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RAIMUNDO LUCIANO SOARES NETO

FILOGENIA E TAXONOMIA DE *TARENAYA* RAF. (CLEOMACEAE)

Recife

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Tese apresentada ao Programa de Pós-gradução em Biologia Vegetal do Centro de Biociências da Universidade Federal de Pernambuco, como requisito parcial para obtenção do título de Doutor em Biologia Vegetal.

Orientador: Dr. William Wayt Thomas

Coorientadora: Dra. Maria Regina de Vasconcellos Barbosa

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Dra. Maria Bernadete Costa-e-Silva

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dedico.

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“*Se te oferecerem um assento em um foguete, não pergunte qual é o assento.*

Apenas entre no foguete!”

Sheryl Sandberg, COO do Facebook

RESUMO

Tarenaya Raf. (Cleomaceae) abrange espécies herbáceas, subarbustivas ou arbustivas, de distribuição predominantemente Neotropical, com apenas uma única espécie presente no oeste da África. Após mudanças na taxonomia de Cleomaceae, *Tarenaya*, que antes era tratado como sinônimo de *Cleome* L., foi reestabelecido, mas, questões como a delimitação do gênero, problemas nomenclaturais, tipificação e relações interespecíficas encontravam-se em aberto. Portanto, os objetivos deste estudo foram: propor uma hipótese filogenética para o gênero; delimitar sua circunscrição; e realizar o tratamento taxonômico de suas espécies. As relações filogenéticas foram reconstruídas a partir de análises de Máxima Verossimilhança e Inferência Bayesiana, utilizando marcadores genômicos nuclear (ITS) e plastidiais (*mat*K e *ndh*F), e incluíram 51 amostras de representantes do gênero. Complementarmente aos estudos de filogenia molecular, análises de tempo de divergência e reconstrução de área ancestral foram realizadas para conhecer a biogeográfica histórica do grupo. Para os estudos taxonômicos foram realizadas expedições de campo para coleta de material botânico e observação das plantas em seu hábitat. Além disso, foram analisados cerca de 6000 espécimes depositados em 29 herbários brasileiros e estrangeiros, incluindo tipos morfológicos. Como resultados obtidos, definiu-se que *Tarenaya* abrange 37 espécies caracterizadas, em sua maioria, pela presença de um par de espinhos na base dos pecíolos, pelas flores com brácteas foliáceas, e sementes com ornamentação rugolosa com a fenda de abertura possuindo uma membrana que liga as extremidades das sementes. A maior riqueza de espécies do gênero encontra-se no Brasil, que apresenta 22 espécies, das quais 10 são endêmicas. Das 37 espécies, quatro são novas espécies descritas para a ciência. Foram designados 27 lectótipos e 4 neótipos, além de 34 nomes terem sido sinonimizados. Os estudos filogenéticos mostraram que o gênero é monofilético, apresentando em sua topologia quatro subclados fortemente sustentados. As relações interespecíficas mostraram-se moderada a fortemente sustentadas. Além disso, as análises biogeográficas sugerem que *Tarenaya* teria se originado no Mioceno, há cerca de 17 milhões de anos atrás, com um ancestral comum distribuído nas áreas secas da América do Sul.

Palavras chave: filogenia molecular. reconstrução de área ancestral. Biogeografia. Sistemática. Taxonomia. tipificação.

ABSTRACT

Tarenaya Raf. (Cleomaceae) comprises herbs, subshrubs and shrubs, distributed predominantly in the Neotropical region, with only one species in West Africa. After taxonomic changes in Cleomaceae taxonomy, *Tarenaya*, previously treated as a synonym of *Cleome* L., was reestablished, but, issues as its generic delimitation, nomenclatural questions, typification and its species relationships remained open. Therefore, this work aimed to provide a phylogenetic hypothesis to the genus; delimit its circumscription; and provide a taxonomic treatment for its species. The reconstruction of phylogenetic relationships was carried out by Maximum Likelihood and Bayesian Inference, performed with nuclear (ITS) and two plastidial (*mat*K and *ndh*F) genomic regions, and included 51 samples of representatives of the genus. In addition, analyses of time divergence and reconstruction of the ancestral area were performed to understand the historical biogeography of the genus. Fieldwork, to gather botanical specimens and observation of plants in their preferred habitats, and analyses of ca. 6000 specimens from 29 Brazilian and foreign herbaria, including morphological types, were carried out to perform taxonomic studies. Based on the results, *Tarenaya* comprises 37 species characterized mostly by the presence of a pair of spines at the base of the petioles, the foliaceus floral bracts, and the seeds with rugulose ornamentation with the cleft recovered by a membrane which attachs the seeds extremities. The main richness of the genus is in Brazil, with 22 species distributed troughout the country, of which 10 species are endemic. Four new species were described, and 34 names were sinonimized, besides the designation of 27 lectotypes and 4 neotypes. The phylogenetic studies demonstrated that the genus is monophyletic, presenting four subclades strongly supported in its topology. The species relationships were moderate to strongly supported. Furthermore, the biogeographic analyses suggest that *Tarenaya* has originated in the Miocene, at circa 17 million years ago, with a more recente common ancestor distributed in the dry areas of South America.

Keywords: ancestral area reconstruction. Biogeography. molecular phylogeny. Systematics. taxonomy. typification

SUMÁRIO

1 INTRODUÇÃO

Tarenaya Raf., Cleomaceae, compreende ervas anuais ou perenes, subarbustos ou arbustos, ocasionalmente escandentes, e raramente arvoretas distribuídas predominantemente nos Neotrópicos, com apenas uma espécie ocorrendo no oeste da África. A maioria de seus representantes apresenta um par de espinhos na base do pecíolo e a testa das sementes com ornamentações rugolosas.

O gênero foi proposto em 1838 por Rafinesque, porém não foi adotado em tratamentos taxonômicos posteriores, sendo considerado como sinônimo de *Cleome* L. por aproximadamente 150 anos. Após estudos filogenéticos mostrarem que *Cleome* não era um gênero monofilético, *Tarenaya* foi reestabelecido por Iltis & Cochrane (2007), com base apenas em caracteres morfológicos. Baseando-se nestes caracteres, os autores estimaram que *Tarenaya* deveria abranger cerca de 40 espécies, porém nenhuma circunscrição formal foi apresentada para o gênero. Dessa forma, após seu reestabelecimento, apenas oito espécies haviam sido formamelmente reconhecidas como *Tarenaya*. Além disso, uma baixa amostragem das supostas espécies que deveriam estar sob *Tarenaya* foi incluída em estudos filogenéticos moleculares.

Desse modo, o objetivo deste trabalho foi realizar um estudo filogenético molecular e taxonômico de *Tarenaya* visando propor uma hipótese filogenética para o gênero; delimitar sua circunscrição; e realizar o tratamento taxonômico de suas espécies. Para tanto, foram realizadas diversas expedições de campo; analisados cerca de 6.000 exemplares herborizados de 29 herbários brasileiros e estrangeiros, incluindo tipos morfológicos, e os protólogos das prováveis espécies, buscando resolver problemas de tipificação e sinonímia, bem como realizar descrições morfológicas completas das espécies aceitas. Os estudos filogenéticos foram viabilizados por meio de uma bolsa do Programa de Doutorado-Sanduíche no Exterior (PDSE)-CAPES, e desenvolvidos na *Washignton State University*, USA, sob supervisão do Dr. Eric Roalson. Foram incluídas amostras em sílica, de material herborizado e sequências do GenBank. As análises foram conduzidas com dois marcadores plastidiais e um nuclear. Em adição à filogenia, buscou-se compreender a biogeografia histórica do grupo.

Os resultados obtidos são apresentados em cinco capítulos:

Capítulo 1: **Diversification of New World Cleomaceae with emphasis on *Tarenaya* and the description of a new genus. —** Nesse capítulo são abordados aspectos filogenéticos e biogeográficos da linhagem Neotropical de Cleomaceae, com ênfase em *Tarenaya*.

Capítuo 2: **Two new species of *Tarenaya* (Cleomaceae) from Brazil**. — Publicado em Phytotaxa 334(1): 28–34, 2018. Descreve duas novas espécies endêmicas do Nordeste do Brasil.

Capítulo 3: **A well-known "mussambê" is a new species of *Tarenaya* (Cleomaceae) from South America**. — (Manuscrito aceito para publicação no periódico Systematic Botany). Descrição de uma nova espécie para a América do Sul que, durante muito tempo, vinha sendo identificada erronamente como *T. spinosa*, binômio amplamente utilizado para identificar as espécies com um par de espinhos na base dos pecíolos.

Capítulo 4: **New combinations and taxonomic notes for *Tarenaya* (Cleomaceae)**. — Publicado em Acta Botanica Brasilica 32(4): 540–545, 2018. Aborda as novas combinações para os táxons que ainda não tinham sido tratados sob *Tarenaya*.

Capítulo 5: **Taxonomic revision of *Tarenaya* (Cleomaceae). —** Uma revisão taxonômica com descrição de espécies, tipificação, sinonímias, notas nomenclaturais e taxonômicas, dados de distribuição geográfica, chave para identificação e imagens e ilustrações das espécies.

2 REVISÃO DE LITERATURA

2.1 HISTÓRICO E CLASSIFICAÇÃO

Tarenaya foi estabelecido por Rafinesque (1838), que não concordava com o amplo conceito de *Cleome* L. e assim segregou diversos gêneros a partir deste. *Tarenaya* foi caracterizado por apresentar representantes com hábito herbáceo, flores com cálice tetrâmero, pétalas unguiculadas com nectário na base e estames subiguais, e frutos do tipo síliqua cilíndrica, torulosa. O gênero foi proposto com base em uma única espécie, *T. spinosa* (Jacq.) Raf., tendo *Cleome spinosa* Jacq. como seu basiônimo. Todavia, muitos dos gêneros propostos por Rafinesque (1838) não foram aceitos pelos botânicos da epóca (MERRIL, 1948), incluindo *Tarenaya* que foi tratado como sinônimo de *Cleome* por aproxidamente 150 anos (PAX & HOFFMANN, 1936; MERRIL, 1948; SOARES NETO ET AL., 2018). O gênero só viria a ser alvo de novos estudos a partir da década de 1950.

