and the polyphyletic condition of this group was enlightened by the studies of Stefanovic et al. (2002) with the Tribe Cresseae. Ongoing phylogenetic studies with sampling of the entire genus indicate that several genera make up *Bonamia* and for species occurring in Brazil, a new generic name will be established (Moreira et al., unpubl. data)).

During the field works and analyses of herbaria material, we identified a new species of *Bonamia*, endemic to Cerrado and Caatinga. Cerrado domain corresponds to Brazilian savanna and comprises 57% of the Brazilian territory. In this domain, dry and rainy seasons are well defined and there is low soil fertility, high water table depth and high fire frequency (Ribeiro & Walter, 2008; Franco et al., 2014). Caatinga domain comprises 11% of territory and is characterized by sedimentary, waterproof crystalline land, and a good water reserve underground (Alves et al., 2009). The rain is irregularly distributed in summer and autumn and is concentrated in specific spots (Andrade-Lima, 1981).

Material and methods

The manuscript is based on herbaria materials and observations made during field trips. Several herbaria material were analyzed. Only mature structures of plants or fully developed were used to take measures and morphologic descriptions. Flowers and fruits were rehydrated in boil before taking measures and drawings, although some materials conserved in ethanol at 70% were also used. The terminology used to describe flat or two-dimensional shapes followed Hickey (1988), and the terms used to describe indument were based on Radford et al. (1974) and Harris & Harris (1994). The distribution map (Fig. 2) was produced with QGIS version 3.6 Noosa (QGIS Development Team, 2019). For the conservation status analysis, we used the GeoCAT (Bachman et al., 2011), to calculate distribution area and IUCN categories (2012). Scanning electron microscopy (SEM) analysis was performed in herborized materials in order to observe structures important in the genus taxonomy. The equipment used was a PHILIPS XL Série XL 20, S/W, version 5.21., in the Instituto de Botanica, with assistance of Dra. Luciana Benatti. The structures were placed directly on the

stubs and coated with a gold jet under high vacuum. The photomicrographs were taken with a Leica DM500 microscope with a Leica ICC50 digital camera coupled.

Results and discussion

TAXONOMIC TREATMENT

Bonamia eustachioi A.L.C.Moreira & Kojima, **sp. nov.** Type: Brazil, Bahia, Igaporã, margem da estrada de Caetité para Bom Jesus da Lapa, 21 May 2015, *J.E.Q. Faria & A.R.O. Ribeiro 4444*. (holotype: SP; isotypes: ALCB, CEN, HUEFS, K, NY, RB, SPF, UB). (Figs. 1, 3–4)

Diagnosis – *Bonamia eustachioi* is morphologically similar to *B. rosiewiseae* J.R.I. Wood, but the new species differs in having green or ferruginous indument, lax inflorescences and flower with smaller corollas (2.5–3 cm long), while *B. rosiewiseae* has whitish to cream indument, congested inflorescences and bigger corollas (3–3.5 cm long). The new species distinguishes from *B. linearifolia* A. L. C. Moreira & Sim.-Bianch. by the tomentose indument, elliptic leaves and bluish to lilac corolla (glabrous, linear leaves and white corolla in *B. linearifolia*). *Bonamia eustachioi* also resembles *B. sericea* Hallier f., distinguishing in ferruginous, tomentose indument and axillary inflorescences (yellowish, sericeous indument, and inflorescences sometimes terminal in *B. sericea*). In comparison with *B. austinii* A. L. C. Moreira & Sim.-Bianch., the new species differs in ovate leaves and bluish to lilac flowers (lanceolate leaves and white flowers in *B. austinii*).

Description – Subshrub 40–80 cm tall, erect or decumbent; xylopodiferous; stems (1.5–) 2–3 (–4) mm diam., woody at base, young stems verrucose, short-pubescent, mature stems tomentose, green or ferruginous, forked trichomes with both branches similar or one shorter

and the other longer; internodes 1–2 cm. Leaves elliptic, narrow-elliptic or ovate, (2.1–) 3.1–4.1 (–5) x 1.7–2.1 (–3.5) cm, base rounded, apex cuspidate or acute, mucronate, margin entire, discolor, tomentose on both surfaces; 4–6 pairs of veins, furrowed on adaxial surface and salient on abaxial surface, brochidodromous; petiole 2–4 mm long. Axillary cymes 1–8 flowers, sessile; bracteole subulate, apex acute (2.5–) 3.5–6.5 mm, tomentose; pedicel 1.5–2.5 mm long, tomentose; sepals ovate, the outer bigger than the inner ones, apex acute, the outer 10–11 x 5.5–6 mm, the inner 7.5–8 x 3.5–5 mm, tomentose, with hyaline margin, ventral surface glabrous; corolla infundibuliform, bluish to lilac, 2.5–3 cm long, tube 1–1.3 cm long, greenish-yellow, limb 1.1–1.2 cm long; mid-petaline bands sericeous; longer stamens 9–1 mm long, shorter 5.5–7 mm long, villous at the base, anthers basifixed, elliptic 1.5–2 mm long, pollen 3-colpate, perforate, surface slightly irregular relief with perforations and granula regularly scattered; ovary densely pilose at the apex, style 2, attached at base to ca. 5 mm, 8–1.3 cm total long, longer branch ca. 5.5 mm long, shorter ca. 3.5 mm long; stigma globose. Capsule apiculate ca. 6 x 4 mm diam., globose or ovoid, cream yellow, 2–valvar, sepals acrescent, seeds 3-4, glabrous, black.

Comments – *Bonamia eustachioi* is an erect or decumbent subshrub, xylopodiferous of campo cerrado and caatinga environment, generally associated to rocky formations in Bahia and Minas Gerais. In some herbaria materials were misidentified as *Distimake tomentosus* (Choisy) Petrongari & Sim.-Bianch., another genus of the family that is easily distinguished by presenting style entire and tomentose indument in the whole plant, also common in rocky environment. Also, misidentifications as *Jacquemontia cephalantha* Hallier f., a species which presents style entire, leaves elliptic or ovate, discolor, apex mucronate and blue flowers. Besides it, *J. cephalantha* has glabrous mid-petaline bands, while in *B. eustachioi* it is sericeous. A comparison of morphological characters of *B. rosiewiseae*, *B. linearifolia*, *B. sericea*, *B. austinii*, *B. eustachioi*, *D. tomentosus* and *J. cephalantha* is presented in Table 1.

The type of pollen grain is characteristic of *B. austinii, B. rosiewisae,* and *B. sericea*. The details of style, stigmas, and pollen are represented in Fig. 1.

Phenology – The species was collected in flower and fruit over the months of March to May.

Etymology – This species is named after the collector Jair Eustáquio Quintino de Faria Júnior, who is a great taxonomist and specialist in the flora of the Cerrado, one of the younger generation of Brazilian botanists, who has an outstanding eye novelties in plant species.

Distribution and habitat – This species occurs in the states of Minas Gerais and Bahia, in rocky environments of cerrado and caatinga vegetation, at altitudes of 1073m (Fig. 2).

Conservation assessment – The known records for *Bonamia eustachioi* show an extent of occurrence (EOO) of 96,779.988 km^2 and area of occupancy (AOO) of 12.000 km^2 (GeoCAT 2019). Due to relevant restricted range, this taxon is under immediate threat according to values presented. This species has a broad distribution (Bahia to Minas Gerais) but with a high specificity of some environments, occurring in small populations. These records are cited for protected and non-protected areas. Two environmental Conservation Units where samples were collected are Serra do Cipó National Park and Serra da Canastra National Park, both in the state of Minas Gerais. In Bahia, the species was found only in rocky formation at roadside, in a vulnerable location. Until now, *Bonamia eustachioi* fulfills threat criteria B1ab (i,ii, iii) and B2ab (i, ii, iii) and falls within the EN (endangered) category (IUCN 2012).

Additional specimens examined. BRAZIL. Minas Gerais: Delfinópolis, Condomínio de Pedra, 20º20'38"S, 46º51'14"W, 17 May 2003, *R.L. Volpi et al. 696* (HUFU, SP); Estrada

para “Casinha Branca Trilha Muro de Pedras”, 20º20'38"S, 46º51'14"W, 12 Mar. 2003, *R.A. Pacheco et al. 532* (HUFU, SP); Estrada para Casa Branca, Fazenda Paraíso, 20º20'38"S, 46º51'14"W, 10 Apr. 2002, *R. Romero et al. 6307* (HUFU, SP); Gouveia, 18º27' 16"S, 43º44'27"W, 5 Apr. 1998, *V.C. Souza et al. 20887* (ESA, SP); Margem da rodovia descendo de Gouveia para Presidente Juscelino, próximo à lanchonete Chupa cabra, Cerrado rupestre, 18°35’40”S, 43º57’50”W, 1024 m, 7 Mar. 2017, *J.E.Q. Farias & C. Proença 7229* (BHCB, CEN, HDJF, RB, SP, UB); Jaboticatubas, Serra do Cipó, Caminho para o Capão dos Palmitos, 19º30'49"S, 43º44'42"W, 31 May 1991, *R.S. Bianchini & S. Bianchini s.n*. (SPF).

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TABLE 1. Comparison of the diagnostic characters of *Bonamia eustachioi* to similar species.

	Bonamia austinii	*Bonamia eustachioi*	*Bonamia linearifolia*	*Bonamia rosiewiseae*	*Bonamia sericea*	*Distimake tomentosus*	*Jacquemontia cephalantha*
Stem	Greenish to ferruginous, tomentose	Tomentose, forked trichomes	Brown/glabrous	Grey tomentose	Yellowish, sericeous	Tomentose	Tomentose
Leaves	Elliptic to narrowly elliptic, base cuneate to rounded, apex acute to rounded	Elliptic, narrow-elliptic or ovate, base rounded, apex acute to cuspidate, mucronate	Linear, base cuneate, apex acute to acuminate, mucronate	Elliptic to broadly ovate, base shallowly cordate, apex rounded to slightly emarginate, mucronate	Elliptic, elliptic-lanceolate or elliptic- ovate, base acute or attenuate, apex obtuse to acute	Narrow-elliptic, base rounded or attenuated, apex acute	Ovate, base cuneate to rounded, apex acute, mucronate
Sepals	Lanceolate, tomentose	Ovate, tomentose	Lanceolate, glabrous	Ovate-elliptic, densely tomentose	Ovate or ovate - acuminate, concave, pubescent	Ovate, glabrous or sparse pilose	Lanceolate

Inflorescence	Axillary cymes of 1 – 3 flowers	Axillary cymes of 1 – 8 flowers	Axillary cymes of 1 – 3 flowers	Axillary cymes of 1 – 5 flowers	Axillary cymes of 2– 3 flowers or sometimes terminal	Axyllary dichasium 1 – 4 flowers	Terminal compound dense dichasium, 1 – 7 flowers
Seeds	Brown	Brown	Brown	Not seen	Black	Brown	Not seen
Geographic distribution	Distrito Federal and Goiás	Bahia and Minas Gerais	Goiás and Tocantins	Mato Grosso do Sul	Mato Grosso do Sul	Distrito Federal, Goiás, Tocantins, Bahia, Minas Gerais, São Paulo, and Paraná	Bahia and Minas Gerais

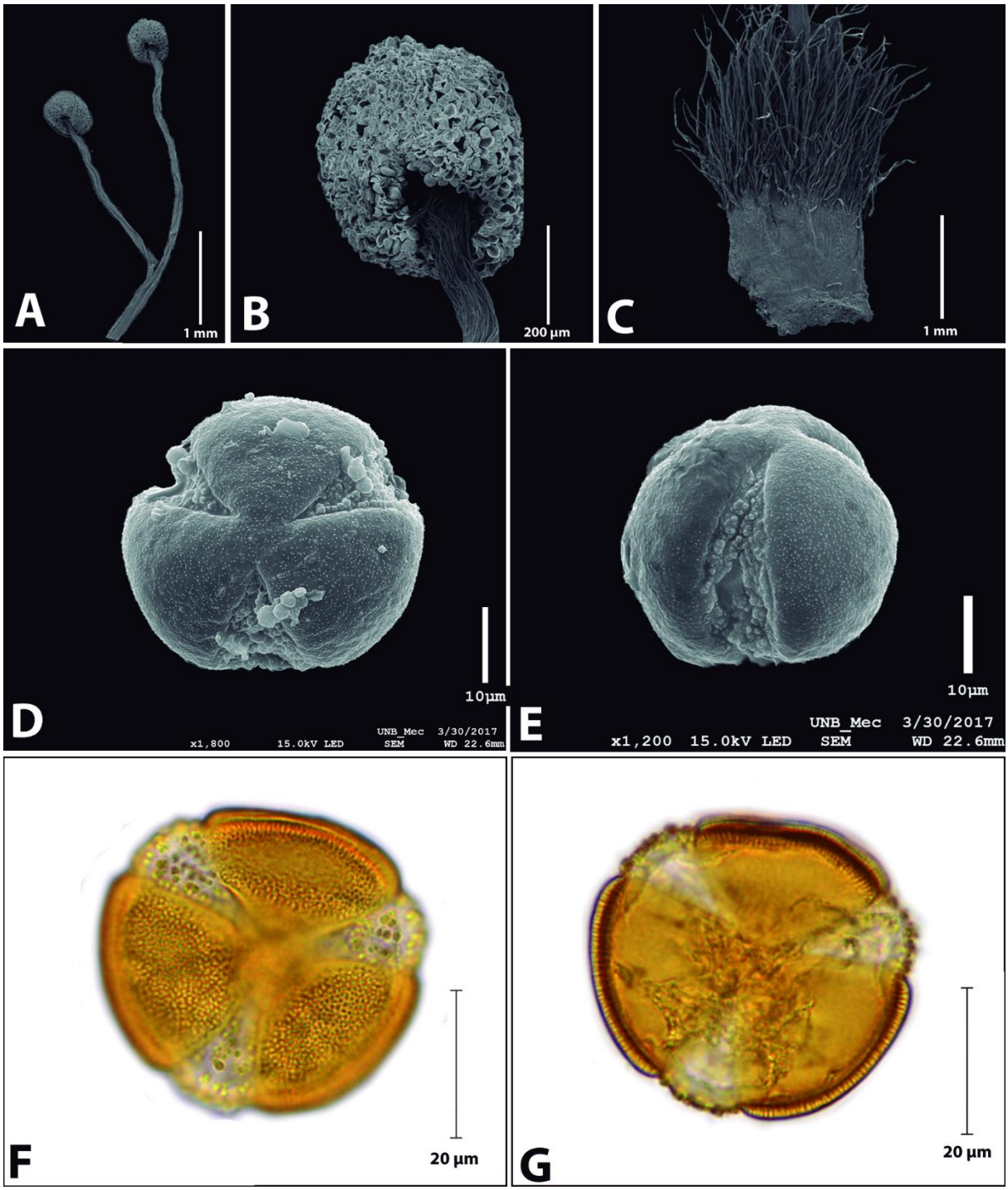

FIG. 1. *Bonamia eustachioi*. **A–E.** Scanning electron micrographs. **A.** Stigmas. **B.** Detail of stigma. **C.** Ovary. **D.** Pollen grain in polar view. **E.** Pollen grain in equatorial view. **F–G.** Scanning optical microscope of pollen grain in polar view (A–C from *Romero et al. 6307*, SP; D-G from *Faria & Ribeiro 4444*, UB).