Ao realizar a revisão das espécies de *Cleome* do Novo Mundo, para sua tese de doutorado, Iltis (1952) propôs um sistema de classificação infragenérica com base no número de folíolos; presença ou ausência de espinhos ou acúleos; abertura floral; tipo de inflorescência; presença ou ausência de nectários e características das sementes. Foram reconhecidas então sete seções de *Cleome* no Novo Mundo, sendo uma delas a seção *Tarenaya.* Esta foi caracterizada

pela presença de espinhos e acúleos; brácteas florais foliáceas; e sementes com testa ornamentada, possuindo uma membrana na fenda de abertura da semente, ligando suas extremidades. A seção abrangia 24 espécies e 22 subespécies que foram divididas em oito séries: *Aculeatae*; *Dendroideae*; *Horridae*; *Roseae*; *Serratae*; *Siliculosae*; *Speciosae* e *Spinosae*.

Embora Iltis (1952) tenha realizado uma revisão taxonômica bem abrangente das espécies do Novo Mundo, apenas partes desse estudo foram publicados (ILTIS 1959, 1960). *Cleome* sect. *Tarenaya* permaneceu inédita até 2005 (ILTIS, 2005a). Contudo, nesse período, Iltis e outros botânicos utilizaram essa classificação informal em artigos de descrição de novas espécies (ILTIS, 1967; ILTIS & ZAPATA, 1997; ILTIS, 1998; ILTIS, 2005b) e monografias taxonômicas (COSTA-E-SILVA, 2000).

A ocorrência de indivíduos de uma espécie de *Cleome* com espinhos e acúleos no continente Africano chamou a atenção de botânicos da região que, levados a acreditar que a espécie havia sido introduzida na região, identificaram tais indivíduos como *C. spinosa*, binômio amplamente utilizado para identificar as espécies de *Cleome* portadoras dessas estruturas. Porém, ao analisar a coleção, Iltis (1967) chegou a conclusão que tratava-se de um táxon distinto e, assim, descreveu *Cleome afrospina* Iltis, única espécie da seção com ocorrência no continente africano.

Posteriormente outras novas espécies da região Neotropical foram descritas e posicionadas nessa seção, como *Cleome torticarpa* Iltis & Ruiz-Zapata (1997), espécie endêmica do Estado de Fálcon, Venezuela, *C. chapalensis* Iltis (1998), endêmica do México, e *C. costaricensis* Iltis, espécie de ocorrência na Costa Rica e Panamá, que só veio a ser publicada em 2005 (ILTIS, 2005a).

Costa-e-Silva (2000), adotando a classificação de seções proposta por Iltis (1952, 1959), realizou o tratamento taxonômico das espécies brasileiras de *Cleome*, e a revisão das seções *Physostemon* e *Tarenaya*. Nesse estudo foram aceitas 23 espécies para a seção *Tarenaya*, ampliando sua circunscrição, incluindo espécies posicionadas por Iltis nas seções *Lianoides* e *Melidiscus*. Contudo, a autora não adotou o tratamento infraespecífico proposto por Iltis (1952), e elevou as subespécies reconhecidas por ele a espécies e, em alguns casos, propôs uma delimitação mais ampla para algumas delas, e.g. *Cleome rosea* Vahl ex DC., *C. parviflora* Kunth. Entretanto, assim como a revisão realizada por Iltis (1952), a revisão da seção *Tarenaya* de Costa-e-Silva (2000) também não foi publicada.

Foi somente com a publicação de *Cleome boliviensis* Iltis, espécie que ocorre em elevadas altitudes da Bolívia e Peru, que Iltis (2005b) formalizou a publicação de *Cleome* sect. *Tarenaya,* incluindo cerca de 40 espécies sob sua circunscrição, porém sem apresentar uma delimitação para a mesma.

Com o reconhecimento de *Cleome* como um gênero não monofilético (HALL ET AL., 2002; HALL, 2008; INDA ET AL., 2008; FEODOROVA ET AL., 2010; RISER ET AL., 2013; PATCHELL ET AL., 2014), tornaram-se necessárias mudanças na taxonomia de Cleomaceae e um moderno tratamento taxonômico foi proposto para a família (ILTIS ET AL., 2011; ROALSON ET AL., 2015; BARRET ET AL., 2017; ROALSON & HALL, 2017; SOARES NETO ET AL., 2017; THULIN & ROALSON, 2017). Nesse novo tratamento, *Tarenaya* foi reestabelecido como um gênero distinto de *Cleome* como proposto por Iltis & Cochrane (2007).

2.2 ESTUDOS FILOGENÉTICOS, O MODERNO TRATAMENTO TAXONÔMICO E O REESTABELECIMENTO DE *TARENAYA*

Estudos filogenéticos moleculares em Brassicales (HALL ET AL., 2002; HALL, 2008), e posteriormente em Cleomaceae (INDA ET AL., 2008; FEODOROVA ET AL., 2010; RISER ET AL., 2013; PATCHELL ET AL., 2014), demonstraram que *Cleome* era um gênero não monofilético. Isso resultou em mudanças na taxonomia da família, devido a necessidade de um moderno tratamento taxonômico para as espécies que, até então, eram tratadas sob *Cleome* s.l. e que se mostraram posicionadas em diferentes clados. Atualmente, com base no posicionamento da espécie-tipo do gênero, *Cleome ornithopodioides* L., *Cleome* é um gênero restrito ao continente Africano.

Essas mudanças tiveram início com o tratamento taxonômico das espécies de Cleomaceae para a Flora da América do Norte (ILTIS & COCHRANE, 2007; TUCKER & VANDERPOOL, 2010). Nesse trabalho ocorreu a transferência de algumas espécies que antes estavam sob *Cleome* s.l. para gêneros reestabelecidos e para outros que foram propostos como novos a partir da segregação de *Cleome*. *Tarenaya* figura entre os gêneros reestabelecidos e passou a incluir em sua circunscrição duas espécies: a espécie-tipo *T. spinosa* e a nova combinação *T. hassleriana* (Chodat) Iltis (ILTIS & COCHARNE, 2007).

Recentemente, uma filogenia mais abrangente de Cleomaceae (PATCHELL ET AL., 2014), incluindo amostras de 114 espécies da família, tanto aquelas que estavam ainda sob *Cleome* s.l. quanto as do novo tratamento taxonômico, resultou numa topologia composta por 15 clados. Entre os 15 clados suportados nesse estudo, inclui-se o clado *Tarenaya* que

compreende espécies de *Cleome* sect. *Tarenaya*, inclusive as duas já tratadas como espécies de *Tarenaya*, e espécies do gênero *Hemiscola* Raf., outro gênero reestabelecido no novo tratamento taxonômico de Cleomaceae. Morfologicamente, as espécies desse clado compartilham o par de espinhos na base dos pecíolos e as sementes com uma membrana na fenda de abertura. Assim, foi sugerido ampliar a circunscrição de *Tarenaya* de modo a incluir as espécies de *Hemiscola* e as demais espécies de *Cleome* sect. *Tarenaya* ainda não transferidas para *Tarenaya*.

2.3 A ATUAL CIRCUNSCRIÇÃO DE *TARENAYA*

Com base nas amostras incluídas nos estudos de Patchell et al. (2014) e com a sugestão de ampliação da circunscrição genérica de *Tarenaya*, novas combinações foram feitas para as espécies da Flora Mesoamericana: *T. costaricensis* (Iltis) Iltis, *T. longipes* (DC.) Iltis e *T. parviflora* (Kunth) Iltis (ILTIS & COCHRANE, 2014, 2015). Posteriormente, Arana & Oggero (2016) realizaram novas combinações para a Flora da Argentina: *T. cordobensis* (Eichler ex Griseb.) Arana & Oggero, *T. lilloi* (S.A.Gómez) Arana & Oggero e *T. tucumanensis* (Iltis) Arana & Oggero. Dessa forma, até a realização deste trabalho, *Tarenaya* compreendia apenas oito espécies. Com a publicação de novas espécies e as novas combinações apresentadas por Soares Neto et al. (2018a), como resultados obtidos nesta tese, a atual circunscrição do gênero foi ampliada para 37 espécies.

2.4 REPRESENTATIVIDADE DE *TARENAYA* EM FLORAS

Os representantes atualmente circunscritos em *Tarenaya* foram abordados sob *Cleome* s.l. em diversos tratamentos taxonômicos ou listagens florísticas para os Neotrópicos. Destacam-se aqui os trabalhos desenvolvidos principalmente ao longo do século XX e os do ínicio do século XXI. Para a América Central listam-se os realizados para a Guatemala (STANDLEY & STEYERMARK, 1946); Nicarágua (ILTIS, 2001) e Panamá (STANDLEY, 1928). Para as Índias Ocidentais os realizados para Barbados (GOODING ET AL., 1965); Cuba (RODRÍGUEZ, 2005); Dominica (ILTIS, 1991); República Dominicana (URBAN, 1920); Jamaica (FAWCETT & RENDLE, 1914; ADAMS, 1972) e Porto Rico (STAHL, 1936). Na América do Sul relatam-se os preparados para a Argentina (SPEGAZZINI, 1905; HAUMAN & IRIGOYEN, 1923; HAUMAN, 1925; CABRERA & ZARDINI, 1978); Equador (DODSON & GENTRY, 1978); Guiana, Guiana Francesa e Suriname, (LINDEMAN, 1997); Peru (MACBRIDE, 1938; SOUKUP, 1967); Trinidad & Tobago (WILLIAMS, 1928); Venezuela

(ILTIS & RUIZ-ZAPATA, 1998; RUIZ-ZAPATA, 2005) e Uruguay (ARECHAVALETA, 1901).