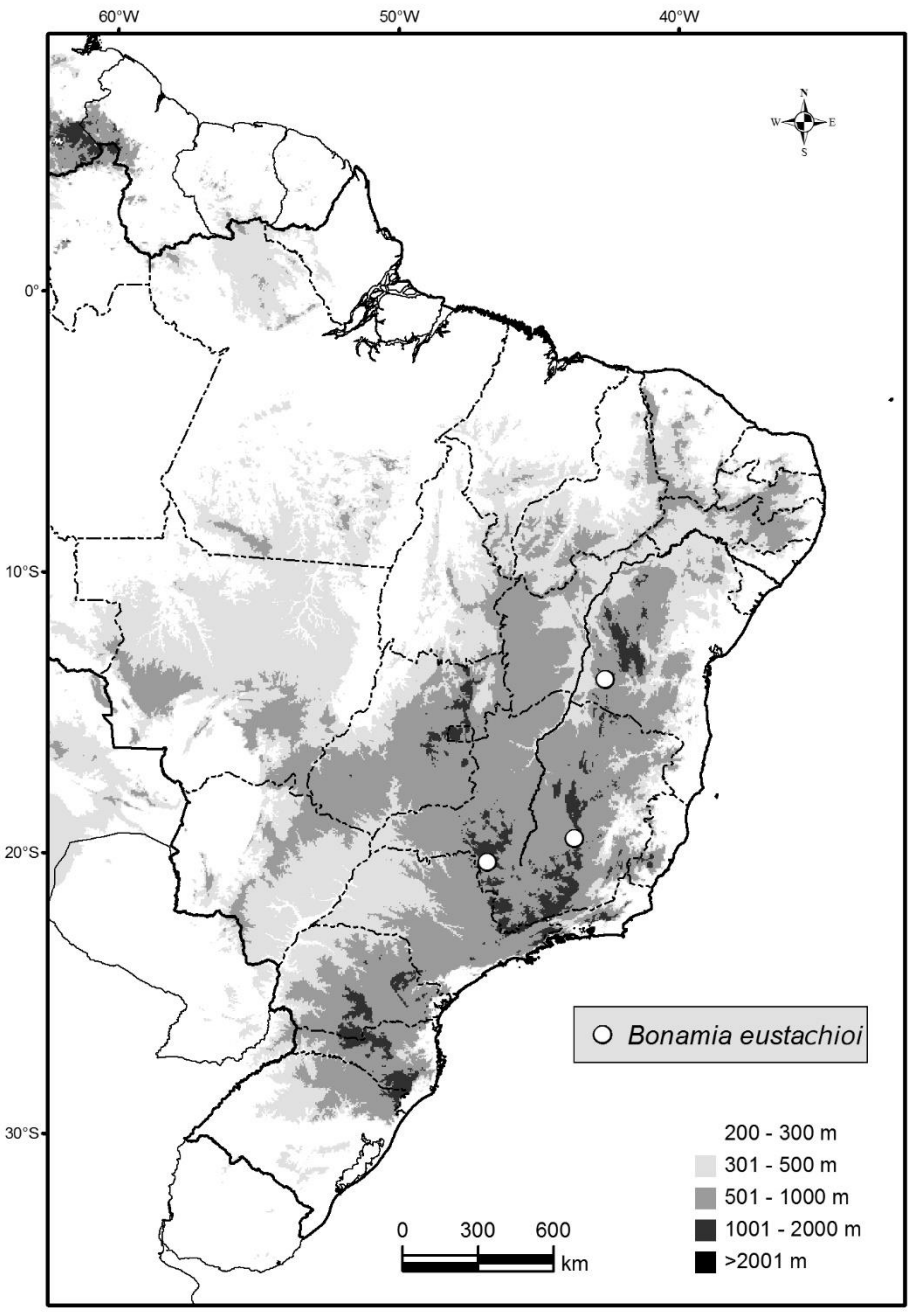

FIG. 2. Distribution map of *Bonamia eustachioi*. State boundaries are indicated by dotted lines.

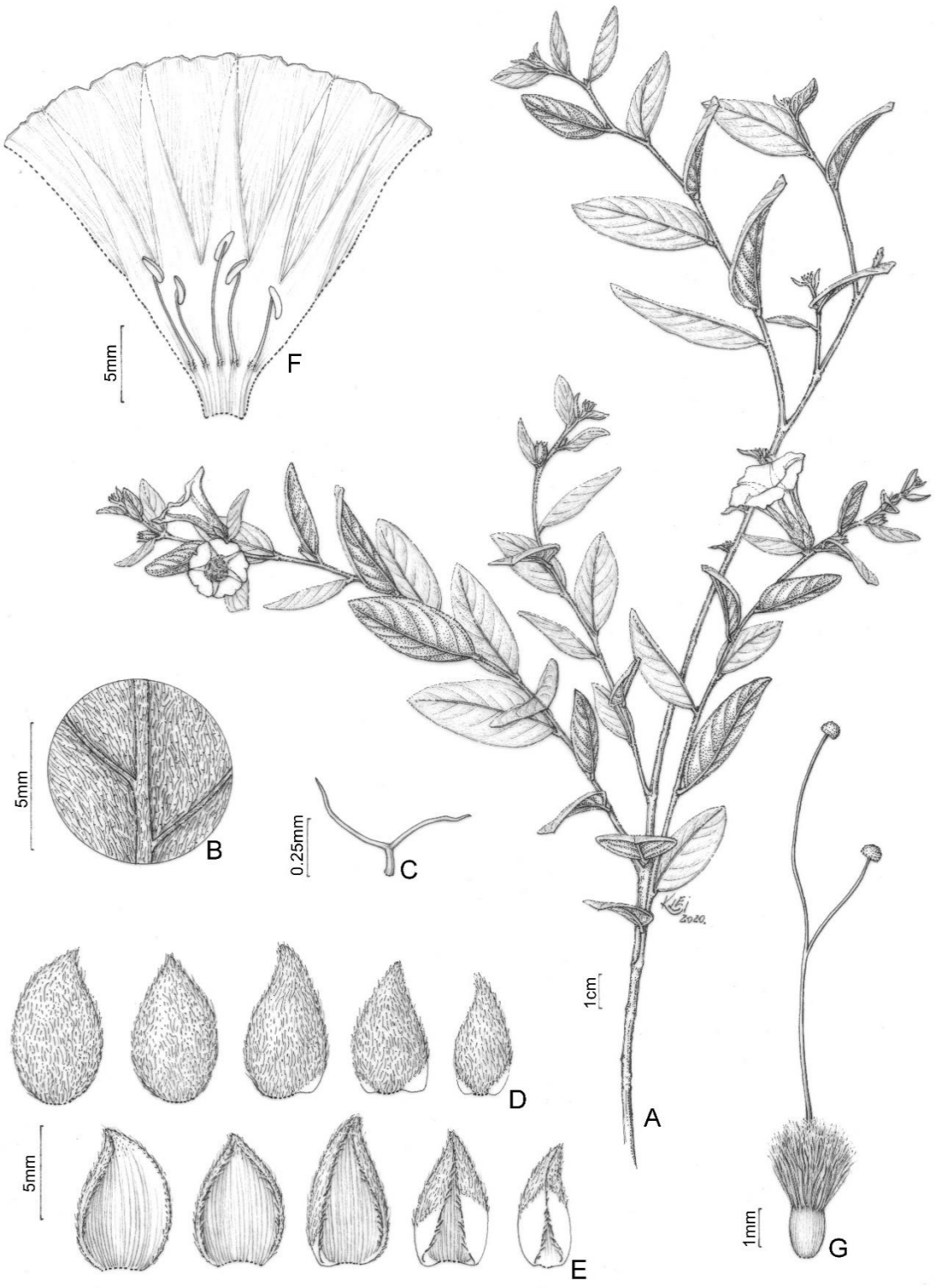

FIG.3. *Bonamia eustachioi*. **A.** Habit. **B.** Leaf indument. **C.** Forked trichome. **D.** Sepals, adaxial surface, **E.** Sepals, abaxial surface. **F.** Corolla opened longitudinally showing androecium**. G.** Pistil. (*Faria & Ribeiro* 4444, SP; drawing by Klei Sousa).

FIG. 4. *Bonamia eustachioi*. **A.** Habit. **B.** Flower in frontal view. **C.** Flower, in lateral view. **D.** Inflorescence. **E.** Immature capsule (Pictures: J.E.Q Faria).