Para o Brasil, a *Flora Brasiliensis* (EICHLER, 1865) é a principal referência para as espécies não só brasileiras, mas também para as outras da América do Sul. Junta-se a essa importante obra, a revisão das espécies brasileiras de *Cleome*, realizada por Costa-e-Silva (2000). Além desses, as espécies foram tratadas em trabalhos pontuais para floras locais ou regionais, sem registros de trabalhos para a região Norte. Para a região Nordeste, destacam-se os realizados para Mirandiba, Pernambuco (COSTA-E-SILVA, 2009); Pico das Almas, Bahia (ZMARZTY, 1995), e a listagem das espécies do Nordeste (COSTA-E-SILVA, 2006). Para o Sudeste temos os realizados para Minas Gerais (FUKS ET AL. 1997), Rio de Janeiro (CARVALHO, 1959; FUKS & COSTA-E-SILVA, 2001) e São Paulo (COSTA-E-SILVA ET AL., 2002). No Centro-Oeste, há a listagem das espécies do estado de Mato Grosso (DUBS, 1998). Para o Sul há apenas a listagem de espécies do estado do Paraná (ANGELY, 1965).

2.5 ESTUDOS CITOLÓGICOS

Estudos citológicos com as espécies reconhecidas atualmente em *Tarenaya* são escassos. Ruiz-Zapata et al. (1996) citaram número cromossômico 2n= 16 para *Cleome torticarpa* (=*T. torticarpa*). Iltis & Cochrane (2007), baseados em comunicação pessoal com outros pesquisadores, citaram números cromossômicos para o gênero variando entre 2n= 18, 20 ou 30, porém não referiram quais espécies apresentavam esses números.

2.6 PALINOLOGIA

Estudos palinológicos, com o objetivo de caracterização do pólen e as implicações da sua morfologia para a taxonomia do gênero, foram realizados com as espécies de *Cleome* ocorrentes na Venezuela (RUIZ-ZAPATA & ENRECH, 1997). Nesse trabalho, os autores adotaram o sistema de classificação de Iltis (1952) e analisaram o pólen de representantes de cinco das sete seções propostas por este autor. Entre as espécies da seção *Tarenaya*, foram analisadas *C. aculeata* L., *C. hassleriana* Chodat, *C. latifolia* Lamb. ex DC., *C. spinosa* Jacq. e *C. torticarpa*. Os resultados obtidos mostraram que as espécies da seção apresentam a ornamentação da exina microequinada, diferindo dos padrões psilado, verrrucoso e microreticulado encontrados nos representantes das outras seções. Apenas *C. pilosa* Benth., da seção Rimosperma, apresentou padrão semelhante ao das espécies da seção *Tarenaya*. Baseado nos resultados obtidos, o autor concluiu que a morfologia do pólen não seria uma sinapomorfia da seção *Tarenaya*.

2.7 MICROMORFOLOGIA DE SEMENTES

Costa-e-Silva (2000) realizou um estudo da ultraestrutura de sementes de 19 espécies de *Cleome* ocorrentes no Brasil utilizando Microscopia Eletrônica de Varredura (MEV). Da seção *Tarenaya* foram analisadas 15 espécies: *Cleome aculeata*, *C. crenopetala* A.DC., *C. dendroides* Mart. ex Schult. & Schult.f., *C. diffusa* Banks ex DC., *C. eosina* J.F. Macbr., *C. hassleriana*, *C. horrida* Mart. ex Schult. & Schult.f., *C. microcarpa* Ule, *C. parviflora*, *C. regnelli* Eichler, *C. rosea*, *C. spinosa*, *C. titubans* Speg., *C. trachycarpa* Klotzsch ex Eichler e *C. virens* J.F.Macbr. Os resultados desse estudo descrevem a ornamentação das sementes dessas espécies como reticulada, reticulada-areolada apresentando cristas transversais, costelada e alveolar, além da presença de arilo nas sementes de algumas espécies. As demais espécies de *Cleome* incluidas nesse estudo apresentaram padrão de ornamentação aculeado, reticulado, liso ou estriado. Assim como o pólen, as espécies da sect. *Tarenaya* não apresentaram um padrão de ornamentação como sinapomorfia.

2.8 BIOLOGIA REPRODUTIVA

As espécies de *Tarenaya* possuem sistema reprodutivo autocompatível, de alogamia ou autogamia, e foi relatado para *T. aculeata* o sistema de cleistogamia (RUIZ-ZAPATA & ENRECH, 1997; PEREIRA ET AL., 2007). A entomofilia parece ser o sistema de polinização predominante nas espécies do gênero. Diferentes espécies de mariposas, abelhas e borboletas são os agentes entomofílicos predominantes na síndrome de polinização do gênero. Além destes, os morcegos também são outros importantes agentes polinizadores em *Tarenaya* (RUIZ-ZAPATA & ENRECH, 1997; PEREIRA ET AL., 2007).

2.9 USOS

As espécies de *Tarenaya* são usadas principalmente para fins ornamentais e medicinais. *Tarenaya hassleriana* (Chodat) Iltis é amplamente cultivada em jardins e jardins botânicos pelo mundo (ILTIS, 1967; SOUZA & LORENZI, 2012). *T. aculeata* é utilizada como medicinal no combate a inflamações corporais (PINTO ET AL., 2006), e pode ser usada também no tratamento contra tosse, defluxo, asma, bronquite, hemorróida e hérnia (OLIVEIRA JÚNIOR & CONCEIÇÃO, 2010). *Tarenaya longicarpa* apresenta efeito anti-helmíntico, atividade anti-inflamatória e antinociceptiva, e também é usada como expectorante, e em tratamentos de asma, tosse, bronquite, hemorróida e hérnia (OLIVEIRA ET AL., 2007; OLIVEIRA JÚNIOR & CONCEIÇÃO, 2010; SANTOS ET AL., 2012 ; ALBARELLO ET AL., 2013; ANDRADE ET AL., 2014).

3 RESULTADOS

3.1 ARTIGO 1 - DIVERSIFICATION OF NEW WORLD CLEOMACEAE WITH EMPHASIS ON *TARENAYA* AND THE DESCRIPTION OF A NEW GENUS[1]

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Abstract The family Cleomaceae is represented in the Neotropics by nine native lineages, with some of them currently recognized as distinct genera and others in need of clear delimitation. We present here a new phylogenetic hypothesis for the New World Cleomaceae with a more comprehensive sampling, including samples of 62 species with emphasis on *Tarenaya* and based on nrDNA ITS and cpDNA *matK* and *ndhF*. Six clades are supported: a new clade (1) comprising *Cleome tenuis* and *Physostemon humilis*; and five other previously identified clades - (2) the Dactylaena clade, including the monophyletic *Dactylaena* and the paraphyletic *Physostemon* and *Mitostylis*; (3) the Andean clade, comprising *Andinocleome* and *Podandrogyne*; (4) the *Melidiscus* clade; (5) the *Cleoserrata* clade, and (6) the *Tarenaya* clade; the last three corresponding to genera with the same name. The lineage comprising *C. tenuis* and *P. humilis* is strongly supported by morphological and molecular datasets, and a

[1] Os resultados desse capítulo serão submetidos ao periódico *Taxon.*

new genus comprising these species is proposed here. *Tarenaya* is clearly demonstrated to be a monophyletic genus, corroborating previous analyses. We identify four subclades in its topology and the relationships among the species in each subclade revealed to be moderately to strongly resolved. Furthermore, we conducted a historical biogeographical analysis of the New World Cleomaceae on time-calibrated trees and our results suggest an Oligocene origin at least 35.02 Mya with a MRCA distributed in Mesoamerica and the Northern Andes. For *Tarenaya*, our results suggest a Miocene origin at least 17 Mya, with the most recent common ancestor in the Chacoan and Atlantic Forest geographic areas.

Keywords ancestral area reconstruction, historical biogeography, molecular phylogeny, Neotropical Cleomaceae, *Tarenaya*.

INTRODUCTION

Cleomaceae, the cosmopolitan sister family to the Brassicaceae, are well-supported by both morphological and molecular data (Hall & al., 2002; Hall, 2008; Iltis & al., 2011). Previous studies have elucidated our broad understanding of the phylogenetic relationships within the family (Hall & al., 2002; Sánchez-Acebo, 2005; Hall, 2008; Inda & al., 2008; Feodorova & al., 2010; Iltis & al., 2011; Riser & al., 2013; Patchell & al., 2014; Barrett & al., 2017). The more comprehensive phylogenetic studies (Feodorova & al., 2010; Patchell & al., 2014; Barrett & al., 2017) demonstrated that the generic boundaries in Cleomaceae are problematic and a taxonomic revision of generic concepts was necessary. Since then, taxonomic changes have been being proposed, clade by clade, integrating support from molecular and morphological datasets, to define these generic circumscriptions (Roalson & al., 2015; Barrett & al., 2017; Roalson & Hall, 2017; Soares Neto & al., 2017; Thulin & Roalson, 2017).

The family is represented in the Neotropics by ~100 species from nine native genera (*Andinocleome* Iltis & Cochrane, *Cleoserrata* Iltis, *Dactylaena* Schrad & Schult.f.,

Haptocarpum Ule, *Melidiscus* Raf., *Mitostylis* Raf., *Physostemon* Mart. & Zucc., *Podandrogyne* Ducke, and *Tarenaya* Raf.) that, together, form a single lineage, the New World Clade (NWC) (Feodorova & al., 2010; Patchell & al., 2014; Barrett & al., 2017). The two other New World lineages (*Cleomella* DC. and *Polanisia* Raf.) constitute two separate radiations into the New World (Feodorova & al., 2010; Bayat & al., 2018). *Dactylaena*, *Haptocarpum*, and *Podandrogyne* have been always recognized as distinct genera, while the others were treated within a broad concept of *Cleome* L.

Previous studies have aimed to split new or reestablished old genera from *Cleome* sensu lato, based predominantly on morphological data (Iltis & Cochrane, 2007, 2014; Cochrane & Iltis, 2014), but also based on morphological lineage concepts (e.g., *Cleoserrata*, Soares Neto & al., 2017). *Tarenaya* was reestablished at the generic level based only on morphological data (Iltis & Cochrane, 2007), but phylogenetic studies demonstrated that the genus was paraphyletic because *Hemiscola* Raf., another Neotropical genus reestablished by Iltis & Cochrane (2007), was nested within *Tarenaya* (Feodorova & al., 2010; Patchell & al., 2014). Both genera share the presence of a pair of spines at the base of the petioles (Feodorova & al., 2010; Patchell & al., 2014; Arana & Oggero, 2016) and the unification of both into a broadly conceived *Tarenaya* was proposed (Patchell & al, 2014; Arana & Oggero, 2016).

Except for *Haptocarpum*, a monotypic genus known only by the type collection, and *Mitostylis*, all the Neotropical genera have been sampled in previous phylogenetic studies and placed in one of five clades that together form the Neotropical clade: the *Dactylaena* clade, the Andean clade, and the *Cleoserrata*, *Melidiscus*, and *Tarenaya* clades (Patchell & al., 2014; Barrett & al., 2017). In these studies, the genera *Dactylaena*, *Physostemon*, *Podandrogyne*, and *Melidiscus* were supported as monophyletic genera based on molecular data, confirming previous proposals based on morphological data within local floristic treatments (Iltis & Cochrane, 2007, 2014, 2015; Tucker & Vanderpol, 2010; Cochrane & Iltis, 2014); however,

only a small percentage of the recognized species of *Dactylaena*, *Physostemon*, and *Podandrogyne* were included.

The *Tarenaya* clade comprises the species that are mostly characterized by the presence of a pair of spines at the base of the petiole, seed cleft closed by a thin to thick membrane, and echinate pollen (Sánchez-Acebo, 2005). It includes species ranging from Mexico to Argentina (excluding Chile), and also one African species (Iltis & Cochrane, 2007; Soares Neto & al., 2018).

Iltis (1952, 1959) presented a comprehensive review of the New World *Cleome* and classified the species in seven sections, including section *Tarenaya*. He divided this section into 8 series and recognized 22 species and 24 subspecies, based on the size of flowers, color of the petals, length of the stamens, gynophore and fruits, characteristics of the seeds, and geographic distribution (Table 1). Although no definitive circumscription of the section was formally presented, subsequent studies informally adopted Iltis' proposal (e.g., Jacobs, 1960 and Costa-e-Silva, 2000, for local treatments; Iltis, 1967, and Iltis & Zapata, 1997, when describing *Cleome afrospina* Iltis and *C. torticarpa* Iltis & T.R. Zapata, respectively).

Costa-e-Silva (2000) enlarged Iltis' concept of section *Tarenaya* (Iltis, 1952) including in it sections *Lianoides* (Kuntze) Iltis and *Melidiscus* (Raf.) Iltis, recognizing 23 species in Brazil. However, in her review, Iltis' infraspecific series were not adopted, and she treated the species in a general classification, raising some subspecies to species level (Table 1).

We here further explore phylogenetic relationships of the NWC using nrDNA ITS and cpDNA *matK* and *ndhF* gene regions to: (1) expand our understanding of lineage relationships of the NWC with expanded sampling; (2) examine the phylogenetic relationships within *Tarenaya* using a more comprehensive sampling of taxa for this genus; and (3) estimate the historical biogeography of the NWC. Although previous studies have reconstructed the patterns

of historical biogeography across Cleomaceae (Feodorova & al., 2010), previous studies have lacked dense sampling of Neotropics species and had weak support for many of the relationships within clades.

MATERIAL AND METHODS

Taxon sampling. — We included 51 accessions of 34 species currently recognized in *Tarenaya* (Soares Neto & al., 2018; Soares Neto & al., in review) and one of an undescribed species for the genus (APPENDIX 1). More than one accession of species with broad distributions and/or with morphological variability were included whenever possible. Additionally, 33 samples representing 28 belong to the genera *Andinocleome*, *Cleoserrata*, *Dactylaena*, *Melidiscus*, *Mitostylis*, *Physostemon*, and *Podandrogyne* were included, and three species of *Sieruela* were included as outgroups based on previous phylogenetic results (Patchell & al., 2014; Barrett & al., 2017).

DNA extraction, amplification and sequencing. — Total DNA was extracted from silica dried material or herbarium specimens using a modified CTAB method (Doyle & Doyle, 1987). The choice of markers (ITS, *matK*, *ndhF*) was based on previous studies within the family (Hall, 2008; Feodorova & al., 2010; Patchell & al., 2014; Barrett & al., 2017). The *matK* region was amplified using the primers matK 495F-1010R (Koch & al., 2001); *ndhF* was amplified using a combination of the primers ndhF 1318F-1703R, 1318F-2110R (Olmstead & al., 1993; Beilstein & al., 2006). For the ITS region, amplification was performed first with ITS5HP (Suh & al., 1993) and ITS4 (White & al., 1990). For some samples, it was necessary to amplify the ITS region separated from the ITS1 and ITS2 spacers. Identification of the terminal ends of ITS1 and ITS2 was compared to other sequences of Cleomaceae deposited in Genbank.

PCR reactions were amplified in a total volume of 25 μL, using 2.5 μL of 10× reaction Buffer,1.5 μL dNTPs, 1.0 μL of each primer, 0.2 μL of *Taq* polymerase, and 1.0—2.0 μL of the

total DNA sample and an amount of sterile water adjusted to the total DNA sample used. For some ITS reactions, 1.5 μL of DMSO was added to increase amplification efficiency. Amplifications conditions for each marker were performed as follows: ITS-initial denaturation for 1 min at 94˚C, followed by 35 cycles of denaturation at 94˚C for 1 min, annealing at 48˚ or 49˚C for 1 min, and extension at 72˚C for 1 min, followed by a final extension of 72˚C for 5 min; *matK*: initial denaturation for 5 min at 94˚C, followed by 36 cycles of denaturation at 94 ˚C for 30 s, annealing at 55 ˚C for 1 min, and extension at 72 ˚C for 2 min, followed by a final extension of 72 ˚C for 10 min; and *ndhF*: initial denaturation for 10 min at 94 ˚C, followed by 36 cycles of denaturation at 94 ˚C for 30 s, annealing at 48 ˚C for 1 min, and extension at 72 ˚C for 2 min, followed by a final extension at 72 ˚C for 10 min. PCR products were visualized using 1% TBE agarose gel, stained with ethidium bromide and then purified using ExoSap-IT. Samples were sequenced by Eurofins Genomics (Louisville, Kentucky-USA). Chromatograms were edited and contigs sequences were assembled using Geneious v.8.1.7 and aligned using Muscle (Edgar, 2004) with default parameters and adjusted by eye for minor corrections to final alignment.

Phylogenetic analyses. — Maximum likelihood (ML) analysis was performed to reconstruct phylogenetic relationships in New World Cleomaceae for ITS, cpDNA, and combined analyses. Analyses were run through the RAxML BlackBox website (https://embnet.vital-it.ch/raxml-bb/) using GTRGAMMA model in RAxML version 7.2.8 (Stamatakis & al., 2008). Bayesian inference (BI) analyses were conducted in MrBayes 3.2.2 (Ronquist & al., 2012) with two partitions (ITS, cpDNA) each using the GTR+G model. BI analyses were run for 10 million generations, with the first 25% removed for burn-in and assessed for convergence and stationarity using average standard deviation of split frequencies (less than 0.01), potential scale reduction factor (PSRF) values approaching 1.0, and a large effective sample size (ESS values >600; assessed in Tracer v.1.4.1, Rambaut & al., 2014).

Divergence time estimation. — We used the program treePL (Smith & O'Meara, 2012) to time calibrate the NWC lineages based on 100 representative Bayesian trees from the posterior distribution using smoothing parameters with penalized likelihood (PL). Time calibration was conducted in the program ExaML for each of the 100 trees. A cross-validation analysis was performed across smoothing parameters 10,000 to 0.0001 with 0.0001 being determined as the best-fit model for our dataset. The ultrametric trees resulted across PL were summarized onto one tree using DendroPy packages, using the sumtrees.py script (Sukumaran & Holder, 2010). To estimate the NWC stem age we relied on calibrations points obtained from the more recent studying of diversification in Brassicales (Cardinal-McTeague et al., 2016). The NWC stem age was constrained to a maximum age of 36 my.

Reconstruction of biogeographic history. — To reconstruct the biogeographic history an ancestral area reconstruction analysis was conducted using BioGeoBEARS R package (Matzke, 2013), performed with the models DEC, and DEC+J. The geographic areas proposed here were based on species distribution data obtained from georeferenced herbarium samples, literature, and GBIF records. The areas of occurrence were categorized in eight Neotropical biogeographic areas following Morrone (2014): A–Mesoamerica, B–Caribbean, C–Northern Andes, D–Southern Andes, E–Amazonia, F–Chacoan, G–Atlantic Forest, and H–Africa. The maximum number of areas one species can occupy was set to four. As the ancestral area reconstructions are based on the current geographic distributions, BioGeoBEARS does not work well when multi-area present-day distributions are implemented, as it generates a large number of possible ancestral areas. So, for the widespread species, *Melidiscus giganteus*, *Tarenaya aculeata* and *T. parviflora*, which occur in more than four areas, we attributed the original area from collection for each one of those terminals.

For the estimation of ancestral areas, we conducted an analysis with a time stratified model with four time slices: TS1 (38–33 My), the start of occasional marine incursions from

the Pacific in southern Ecuador, northern Peru, and the Western Andean Portal; TS2 (33–12 My), the peak of mountain uplift in the Central and Northern Andes; TS3 (12–4.5 My), Amazon Basin dominated by a large lake known as the Pebas system; and TS4 (4.5–0 My), complete drainage of the Pebas system and formation of the Panama Isthmus. For each time slice a matrix for dispersal probabilities between pairs of areas and areas allowed was specified based on the geological events occurring in each period (see Appendix 3).

RESULTS

DNA datasets. —The total alignment matrix sequence for samples obtained here combined with sequences from Genbank was of 871 base pairs (bp) for ITS, 1831 bp for *matK*, 1134 bp for *ndhF*, and 3836 bp for total evidence. BI analyses were assessed for convergence and stationarity with average standard deviation of split frequencies, which were less than 0.01 for both independent runs, PSRF which for all parameters were equal to or greater than 0.999, and parameter ESS values, which all exceeded 600.