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Morpho-anatomy of underground system of *Evolvulus pterygophyllus* Mart. var. *puberulus* Meisn. (Convolvulaceae)

Capítulo em formato de artigo a ser submetido e adequado às normas da revista Willdenowia

Morpho-anatomy of the underground system of *Evolvulus pterygophyllus* Mart. var. *puberulus* Meisn. (Convolvulaceae)

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Abstract: Convolvulaceae is a cosmopolitan family with representatives distributed in tropical and temperate regions. The species have underground system formed mainly by tap roots, such as in *Evolvulus* L., followed by tuberous root, generally in species of *Ipomoea* L., and rarely rhizome or xylopodium, but the anatomical studies of these underground systems of Convolvulaceae are still poorly known. Several native species from the Brazilian Cerrado survive under unfavorable dry season and periodical fire, which destroys the shoots but do not reach the underground system that remains intact. Most of *Evolvulus* representatives grow only in open dry fields, such as Cerrado and Caatinga. This work dealt with shallow horizontal underground system of *Evolvulus pterygophyllus* Mart. var. *puberulus* Meisn. in order to characterize its structural nature and contribute to the familiar and generic taxonomy. The anatomical analyses showed that the shallow horizontal underground system has radicular or caulinar structure that is responsible for new growths of the aerial part. We verified that underground stem is fistulous, an inedited character in *Evolvulus* and reported only for *Ipomoea* and *Keraunea* Cheek & Sim.-Bianch. This work is also the first root anatomical study of *Evolvulus* and the first record of occurrence of gemmiferous root in this genus.

Keywords: Brazilian savanna, Cerrado, gemmiferous root, stem, subterranean system, Solanales

Introduction

Convolvulaceae has a wide distribution, being very common in tropical and temperate regions, with the greatest number of representatives concentrated in America and Africa (Austin & Cavalcante 1982; Austin 1997; Staples 2012).

Although the family is recognized by the voluble habit, there are species with prostrate or erect stems in several genera, but in the genus *Evolvulus* L. there is no references to voluble species, most of them are erect to decumbent herbs. This genus is currently represented by 103 species, the majority restricted to America (Ooststroom 1934; Staples 2019). In Brazil, the genus is represented by 73 species, 50 of which are endemic, which are present in a several types of vegetation, but great part of them occurs only in open dry fields of Cerrado and Caatinga (Flora do Brasil 2020, ongoing).

The revision of *Evolvulus* made by Ooststroom (1934) proposed seven sections, not yet confirmed by molecular studies: *Alsinoidei* Meisn., *Involucrati* Ooststr., *Lagopodini* Meisn., *Linoidei* Meisn., *Paniculati* Peter, *Passerinoidei* Meisn., and *Pedunculati* Ooststr. The morphological characteristics suggest that the Section *Lagopodini* Meisn. encompasses five species and the members have all bracts become small and narrow than in the representatives of other sections. The inflorescence is spike-like, the bracts are alike to the sepals and distinctly separated with flowers aggregated at end of branches, distinct hippocrateriform corolla and the leaf base decurrent on the stem. The latter character is typical of *Lagopodini* and unique in Convolvulaceae (Ooststrom 1934).

Evolvulus pterygophyllus Mart. is an herbaceous species with two varieties (the type variety and var. *puberulus* Meisn.) endemic from Brazil that occurs in the Cerrado and Caatinga (Ooststrom 1934; Flora do Brasil 2020, ongoing). Plants from these

phytogeographic domains have peculiar morphological and physiological characteristics adapted to the environmental conditions (Rizzini & Heringer 1961; Ratter & al. 1997).

Cerrado is characterized by low soil fertility, high water table depth, high fire frequency, and well defined dry and rainy seasons (Ribeiro & Walter 2008; Franco & al. 2014). Thus, many plants from this vegetations are fire- or drought-resistant, maintaining adaptations such as specialized underground systems (Ratter & al. 1997).

Tuberous roots with laticiferous cells are generally related to Convolvulaceae representatives, mainly in *Ipomoea* L. (Simão-Bianchini 1998). These tubers represent for the millenarian and economic recognition conferred to the family: *Ipomoea batatas* (L.) Lam., the sweet-potato. Meanwhile, the tap roots such as those occurring in *Evolvulus*, are the most common in the family (Ooststroom 1934; Silva 2013). Less frequently are the underground systems that present rhizome (Maire 1913) or xylopodium, both based only on external morphological observation (Wood & al. 2015, 2017), whereas adventitious roots might appear in species of *Bonamia* Thouars, *Dichondra* J.R. Forst. & G. Forst., *Ipomoea*, *Iseia* O'Donell, *Evolvulus*, *Jacquemontia* Choisy and *Maripa* Aubl. (Simão-Bianchini 1998).

The gemmiferous underground systems have varied morpho-anatomical features and might present complex structural nature (Dietrich & Figueiredo-Ribeiro 1985). The anatomical analyses are needed due to underground systems may have root, stem or mixed origin. The observations based just in external morphology are insufficient to identifying its structural nature (Raju & al. 1966). Among the underground structures found in Cerrado stand out xylopodia, gemmiferous roots, tuberous roots, rhizophores, stem-like (soboles) or radicular diffuse system (Hayashi & Appezzato-da-Glória 2005, 2007; Alonso & Machado 2007; Appezzato-da-Glória & al. 2008; Appezzato-da-Glória 2015; Abdalla & al. 2016).

The bud formation in underground systems has an importance in the species survival in dry regions because these buds are related specially to shoot regeneration of plants.

Gemmiferous roots are protected in the underground against the actions of fire and human, providing nutrition to development of the buds (Rizzini 1965).

Although species of *Evolvulus* have economic importance due to their biological activities such as anthelmintic, antimicrobial, antioxidant, adaptogenic and anti-amnesic, among others (Dash & al. 2002; Siripurapu & al. 2005; Gomathi & al. 2014), anatomical studies are still scarce. These works focused on the anatomy of aerial organs, especially the leaves (Inamdar & Shenoy 1981; Ketjarun & al. 2016; Ashfaq & al. 2019) and, then, studies with underground organs were not found.

In view of the lack knowledge about underground system of *Evolvulus*, the objective of this work was to characterize the anatomy of shallow horizontal underground systems of *E. pterygophyllus* Mart. var. *puberulus* Meisn. in order to identify characters with taxonomic importance to contribute in further studies of the genus representatives in the face of difficult to recognize the stem or root structure in this species only by macroscopic analysis.

Material and methods

Samples of underground systems from five herborized individuals (n = 3 for stem and n = 2 for root) were used for the anatomical study (table 1). All the specimens were collected in Cerrado phytogeographic domain. Voucher specimens are deposited in SP Herbarium (acronym according to *Index Herbariorum* – Thiers 2018+, continually updated) of the Instituto de Botânica, São Paulo State, Brazil.

Table 1. Analyzed material of *Evolvulus pterygophyllus* Mart. var. *puberulus* Meisn. with locality of collection and voucher in SP Herbarium, Brazil.

State	**County**	**Voucher**
Bahia	Abaíra	*Melo & al. 1002*
Minas Gerais	São Roque de Minas	*Romero & al. 5002*
Minas Gerais	São Roque de Minas	*R.K. Kojima & R.S. Bianchini 21*
Minas Gerais	Uberlândia	*G.C. Oliveira 225*
Minas Gerais	Uberlândia	*G.C. Oliveira 269*

The herborized samples were submitted to reversion processes, to rehydration and distension of cells, under 5% potassium hydroxide (Demarco, pers. comm.), and then dehydrated in a graded ethylic series to after being embedded in hydroxy-ethyl-methacrylate resin (Leica Historesin). Transverse sections of 7 mm thick were cut on a rotary microtome (Olympus CUT 4055) and stained with 0.05% toluidine blue O (Sakai 1973) in phosphate-citrate buffer at pH 4.5. Free-hand transverse sections were also cut with razor blade. For histochemical tests, aqueous solution of ferric chloride was used to identify total phenolic compounds (Johansen 1940), Lugol reagent for starch grains (Berlyn & Miksche 1976) and Sudan IV for lipophilic substances (Jensen 1962). Photomicrographs were taken with an Olympus BX53 microscope coupled with an Olympus Q-Color 5 camera, using the software Image-Pro Express 6.3 (Media Cybernetics).

Results

Evolvulus pterygophyllus is an erect herb, with gemmiferous underground system located in the surface layers of the soil, reaching 3-5 cm deep, winged stem, leaves narrow-

elliptic or lanceolate with acute or acuminate apex; dense villous inflorescence, flowers sessile, blue corolla with mid-petaline bands sericeous; ovoid and glabrous capsule. The type variety is distinguished by having glabrous or sparse trichomes, whereas the variety *puberulus* has appressed-lanate indument in whole plant. In our work, we studied only *E. pterygophyllus* var. *puberulus* (fig. 1A-B).

The shallow horizontal underground system of *E. pterygophyllus* var. *puberulus* consists of axes oriented perpendicularly to soil surface with the aerial branches originating from them (fig. 1 C-D). The anatomical study of these shoot-forming underground systems confirmed radicular or caulinar structure (figs. 2, 3, respectively). Roots and stems of analyzed specimens have primary and secondary structure (figs. 2, 3). Initially the epidermis constitutes the covering tissue which is subsequently replaced by the periderm (fig. 3C, D) and the phellogen is formed from cortical parenchymatic cells in the root (fig. 2C) and epidermal cells in the stem (fig. 3A, B). The cortex is constituted by several layers of parenchymatic cells and there are large air gaps in the inner cortex forming the aerenchyma in both organs (fig. 2 A, C; fig. 3 A, B). Outer cell layers of cortex with suberized walls may also have phenolic compounds (fig. 2 D, E; fig. 3 C, D), and they are discarded as the radial growth of the organ progresses (fig. 2 B, C). The vascular cambium produces secondary phloem outwards and secondary xylem inwards (fig. 2A-C; fig. 3A, B).

The root structure was confirmed by centripetal maturation of protoxylem poles (exarch xylem) and the presence of metaxylem in the center of the organ (fig. 2 F). The root is triarch (fig. 2 F) to tetrarch. Stem structure was confirmed by the centrifugal maturation of protoxylem poles (endarch xylem) and presence of parenchymatic medulla in its core (fig. 3 A, E). Intraxylary (internal) phloem was found in stem (fig. 3 E-F). There is disintegration of the inner medulla parenchymatic cells as stem grows, whereby it gradually becomes fistulous (fig. 3 A).

Discussion

When analyzing herborazied materials of *Evolvulus pterygophyllus* Mart. var. *puberulus* Meisn. and observing specimens in the field, we verified that there were neither collections nor plants *in situ* during winter, so it was constated that aerial branches may have been destroyed by fire or dry season, among other typical factors from the Cerrado. Our results showed that plants of this species have shallow horizontal underground systems bearing shoots with similar external morphology but different anatomical structure as root has exarch xylem whilst stem has endarch xylem.

The periodic fire and dry season in the winter in Cerrado damage the aerial branches, but the underground system is protected against drought and overheating of the soil layer (Coutinho 2002). In the face of inhospitable environmental conditions, aerial branches can develop from the underground buds during the life cycle of the plant (Jeník 1994).

The high potential of natural regeneration in Cerrado vegetation was related by Durigan (2005). The growth of branches from gemmiferous root provides to plant ability of surviving in Cerrado conditions, especially in water deficit, generally associated to fire (Rizzini & Heringer 1961). Adaptations as occurrence of gemmiferous underground systems to inhospitable environment, especially against drought and fire, are reported for many Asteraceae species from Cerrado (Vilhalva & Appezzato-da-Glória 2006; Hayashi & Appezzato-da-Glória 2007; Abdalla & al. 2016). The resprouting ability from gemmiferous roots after environment disturbances were also mentioned to wood plants (Hayashi & al. 2001; Hayashi & Appezzato-da-Glória 2009).

Root and stem fragments can be used as vegetative propagules for the restoration of

plant communities. The topsoil translocation to resprouting of root fragments was recorded to regenerate dry forest, making available the ecological succession process (Ferreira & Vieira 2017). Resprouting from gemmiferous root is also known as strategy used by several ruderal and invasive plants in order to colonize and successful adapt in a new area (Busso & al. 2013).

Phenolic compounds verified in covering tissue both in root and stem of *Evolvulus pterygophyllus* Mart. var. *puberulus* Meisn. is associated to protection of plant vegetative organs, as chemical defense against damage by pathogen, herbivory and UV radiation (Jacomassi & al. 2007; Castro & Demarco 2008). In Convolvulaceae invasive plants, it is supported the idea that phenolic compounds have an allelochemicals function (Singhvi & Sharma 1984; Howard & Peterson 1986), such was recorded in *Merremia umbellata* subsp. *orientalis* (Hall. f.) inhibitory activities on the germination of *Arabidopsis* (Brassicaceae) seeds (Yan & al. 2010). Antioxidative activities are associated to phenolic compounds in leaves, stem and root of *Ipomoea batatas* (Jung & al. 2011; Mohanraj & Sivasankar 2014). These compounds have also been reported to improve a several benefices to human health (Kurata & al. 2007).

The occurrence of large air gaps in the inner cortex (aerenchyma) of the underground systems (both root and stem) of the analyzed specimens is an interesting character, as those plants are terrestrial, but these air gaps are generally related to oxygen shortage in flooded environment, providing an internal pathway for oxygen transfer to plant (Drew & al. 2000) or as gas reservoir in hydrophyte plants (Aliscioni 2000). Thus, in general the formation of aerenchyma is induced by anaerobiosis of soil (Peterson 1992). But some dryland species subject to adverse environment conditions such as high temperature, drought and nutrient deficiency can also form aerenchyma in roots and shoots (Evans 2003). In dry environment, these air gaps may work as regulatory function in the gas exchanges (Barboza & al. 2006).

Then, the aerenchyma occurrence in underground root and stem of studied plants may be result of unfavorable environmental conditions to which they were subjected. In Convolvulaceae, aerenchyma was related in roots of *Cressa cretica* L., a halophytic shrub of sea cost in India, Timor, and Australia (Suganthi & al. 2007; Priyashree & al. 2010; Chaudhary & al. 2012).

According to synapomorphy related to Convolvulaceae (Stefanović & al. 2002, 2003), intraxylary (internal) phloem was also observed in this studied species, confirming its occurrence in representatives of *Evolvulus*. Typical members of the family have intraxylary phloem, absent only in *Cuscuta* L. and *Humbertia* Lam. (Metcalfe & Chalk 1950; Stefanović 2002, 2003).

The studied species has fistulous underground stem that was previously reported only in aerial stems of *Ipomoea* (Simão-Bianchini & Pirani 1997; Buril & al. 2013; Simão-Bianchini & al. 2016) and *Keraunea* Cheek & Sim.-Bianch. (Cheek & Simão-Bianchini 2013). So, this character is inedited in *Evolvulus* and further studies with genus representatives could show whether this feature is interesting for the group's phylogenetic studies.

Conclusion

The shoot development from the underground systems contribute to adaptive strategies that allowed the successful establishment of *E. pterygophyllus* var. *puberulus* under dry and heat conditions in Brazilian Cerrado. Such organs can influence the population dynamics of this species, producing new shoots after removal of aboveground branches by fire or drought, among other factors.

Morpho-anatomical studies of underground systems in representatives of Convolvulaceae is still scarce. So, this paper provides the first anatomical study of underground system of *Evolvulus*, highlighting to gemmiferous roots and fistulous underground stem, opening the way for further investigations in order to contribute to taxonomy of this Convolvulaceae genus.