Phylogenetic relationships in NWC. — The combined DNA analyses resulted in a topology that support six clades for the Neotropical region (Figure 1; Suppl. Fig. 1): a new clade, which includes *Cleome tenuis* S. Watson and *Physostemon humilis* (Rose) Iltis (BS= 100%, PP=1), named here as *Tenues* based on *Cleome* sect. *Tenues* Iltis (Iltis, 1959), and five previously recognized by Patchell & al. (2014) and Barrett & al. (2017): *Dactylaena* (BS= 82%, PP=0.98), including the *Physostemon* subclade which now includes *Mitostylis*; the Andean clade (BS=100%, PP=1) which includes *Andinocleome* and *Podandrogyne*; and the clades *Melidiscus, Cleoserrata*, and *Tarenaya* (all supported by BS=100%, PP=1).

Phylogenetic relationships in *Tarenaya*. — *Tarenaya* is a strongly supported clade based on combined analyses (BS=100%, PP= 1), corroborating the monophyly of this genus. In both analyses the genus is composed of four subclades: “Rosea” (BS=85%, PP= 0.97), “Spinosa”

(BS=100%, PP= 1), “Parviflora” (BS=94%, PP= 1), and “Hemiscola” (BS=89%, PP= 0.99). The first three are named here based on the name of the species most widespread in the species taxonomic complex to which they are assigned, and the last, which includes all the species previously recognized in the genus *Hemiscola* Raf. *sensu* Iltis, by the former generic name. Rosea is sister to the rest of *Tarenaya*, followed by Spinosa, sister to the Parviflora + Hemiscola clades. Among those species with multiple individuals sampled, monophyly was supported in *Tarenaya siliculifera*, *T. pernambucensis*, *T. rosea*, *T. domingensis*, *T. spinosa*, *T. boliviensis*, and *T. parviflora*, whereas *T. aculeata*, *T. afrospina*, and *T. longicarpa* are not monophyletic.

Divergence time estimates and reconstruction of ancestral area. — The divergence time estimates for NWC lineages using penalized likelihood analyses from treePL with mean ages and 95% High Posterior Density (HPD) are presented in Appendix 2. The best fit-model for the constrained set was DEC+J as indicated by a likelihood test (DEC LnL -268.91, DEC+J LnL -248.31).

Divergence time estimates, and ancestral area reconstruction suggest an Oligocene origin for the age of the NWC at 35.02 Mya (95% HPD: 32.90–36.16 My; Figure 2), possibly by an early long-distance dispersal from Africa (H) to the Neotropics, with the most recent common ancestor (MRCA) of the Neotropical Cleomaceae widespread in Mesoamerica (A) and Northern Andes (C) at 35.02 Mya (Figure 4). The main lineages of NWC have diverged during the Miocene and Pleistocene with the mean crown age for each lineage as follows: the clade *Tenues* at 1.24 Mya (95% HPD: 0.30–2.88 My); *Dactylaena* at 15.25 Mya (95% HPD: 11.44–17.89 My); the clade including *Physostemon* and *Mitostylis*, at 22.15 Mya (95% HPD: 19.44–25.85 My); *Andinocleome*, not including *A. pilosa*, at 15.85 Mya (95% HPD: 11.84–19.48 My); *Podandrogyne* 4.50 Mya (95% HPD: 2.20–7.45 My); *Cleoserrata* at 14.01 Mya (95% HPD: 12.55–15.83 My); *Melidiscus* at 4.26 Mya (95% HPD: 2.48–6.09 My), and *Tarenaya* at 17.93 Mya (95% HPD: 16.62–19.43 My).

Ancestral Area Reconstruction

A dispersal event was recovered splitting the MRCA of clade A in Mesoamerica (A) between 35.02 Mya and 1.24 Mya. Dispersal events from Northern Andes (C) to Chacoan (F) at 30.13 Mya originated the stem group of clade C, with a MRCA distributed through Chacoan (F) for *Physostemon* + *Mitostyis* (clade D); and later migrations events with colonization of the Atlantic Forest (G) led to a MRCA distributed in the Chacoan (F) and the Atlantic Forest (G) for *Dactylaena* (clade E). The extant Northern Andean lineage (clade G), diversified at 18.17 Mya, expanding its distribution through Northern Andes (C), with later dispersal events and subsequent speciation in the Southern Andes (D), Amazonia (E), Mesoamerica (A), and the Caribbean (B). Extant *Melidiscus* (clade K) diverged at 4.06 My, with a MRCA in the Northern Andes (C).

A dispersal event from Northern Andes (C) to the Atlantic Forest (G) at 20.53 Mya with following migrations and colonization of Mesoamerica (A) and Chacoan (F) gave rise to two lineages in these regions. The first, *Cleoserrata*, diversified at 14.01 Mya with dispersals from the Mesoamerica (A) to almost all the regions in South America, except the Southern Andes (D). The second lineage gave rise to *Tarenaya* at 17.93 Mya, with diversification mostly through the Chacoan (F) and the Atlantic Forest (G). Within *Tarenaya*, many dispersal events occurred throughout the Neotropics, except in the Southern Andes. A recent long dispersal event from South America to Africa at ~6 Mya gave rise to *T. afrospina*.

DISCUSSION

We present here a new phylogenetic hypothesis of New World Cleomaceae diversification, with emphasis on diversification of *Tarenaya* lineages (Figure 1). Although previous studies had sampled many New World species, we significantly increased the number

of species sampled for the genera *Andinocleome*, *Physostemon*, *Dactylaena*, and *Tarenaya*, and included for the first time a sample of the reestablished genus *Mitostylis*.

Overall phylogenetic relationships. — The presence of the *Tenues* clade, composed of *Cleome tenuis* and *Physostemon humilis*, sister to the rest of the New World Cleomaceae clade is novel and supported by all the analyses included here. Both species comprise the series *Tenues* in *Cleome* sect. *Physostemon* Iltis (1959), which comprised *Cleome tenuis* and its subspecies: *C. tenuis* subsp. *tenuis* and *C. tenuis* subsp. *humilis*. Iltis (1959) included these species in sect. *Physostemon* (now the genus *Physostemon*) because of the open aestivation shared with other *Physostemon* species. However, series *Tenues* is distinct from the rest of *Physostemon* in having 3–5-foliolate leaves (vs. unifoliolate or simple leaves) and 6 exapophystate stamens (vs. apophysatae). This arrangement of character states was considered by Iltis to represent the plesiomorphic condition within *Physostemon*. This distinct lineage within Cleomaceae suggests that a new taxonomic delimitation is necessary for these species.

Within the *Dactylaena* clade, the genus *Dactylaena* is supported as monophyletic, as previously considered by Patchell & al. (2014), which is also corroborated by morphological characters. Samples of a new *Dactylaena* species from Bolivia named on herbaria labels by Iltis but never published, were included here, and this species is believed to be a new species related to *D. pauciflora*. The inclusion of only one sample of *Mitostylis*, *M. macrorhiza* (C. Wright) Iltis, and its position nested within a paraphyletic *Physostemon* suggests the monophyly of neither genus is supported. *Mitostylis* was previously included within series *Exapophysatae* Iltis, in sect. *Physostemon* (Iltis, 1959), and it seems that this prior hypothesis of Iltis better reflects the phylogenetic relationships. More detailed sampling of *Physostemon* and *Mitostylis* species would be helpful to better understand these relationships and the origin of apophyses in this clade.

Andinocleome does not yet have a formally complete circumscription and currently only *A. magnifica* (Briq.) Iltis & Cochrane, *A. lechleri* (Eichler) Iltis & Cochrane and *A. pilosa* (Benth.) Iltis & Cochrane have combinations under this genus. At the same time, its current delimitation is not supported as monophyletic because *A. pilosa* is positioned as the sister lineage of *Podandrogyne*, a relationship previously suggested by Sánchez-Acebo (2005). Feodorova & al. (2010), based on parsimony and Bayesian inference, suggested the position of *A. pilosa* as the sister lineage of *Podandrogyne*, or sister to a combination of the clade comprising *Podandrogyne* and the rest of *Andinocleome*. This last relationship was also found by Patchell & al. (2014) and Barret & al. (2017). Further studies are required to better understand the relationships in the Andean clade, including more samples of *Podandrogyne* and thus, providing a clear generic delimitation for the genera and species in this clade. Particularly, a detailed morphological study of this clade will be important to clearly establish generic boundaries.

Previous studies (Patchell & al., 2014; Barret & al., 2017) have supported *Melidiscus*, *Cleoserrata*, and *Tarenaya* (including *Hemiscola*) as monophyletic genera, and this has continued to be supported with our data.

Phylogenetic relationships in *Tarenaya*. — This study includes the most comprehensive sample of *Tarenaya* species up to now, representing most of the morphological diversity and geographic distribution within the genus. We identified four strongly supported major clades within the genus, the same identified by Feodorova & al. (2010) with fewer samples.

The Rosea clade includes only species that are endemic to Brazil. Comprising this clade are the species included by Iltis (1952) in series *Siliculosae*, *Horridae*, *Dendroideae*, and *Roseae*. According to Iltis (1952), his series The series *Roseae* consisted of five subspecies of *Cleome rosea* Vahl ex DC. based on *C. bicolor* Gardner, *C. inermis* Malme, *C. regnelii* Eichler, and a new subspecies. *Tarenaya rosea*, *T. bicolor*, and the recently described *T. pernambucensis*

are well-demonstrated to be distinct species (Soares Neto, Barbosa & Roalson, 2018; Soares Neto & al., in prep.). *Tarenaya regnellii* is a rare species from Brazil with few collections in herbaria and it was not possible to include it in our analysis, but we expect it to be placed in this clade. The other species expected to be placed in this clade, *T. inermis* (Iltis, 1952), was demonstrated by cpDNA analysis to be related to the Spinosa clade (Suppl. Fig. 2). However, the relationships of both *T. regnellii* and *T. inermis* remain unclear and will require further study. The broad concept of *T. rosea* (= *C. rosea s.l.*, including *C. rosea* s.s., *C. bicolor*, and *C. inermis*) previously adopted for Brazilian collections has led to the overly broad and erroneous application of this name to specimens of both *T. bicolor* and *T. inermis* (Costa-e-Silva, 2000; Costa-e-Silva & al., 2002; Akemi-Borges & Pirani, 2017). This broad circumscription of *T. rosea* is not supported by our results, and the distinction of these three species by Soares Neto & al. (2018) is supported here. Furthermore, our study supports a new species from Brazil, previously recognized only by morphological traits (*Tarenaya* sp. nov.; Soares Neto & al., in prep.).