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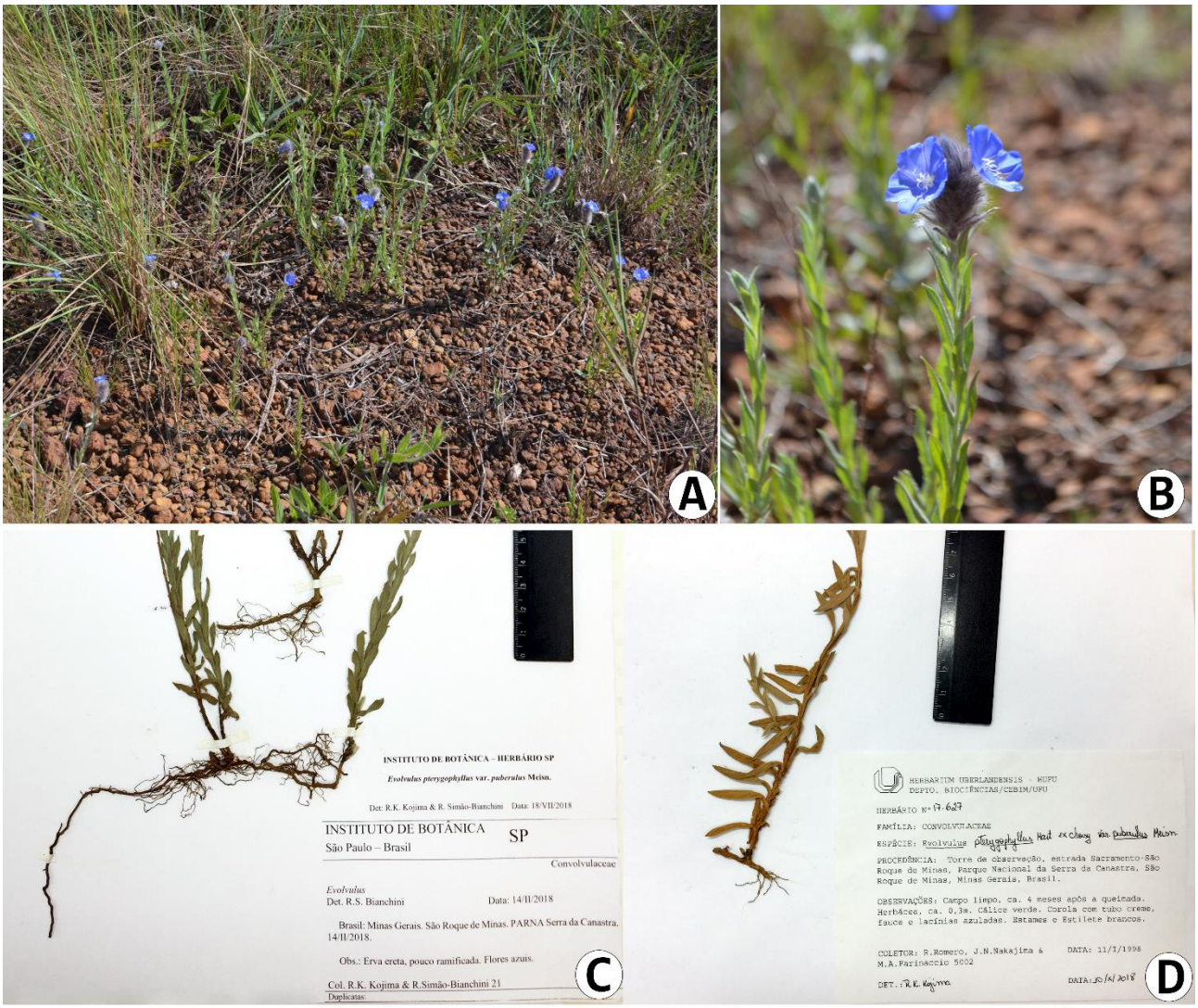

Fig. 1 – *Evolvulus pterygophyllus* var. *puberulus* – A. Population in natural habitat, in Serra da Canastra National Park, State of Minas Gerais. B. Detail of branch and flowers. C. Detail of underground system – root. D. Detail of underground system – stem (A-B: R.S. Bianchini; C-D: *R.K. Kojima & R.S. Bianchini 21*).

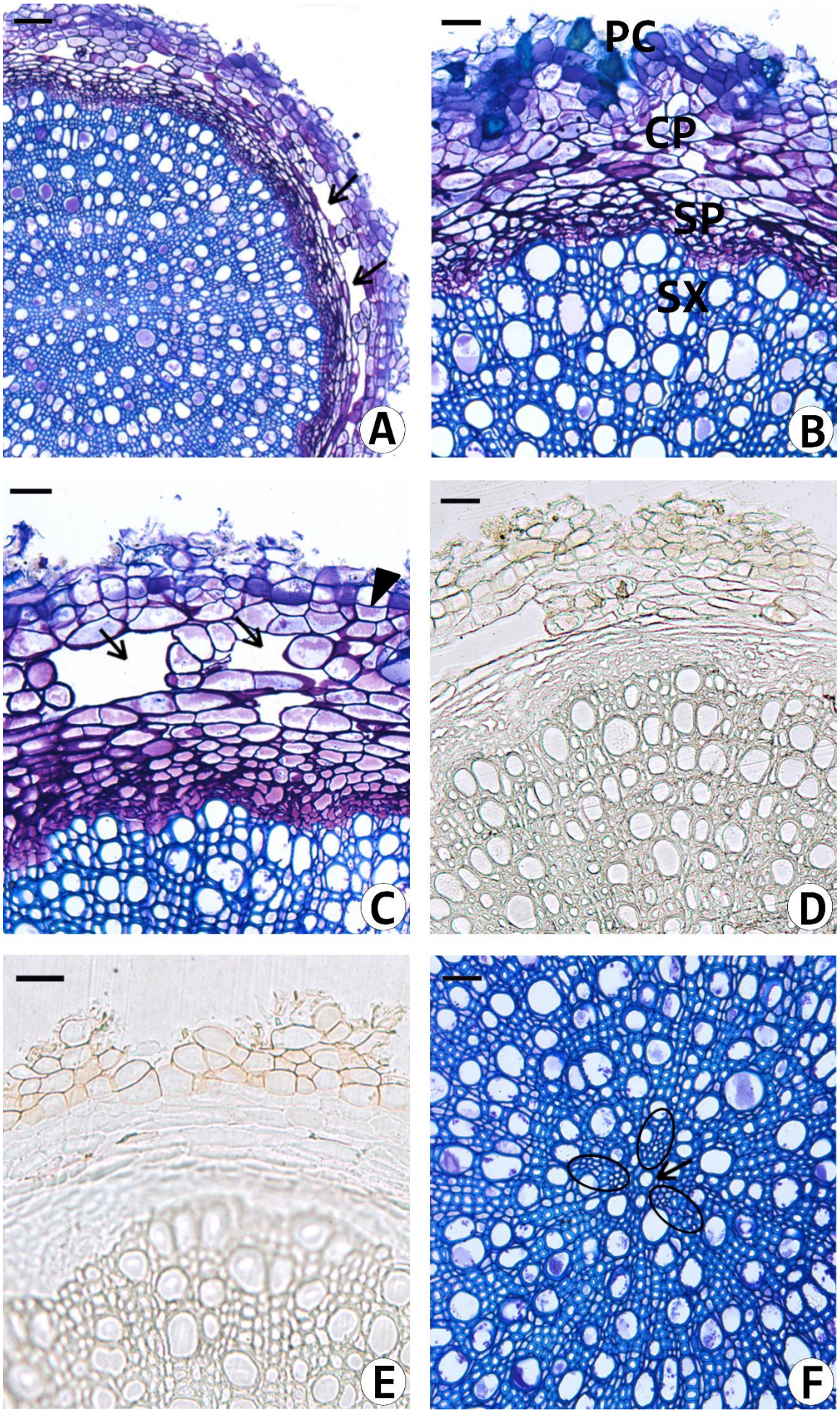
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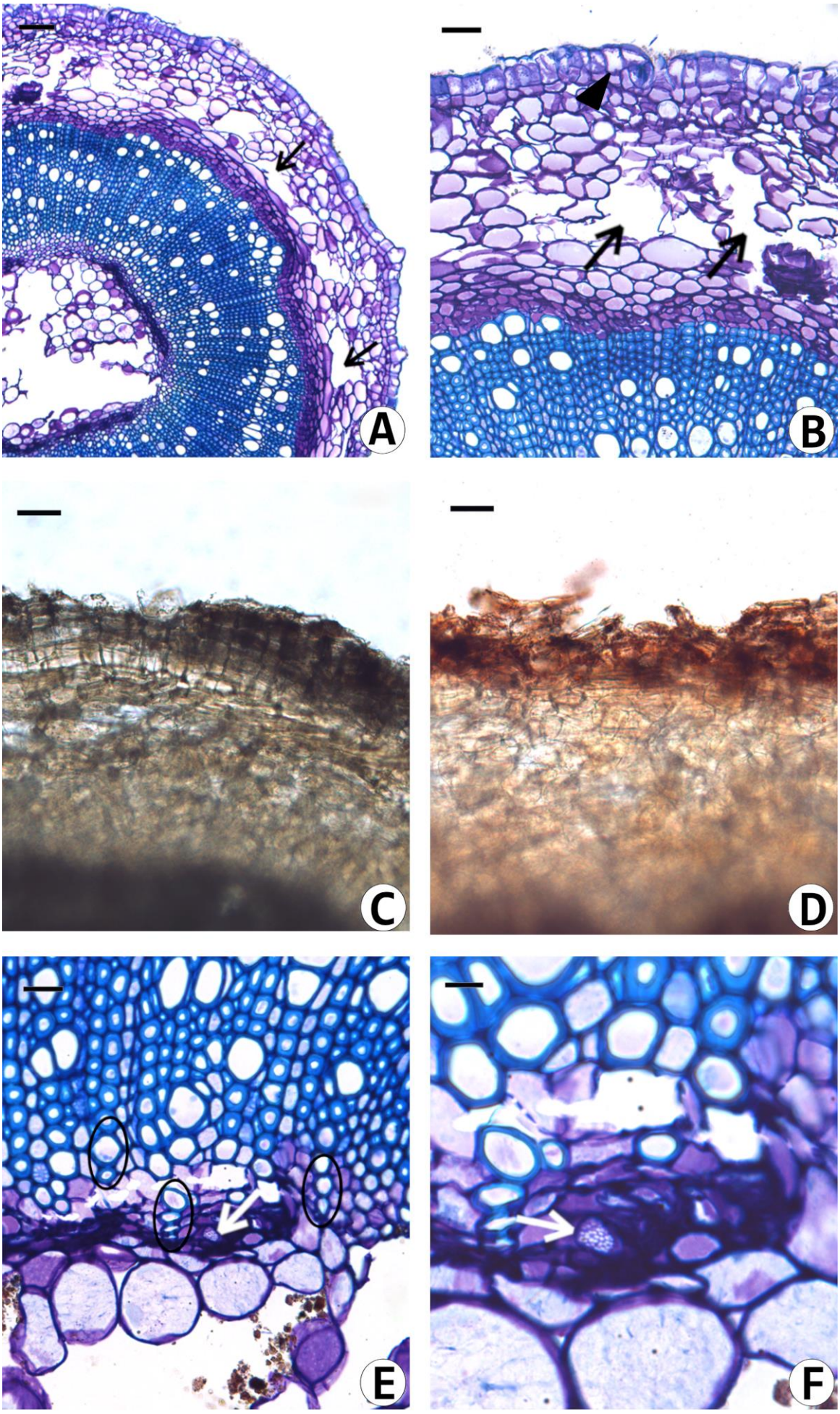
Fig. 2 – Transverse sections of the root of *Evolvulus pterygophyllus* var. *puberulus* – A. General view of the root with large air gaps in the inner cortex (arrows); B. Detailed view of the root, showing phenolic compounds (PC) in the outermost cell layers of cortex; cortical parenchyma (CP), secondary phloem (SP), and secondary xylem (SX); C. Phellogen installing from cortical parenchymatic cells (arrow head), air gaps (arrows); D-E. Detection of phenolic compounds (ferric chloride) and suberin (Sudan IV), respectively, in the outermost layers of cortex; F. Root center detail showing centripetal maturation of protoxylem (ellipses) and central metaxylem (arrow). Scales: 50 µm (B, C, D, E, F); 100 µm (A).


A
B
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D
E
F

Fig. 3 – Transverse sections of the stem of *Evolvulus pterygophyllus* var. *puberulus* – A. General view of the underground stem with large air gaps (arrows) in the inner cortex and medulla almost fistulous; B. Detailed view of the underground stem, showing phellogen installing from epidermis (arrow head) and air gaps (arrows); C-D. Detection of phenolic compounds (ferric chloride) and suberin (Sudan IV) in the outermost cell layers of the cortex, respectively; E. Stem center detail showing centrifugal maturation of protoxylem (ellipses) and internal phloem with sieve plate (arrow); F. Detail of sieve plate (arrow). Scales: 10 µm (F); 25 µm (E); 50 µm (B, C, D); 100 µm (A).

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Capítulo 4

Field Guide – Convolvulaceae of Serra da Canastra

Capítulo redigido de acordo com o modelo Rapid Color Guides do Field Museum (http://fieldguides.fieldmuseum.org/)

Serra da Canastra National Park, MINAS GERAIS, BRAZIL

CONVOLVULACEAE of SERRA DA CANASTRA

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Photos by the authors. *not taken in Serra da Canastra. Produced by: Roberta Keyla Kojima.
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The Serra da Canastra National Park is included in Cerrado domain and is situated in Southwestern portion of Minas Gerais State, Brazil. Its altitudes vary between 800 to 1200 m, with a maximum of 1496 m in Serra Brava. It is managed by Instituto Chico Mendes de Conservação e Biodiversidade (ICMBio) in order to protect and maintain the natural richness. The Park was created at April 3th, 1972, comprising areas of counties of Capitólio, Delfinópolis, Sacramento, São João Batista do Glória, São Roque de Minas and Vargem Bonita. The PNSC has an area of about 200 thousand ha. and is the second largest protected area of Minas Gerais. It encompasses two great blocks: Canastra Plate and Babilônia Plate. In the Serra da Canastra was recognized five genera and 23 species of Convolvulaceae. In surrounding areas, occur ten species, some of them are ruderal. Photographs were not taken of *Evolvulus goyazensis*, *Ipomoea acutisepala*, *I. campestris*, *I. fiebrigii*, *I. pohlii*, *I. verbasciformis*.

O Parque Nacional da Serra da Canastra é abrangido pelo domínio Cerrado e está situado na porção Sudoeste do Estado de Minas Gerais, Brasil. Suas altitudes variam entre 800 a 1200 m, com um máximo de 1496 m na Serra Brava. É gerido pelo Instituto Chico Mendes de Conservação e Biodiversidade (ICMBio), com o intuito de proteger e manter a riqueza natural. O Parque foi criado em 3 de abril de 1972, compreendendo as áreas dos municípios de Capitólio, Delfinópolis, Sacramento, São João Batista do Glória, São Roque de Minas e Vargem Bonita. O PNSC tem uma área de cerca de 200 mil ha, sendo a segunda maior área protegido de Minas Gerais. Compreende dois grandes blocos: o Chapadão da Canastra e o Chapadão da Babilônia. Na Serra da Canastra foram reconhecidos cindo gêneros e 23 espécies de Convolvulaceae. Nos arredores ocorrem dez espécies, algumas delas são ruderais. Não foram fotografadas *Evolvulus goyazensis*, *Ipomoea acutisepala*, *I. campestris*, *I. fiebrigii*, *I. pohlii*, *I. verbasciformis*.