The Spinosa clade comprises almost all the species of series Spinosae (Iltis, 1952), except *T. houstonii*, an endemic species from Cuba, which we were unable to sample, and *T. parviflora*, which is now positioned in the Parviflora clade. The species hypothesized to belong to this clade are commonly known as *Tarenaya spinosa* s.l. due to the morphological similarity of these species and the long history of misapplication of the name *T. spinosa*. The relationships among the species of this clade are moderately to strongly resolved. Species from series Spinosae have been previously supported as a clade by Sánchez-Acebo (2005), Feodorova & al. (2010), Patchell & al. (2014), and Barret & al. (2017). In addition, morphological features as pollen, and seeds morphology support the grouping of Spinosae species as a clade (Sánchez-Acebo, 2005).

The samples of *Tarenaya longicarpa* included in our analysis are not monophyletic. One sample (*T. longicarpa* 3) is sister to the *T. costaricensis* + *T. spinosa* clade, while the other two are in a polytomy with *T. titubans* and *T. werdermannii* (Fig. 1; Suppl. Fig. 1). When Iltis (1952) proposed *Cleome spinosa* subsp. *longicarpa*, he mentioned some odd collections from Venezuela, although he was not sure if those samples were from the typical subspecies or subsp. *longicarpa*. We included in our study one sample from Venezuela identified by Iltis as *Cleome spinosa* subsp. *longicarpa* and, based on our results, this specimen (*T. longicarpa* 3) is more closely related to *T. spinosa* sensu stricto than to *T. longicarpa* from Brazil.

The Parviflora clade is composed of two subclades. One, less strongly supported (BS= 55%, PP= 0.66), is composed of *T. torticarpa*, *T. longipes*, and *T. virens*, this last species previously recognized in sect. *Lianoides* (Kuntze) Iltis (*sensu* Iltis, 1952). The other strongly supported subclade (BS=100%, PP=1), comprises *T. afrospina*, *T. latifolia*, *T. psoraleifolia*, and *T. parviflora*, this last is considered a monophyletic species distinct from *T. psoraleifolia*. *Tarenaya parviflora*, *T. psoraleifolia*, and *Cleome brasiliensis* (treated here as a synonym of T. parviflora) were treated as a single species, with samples of these three species being positioned in a polytomy with an unclear relationship between them (Sánchez-Acebo, 2005). *Tarenaya afrospina* is the only *Tarenaya* species native to Africa and clearly represents a long-distance dispersal from Brazil to Africa in the last ~6 My.

The species included in the Hemiscola clade are predominantly distributed throughout South America, except for *Tarenaya aculeata* which has a world-wide distribution. This clade comprises the species from series Aculeatae (Iltis, 1952). Except for *Tarenaya aculeata*, the species in this clade are distinct and are easily delimited based on morphological features (Soares Neto & al., in prep.). We sampled *T. aculeata* from a variety of localities across its geographic distribution and included morphological variants to the degree possible in this study. These samples are distributed throughout the Hemiscola clade. It is unclear at this time whether

the morphological variation and non-monophyly of samples suggests that multiple species are present in *T. aculeata*, or if this broadly distributed species is the progenitor lineage from which other Hemiscola species are derived. Further morphological and genetic studies of *T. aculeata* are necessary to better circumscribe this species.

Divergence times estimates. — The divergence time estimates for the stem of the NWC shown here (ca. 35 Mya) is different from that estimated by Feodorova & al. (2010) at 7 Mya and is quite similar with the time divergence estimated by Cardinal-McTeague & al. (2016), at ca. 31 Mya. Feodorova & al. (2010) presented a chronogram based on previously estimated calibrations (Cleomaceae stem age of 41 Mya sensu Schranz & Mitchell-Olds, 2006) using penalized likelihood and not using direct fossil calibration. More recently calibrated phylogenies of the Brassicales, such as Cardinal-McTeague & al. (2016), suggest an earlier origin of Brassicales lineages, including a much older origin of Cleomaceae (stem age >50 My). In general, the clade age estimates of Feodorova & al. (2010) are much younger than suggested here and in other recent calibrated phylogenies (Cardinal-McTeague & al., 2016) and this is likely a function, at least in part, of the Feodorova & al. estimates being based on ITS sequences alone and reliance on the much younger estimates of family age by Schranz & Mitchell-Olds (2006).

Few taxonomic samples of NWC were included by Cardinal-McTeague & al. (2016) in their study. They included a single representative of *Dactylaena*, mean stem age at 24.24 Mya (vs. 30.13 Mya presented here), a clade including *Andinocleome* and *Podandrogyne* with age at 24.71 (vs. 27.98 Mya), *Melidiscus* at 19.22 Mya (vs. 23.75 Mya) and *Tarenaya* at 19.22 Mya (vs. 20.53 Mya). This period of lineage diversification also suggests a Miocene origin for the main NWC lineages. Several NWC lineages were represented by only a single sample by Cardinal-McTeague & al. (2016), thus limiting possible comparisons of crown ages.

Biogeography. — Ancestral area reconstruction of the NWC demonstrates the importance of several long-distance dispersal events in both the early diversification of NWC Cleomaceae as well as among younger lineages and is hypothesized to be of greater frequency compared to vicariance events (Fig. 3). The ancestral area reconstruction suggests a first long-dispersal event within this lineage from an African origin, as previously suggested by Cardinal-McTeague & al. (2016). This long-distance dispersal event from Africa followed by diversification in the Neotropics coincides with similar events for lineage diversification in Caricaceae, with a MRCA dispersing from Africa to Central America in the Oligocene and latter dispersals through the Neotropical region (Carvalho & Renner, 2012).

The diversification of NWC lineages occurred during a time (Oligocene to Pleistocene) of several geological events in the Neotropics that might have influenced lineage accumulation, particularly in the Miocene, including: the Andean uplift, marine incursions from the Pacific, hydrological changes in western Amazonia and the formation of the Isthmus of Panama (Hoorn & al., 2010; Antonelli & Sanmartín, 2011; Rull, 2011). These geological events also have been inferred to play an important role in the diversification of Neotropical lineages in Rapateaceae and Bromeliaceae (Givnish & al., 2004), Caricaceae (Carvalho & Renner, 2012), Dioscoreaceae (Viruel & al., 2016); *Dolichandra* Cham. (Fonseca & Lohmann, 2015) and *Tynanthus* Miers. (Medeiros & Lohmann, 2015), corroborating the importance of the Miocene for Neotropical plant diversification (Hoorn & al., 2010; Antonelli & Sanmartín, 2011). Within Cleomaceae, during this time, many migration events from the Northern Andes (C) gave rise to lineages in both dry and moist habitats (*Physostemon*, *Dactylaena*, *Cleoserrata*, and *Tarenaya*), and concurrent diversification of Andean lineages (*Podandrogyne*, *Andinocleome*, and *Melidiscus*). Detailed studies of *Podandrogyne*, *Andinocleome*, and *Melidiscus* are necessary to better understand the relationships and historical biogeography within these groups. Despite this, mountain uplifts, marine incursions, and the formation of the Pebas

System seem to act as dispersal barriers for these lineages, influencing their diversification, with many ancestral distributions occurring partly or exclusively in the Northern Andes, with some dispersal events to other regions, as is also observed in Cinchoneae, Rubiaceae (Antonelli & al., 2009).

Physostemon, *Dactylaena*, and *Tarenaya* diversified mainly in the Chacoan (dry South American areas) and the Atlantic Forest. Probably, the changes in the climate, in the drainage systems, and successive fragmentation and expansion of forests during glacial and interglacial periods of the Miocene (Salzmann et al., 2008) have influenced the migration and colonization by species from these lineages, with posterior long-dispersal events to other regions, leading to expansion of their distribution. These environmental factors seem to be relevant to diversification of many groups in these areas, as experienced for *Dolichandra* (Fonseca & Lohmann, 2015); Gesneriaceae lineages (Roalson & Roberts, 2016); *Campylocentrum* Benth. (Pessoa & al., 2018); *Eugenia* L. (Mazine & al., 2018) and *Amorimia* W.R. Anderson (Almeida & al., 2018).

The recent long-distance dispersal event and speciation of *Tarenaya afrospina* in west Africa mirrors other known cases of dispersal from the Neotropics to west Africa, such as *Pitcairnia feliciana* (A. Chev.) Harms & Mildbr. (Bromeliaceae; Givinish & al., 2011) and *Maschalocephalus dinklagei* Gilg & K. Schum. (Rapateaceae; Givinish & al., 2000, 2004). Iltis (1967) suggested the dispersal of *T. afrospina* might have occurred via aquatic birds such as ducks, as it is commonly distributed along roadsides close to river banks, along riversides, in forest borders, and coastal forests, similar to closely related species in the Neotropics.

Taxonomic implications. — It is clear from the phylogenetic hypotheses presented here and from morphological comparisons that *Physostemon humilis* and *C. tenuis* do not belong to *Physostemon*. We therefore make the necessary nomenclatural changes to establish these two

species as a separate genus and provide clarification on the morphological differences between the new genus and other similar New World Cleomaceae genera.

Iltisella Soares Neto & Roalson, **gen. nov.** Type: *Iltisella tenuis* (S.Watson) Soares Neto & Roalson.

Diagnosis: Differs from *Physostemon* by having leaves 3–5-foliolate leaves (vs. unifoliolate or simple leaves) and 6 exapophysate stamen (vs. 6–10 apophysate stamen).