Landscape of Serra da Canastra

1 ***Bonamia eustachioi**** Photo: Jair Faria

2 ***Bonamia eustachioi**** Photo: Jair Faria

3 ***Bonamia eustachioi**** Photo: Jair Faria

4 ***Bonamia eustachioi**** Photo: Jair Faria

5 ***Distimake cissoides****

Serra da Canastra National Park, MINAS GERAIS, BRAZIL

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6 ***Distimake cissoides**** 

7 ***Distimake macrocalyx**** 

8 ***Distimake macrocalyx**** 

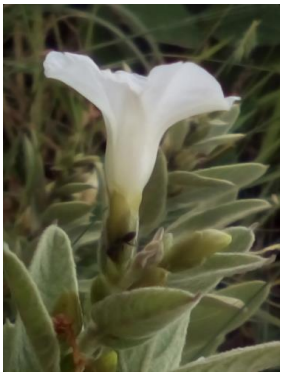
9 ***Distimake macrocalyx**** 

10 ***Distimake maragniensis**** Photo: Mauricio Mercadante

11 ***Distimake maragniensis**** 

12 ***Distimake maragniensis**** 

13 ***Distimake tomentosus*** 

14 ***Distimake tomentosus*** 

15 ***Distimake tomentosus***

76 ***Distimake tomentosus**** 

77 ***Evolvulus aurigenius**** 

78 ***Evolvulus aurigenius**** 

79 ***Evolvulus cressoides*** 

80 ***Evolvulus cressoides***

81 ***Evolvulus cressoides*** 

82 ***Evolvulus glomeratus**** 

83 ***Evolvulus glomeratus**** 

84 ***Evolvulus lagopodioides**** Photo: Henrique Moreira

85 ***Evolvulus pterygophyllus***

Serra da Canastra National Park, MINAS GERAIS, BRAZIL

CONVOLVULACEAE of SERRA DA CANASTRA

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16 Evolvulus pterygophyllus

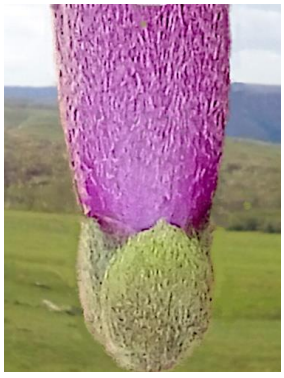
17 Evolvulus pterygophyllus

18 Evolvulus terygophyllus*
Photo: Mauricio Mercadante

19 Ipomoea aprica

20 Ipomoea aprica

21 *Ipomoea aprica*



22 *Ipomoea aprica*

23 *Ipomoea argentea**
Photo: Mauricio Mercadante

24 *Ipomoea argentea**
Photo: Mauricio Mercadante

25 *Ipomoea argentea**
Photo: Mauricio Mercadante

26 *Ipomoea argentea**
Photo: Mauricio Mercadante

27 *Ipomoea cairica**

28 *Ipomoea cairica**

29 *Ipomoea delphinioides*

30 *Ipomoea delphinioides*

31 *Ipomoea delphinioides*

32 *Ipomoea langsdorffii*

33 *Ipomoea langsdorffii*

34 *Ipomoea langsdorffii*

35 *Ipomoea nil*

Serra da Canastra National Park, MINAS GERAIS, BRAZIL

CONVOLVULACEAE of SERRA DA CANASTRA

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36 ***Ipomoea nil***

37 ***Ipomoea nil***

38 ***Ipomoea pinifolia**** Photo: Mauricio Mercadante

39 ***Ipomoea pinifolia**** Photo: Henrique Moreira

40 ***Ipomoea pinifolia**** Photo: Mauricio Mercadante

41 ***Ipomoea procumbens***

42 ***Ipomoea procumbens***

43 ***Ipomoea procumbens***

44 ***Ipomoea procumbens***

45 ***Ipomoea procurrens***

46 ***Ipomoea procurrens***

47 ***Ipomoea procurrens***

48 ***Ipomoea procurrens***

49 ***Ipomoea sidifolia***

50 ***Ipomoea sidifolia***

51 ***Ipomoea triloba***

52 ***Ipomoea triloba***

53 ***Jacquemontia blanchetii***

54 ***Jacquemontia blanchetii***

55 ***Jacquemontia cataractae***

Serra da Canastra National Park, MINAS GERAIS, BRAZIL

CONVOLVULACEAE of SERRA DA CANASTRA

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56 ***Jacquemontia cataractae***

57 ***Jacquemontia prostrata****

58 ***Jacquemontia prostrata****

59 ***Jacquemontia sphaerocephala***

60 ***Jacquemontia sphaerocephala***

61 ***Jacquemontia sphaerocephala***

62 ***Jacquemontia sphaerocephala***

63 ***Jacquemontia sphaerostigma***

64 ***Jacquemontia sphaerostigma***

65 ***Jacquemontia sphaerostigma***

Considerações Finais

Foram inicialmente listadas 23 espécies de Convolvulaceae no Parque Nacional da Serra da Canastra, de acordo com o banco de dados da orientadora. Após a análise de todos os materiais registrados na área, inclusive aqueles provindos de empréstimos de outros herbários e das novas coletas realizadas durante este estudo, o número de espécies permaneceu inalterado, porém muitas foram remanejadas. Alguns materiais com identificação duvidosa foram reidentificados em espécies que já constavam na lista preliminar de ocorrência no Parque; e outras espécies foram acrescentadas: *Evolvulus goyazensis*, inicialmente considerada como *E. tomentosus*, *Ipomoea delphinioides*, *I. langsdorffii*, *I. pohlii* e *Jacquemontia sphaerostigma*. *Merremia digitata* Spreng. foi reidentificada e atualizada para *Distimake maragniensis*; *M. tomentosa* (Choisy) Hallier f. foi atualizada para *D. tomentosus*. *Ipomoea sidifolia* e *J. sphaerocephala*, preliminarmente listadas, não foram encontradas dentro da área do Parque, apenas nos arredores da região.

Foi reconhecida uma nova espécie inédita para a ciência: *Bonamia eustachioi*, típica de ambientes rupestres. Dentre os materiais da Serra da Canastra, esta espécie foi inicialmente identificada como *Bonamia* aff. *sericea*. O trabalho de descrição desta nova espécie foi realizado em colaboração com o Dr. André L. C. Moreira, da Universidade de Brasília.

O estudo anatômico do sistema subterrâneo de *E. pterygophyllus* var. *puberulus*, realizado em colaboração com a Dra. Adriana Hissae Hayashi, do Núcleo de Pesquisa em Anatomia do Instituto de Botânica, é inédito para este gênero e abre caminho para que novas investigações sejam feitas a fim de contribuir com a taxonomia do grupo. As perspectivas são de que estudos desta natureza sejam feitos abrangendo o maior número possível de espécies dentro do gênero.

O guia de campo, que compõe o último capítulo da dissertação, é importante para o reconhecimento das espécies em campo. Foram incluídas não somente as espécies que ocorrem dentro do Parque, mas também as ruderais do entorno e aquelas típicas de Cerrado que ocorrem nas regiões dos arredores e que, possivelmente, possam ocorrer dentro do Parque no futuro.

A partir do nosso estudo, constatamos que todas as espécies são nativas, a maioria típica de Cerrado. Um elevado número de espécies nativas ocorre em campos limpos e campos rupestres. Não foram encontrados espécimes em campo durante o inverno, época de seca, periodicamente associada a queimadas naturais no Cerrado. Na região da Serra da Canastra, que engloba os arredores do Parque, foram registradas dez espécies, das quais cinco são ruderais, ocorrendo em áreas antropizadas, principalmente em beiras de estrada, áreas de pastagens e cultivos. Foi encontrada apenas uma espécie ruderal dentro do Parque (*J. sphaerostigma*), constatando que a área protegida é bem preservada. Cinco espécies que também ocorrem nos arredores são nativas e não foram encontradas dentro do PNSC: *I. rupestris, I. sidifolia*, *J. blanchetii*, *J. cataractae* e *J. sphaerocephala*. Apenas *D. tomentosus*, espécie típica de Cerrado, restrita ao Brasil e com ampla distribuição, ocorre no Parque e na região do seu entorno. Das espécies encontradas apenas na área de estudo, treze são restritas ao Brasil, uma tem ocorrência registrada apenas em Minas Gerais e nove são raras ao longo de sua distribuição, das quais *Bonamia eustachioi*, *I. langsdorffii* e *I. pohlii*, se destacam por serem geralmente associadas a campos rupestres e por haver poucas coletas; as duas últimas são pouco estudadas.

Ao longo dos anos, os arredores do PNSC vêm sofrendo impactos causados pelas pastagens e agricultura, fatores com potencial de causar fragmentação e destruição de habitats, com provável perda de espécies. Como forma de neutralizar estes impactos, foram regulamentadas, pelo Sistema Nacional de Unidades de Conservação da Natureza, as zonas de amortecimento, limitando as atividades antrópicas a restrições específicas legais. O turismo, por outro lado, geralmente considerado como fator de ameaça à preservação de ambientes naturais, tem se mostrado proveitoso no Parque, com ações intensas de educação ambiental promovidas por voluntários do ICMBio, conscientizando, promovendo a vivência dos visitantes ao ambiente natural e contribuindo para a conservação.