Annual herbs, unarmed, essentially glabrous. Stipules minute, hyaline. Leaves 3–5-foliolate; leaflets glabrous, margin serrulate-ciliate. Racemes terminal, open and few-flowered; flowers ebracteate. Sepals 4, free. Petals 4, basally narrowed, yellow. Stamens 6, exapophysate. Style short in flower, elongated and persistent in fruit. Capsules cylindrical-linear, rarely oblong-fusiform, ascending. Seeds suborbicular, longitudinally striate, transversed ridged; without cleft cavity.

Distribution: Two species distributed in Mexico and Guatemala.

Etymology: We honor Dr. Hugh Iltis in the naming of this genus given his long history of study of these Cleomaceae lineages.

1. *Iltisella humilis* (Rose) Soares Neto & Roalson, comb. nov. Basionym: *Cleome humilis* Rose, Contr. U.S. Natl. Herb. 5: 196. 1899. Type: Mexico: Zacatecas, tropical valleys of the table land, San Juan Capistrano, 22 Aug. 1897, *J. N. Rose 2479* (lectotype, designated by Iltis and Cochrane 2014: 55: US 301394 [barcode 100477]; isolectotypes: GH 42302, MEXU). *Cleome tenuis* subsp. *humilis* (Rose) Iltis, Brittonia 11: 138. 1959. *Physostemon humilis* (Rose) Iltis, Novon 23: 55. 2014.

2. *Iltisella tenuis* (S.Watson) Soares Neto & Roalson, comb. nov. Basionym: *Cleome tenuis* S.Watson, Proc. Amer. Acad. Arts 24: 39. 1889. Type: Mexico: Sonora, Guaymas, June

1887, *E. Palmer 214* (lectotype, designated here: GH 00042311 [photo!]; isolectotypes: BM 000629047 [photo!], E 00326212 [photo!], K 000220439 [photo!], NY 00387674!, NY 00387675!, UC 11101 [photo!], US 6589 [barcode 00100497] [photo!], US 1416494 [barcode 00931462] [photo!], US 1392130 [barcode 00931463] [photo!], YU 001609 [photo!]).

Notes: Watson (1889) did not designate a type specimen/herbarium location and Iltis (1959) did not designate a type collection or formally lectotypified a specimen. The GH collection has been referred as the "type" in online databases (e.g., JSTOR Global Plants), but since it does not appear that a type specimen was ever officially designated, we lectotypify the basionym with the GH collection.

CONCLUSIONS

The phylogenetic study presented here reveals six clades within the New World Cleomaceae lineage. Five of these were observed in previous studies. The new clade revealed here is strongly supported by nuclear and chloroplast markers, and this combined with morphological data is used to establish a new genus. Furthermore, *Tarenaya* was corroborated as a monophyletic genus in its current circumscription, comprising four subclades. Denser taxon sampling of *Physostemon*, *Mitostylis*, *Andinocleome*, and *Podandrogyne* must be included to better circumscribe the relationships within each of these lineages and what might constitute morphological recognizable genera.

Divergence time analyses and area ancestral reconstructions suggest a 35.05 Mya (Oligocene) origin for the NWC of Cleomaceae in the Northern Andes, with current biogeographic patterns of genera predominantly driven by dispersal events during the Miocene. Diversification within *Tarenaya* was influenced by the climatic cycles and dispersal during the Pliocene-Pleistocene.

AUTHOR CONTRIBUTIONS

RLSN collected data, carried out laboratory work, performed data analysis, interpreted and wrote part of the manuscript; WWT and MRVB interpreted and wrote part of the manuscript; EHR designed, performed data analysis, interpreted and wrote part of the manuscript.—ORCID: RLSN, https://orcid.org/0000-0002-5643-9464; WWT, https://orcid.org/0000-0002-4996-536X; MRVB, https://orcid.org/0000-0001-6166-3922; EHR, https://orcid.org/0000-0003-1655-3681.

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Table 1. Comparative table with the currently *Tarenaya* species classification according to Iltis (1952), Costa-e-Silva (2000) and Soares Neto et al. (2018). [2]

Iltis (1952)			**Costa-e-Silva (2000)**	**Soares Neto & al. (2018)**
Series	**Species**			
Aculeatae	*Cleome aculeata*	subsp. *aculeata*	*C. aculeata*	*T. aculeata*
		subsp. *cordobensis*		*T. cordobensis*
		subsp. *guaranitica*		*T. guaranitica*
	C. crenopetala		*C. crenopetala*	*T. crenopetala*
	C. diffusa		*C. diffusa*	*T. diffusa*
	C. eosina		*C. eosina*	*T. eosina*
	C. microcarpa		*C. microcarpa*	*T. microcarpa*
	C. tucumanensis			*T. tucumanensis*
Dendroideae	*C. dendroides*	subsp. *dendroides*	*C. dendroides*	*T. atropurpurea*
		subsp. *multinervosa*		
Horridae	*C. horrida*		*C. horrida*	*T. horrida*
Rosae	*C. rósea*	subsp. *rosea*		*T. rosea*
		subsp. *inermis*	*C. rosea*	*T. inermis*
		susbp. *bicolor*		*T. bicolor*
		subsp. *regnellii*	*C. regnellii*	*T. regnellii*
		susbp. *pernambucensis*	*C. pernambucensis*	*T. pernambucensis*
Serratae	*C. serrata*	*C. melanosperma*[1]		
		subsp. *serrata*[2]		
		subsp. *paludosa*[3]	*C. paludosa*[3]	
Siliculosae	*C. siliculifera*		*C. siliculifera*	*T. siliculifera*

[2] Species not included in one or more treatments: 1 = *Cleoserrata melanosperma* (S. Watson) Roalson & Soares Neto, 2 = *Cleoserrata serrata* (Jacq.) Iltis, 3 = *Cleoserrata paludosa* (Willd. ex Eichler) Iltis ex Soares Neto & Roalson, 4 = *Cleoserrata speciosa* (Raf.) Iltis, 5 = *Cleoserrata bahiana* (Iltis & Costa-e-Silva) Soares Neto & Roalson, 6 = sect. *Lianoides* (Kuntze) Iltis sensu Iltis (1952); 7 = sect. *Melidiscus* (Raf.) Iltis sensu Iltis (1952) = *Melidiscus giganteus* (L.) Raf.

Speciosae	*C. speciosa* subsp. *speciosa*[4]		
	C. speciosa subsp. *pachystigma*[5]		
	C. chacoensis (= *C. lilloi*)		*T. lilloi*
	C. erosa (= *C. domingensis*)		*T. domingensis*
	C. latifolia	*C. latifolia*	*T.latifolia*
	C. houstonii		*T. houstonnii*
	C. houtteana (=*C. hassleriana*)	*C. hassleriana*	*T. hassleriana*
	C. moricandii (= *C. boliviensis*)		*T. boliviensis*
	C. parviflora subsp. *brasiliensis*		
	C. parviflora subsp. *microflora*	*C. parviflora*	*T. parviflora*
	C. parviflora subsp. *parviflora*		
	C. parviflora subsp. *psoraleifolia*		*T. psoraleifolia*
	C. pringlei (= *C. chapalensis*)		*T. chapalensis*
	C. spinosa subsp. *longicarpa*	*C. spinosa*	
Spinosae	*C. spinosa* subsp. *spinosa*		*T. spinosa*
	C. spinosa subsp. *megasperma*		*T. costaricensis*
	C. spinosa susbp. *werdermanii*		*T. werdermanii*
	C. titubans	*C. titubans*	*T. titubans*
	C. trachycarpa	*C. trachycarpa*	*T. trachycarpa*
			T. afrospina
		C. curvispina	*T. curvispina*
		C. bahiana[6]	
			T. longipes
			T. torticarpa
		C. virens[6]	*T. virens*
		C. viridiflora[7]	

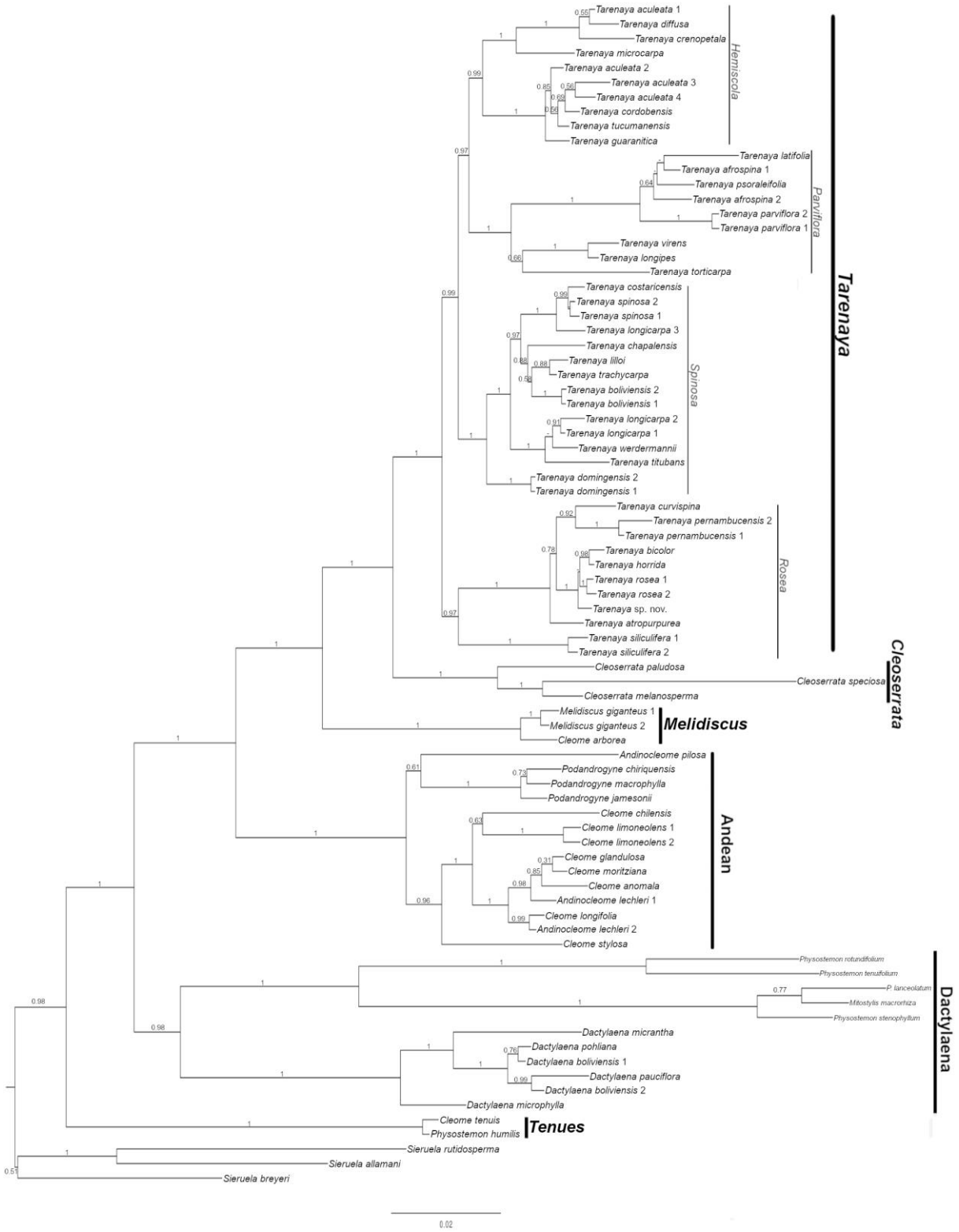
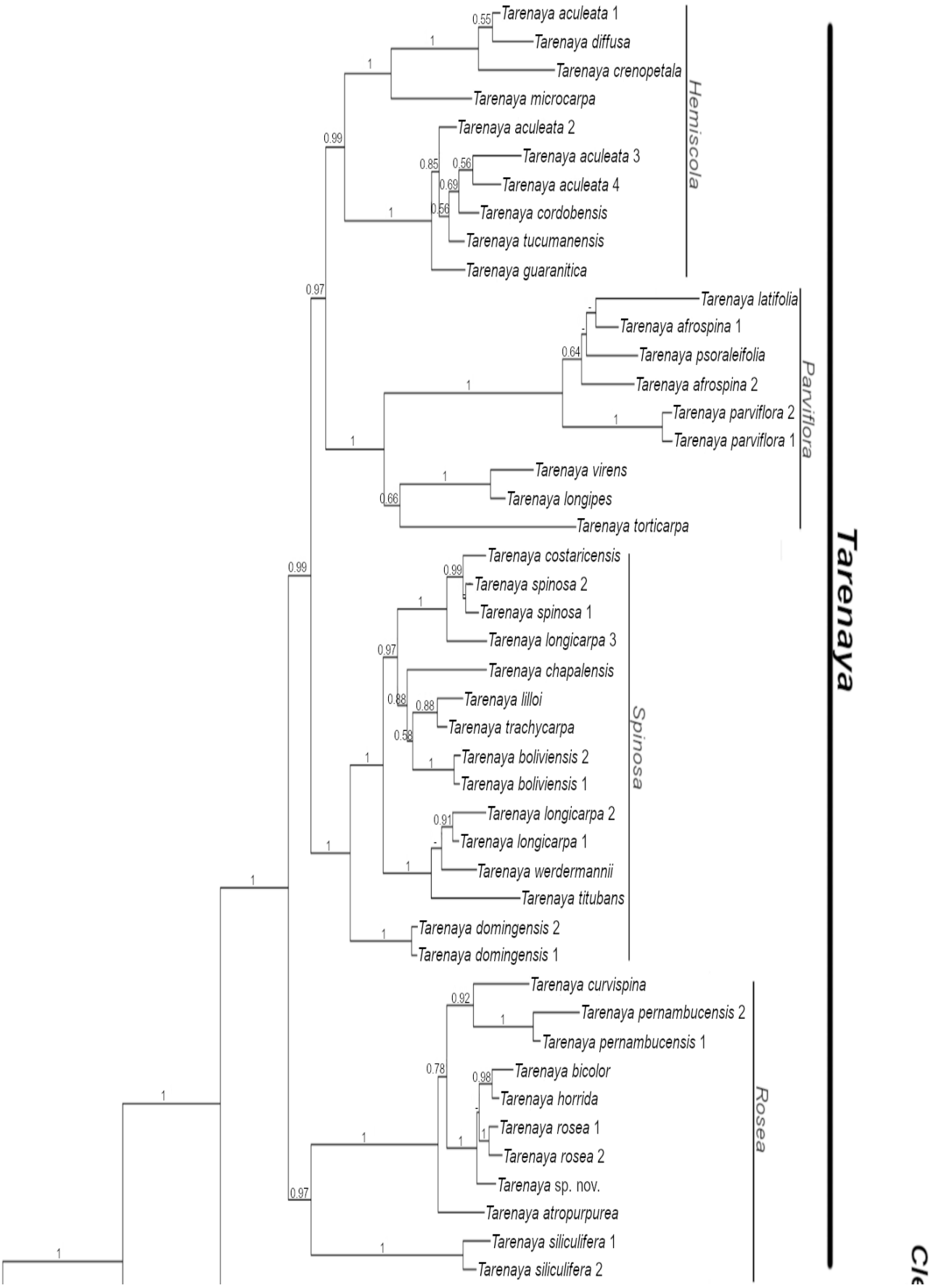
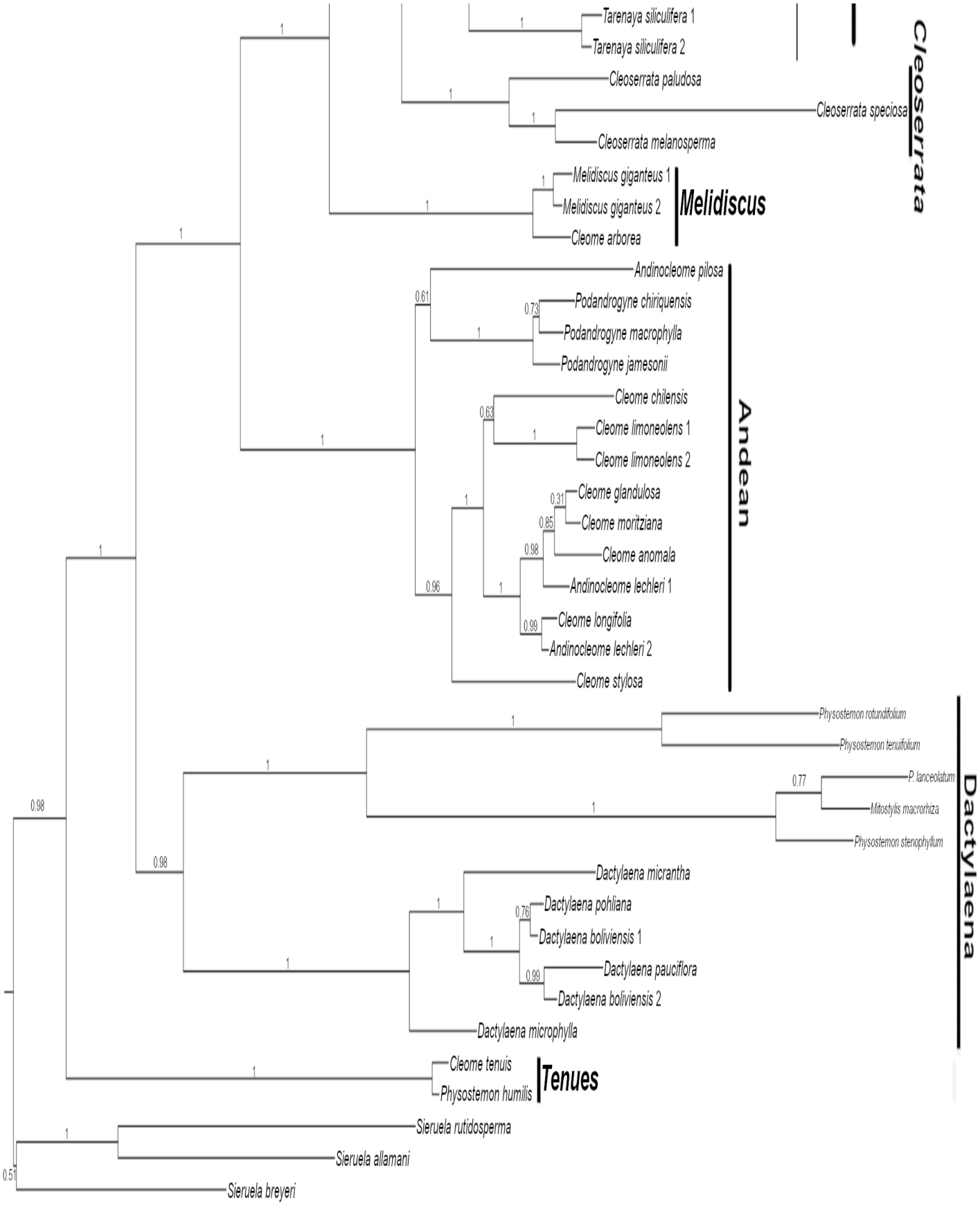


Figure 1. Bayesian maximum clade credibility tree based on combined ITS, *mat*K and *ndh*F markers. Bayesian posterior probabilities are indicated above branches. Posterior probabilities less than 50% are indicated as (-).


Tarenaya
Hemiscola
Tarenaya aculeata 1
Tarenaya diffusa
Tarenaya crenopetala
Tarenaya microcarpa
Tarenaya aculeata 2
Tarenaya aculeata 3
Tarenaya aculeata 4
Tarenaya cordobensis
Tarenaya tucumanensis
Tarenaya guaranitica
Parviflora
Tarenaya latifolia
Tarenaya afrospina 1
Tarenaya psoraleifolia
Tarenaya afrospina 2
Tarenaya parviflora 2
Tarenaya parviflora 1
Tarenaya virens
Tarenaya longipes
Tarenaya torticarpa
Spinosa
Tarenaya costaricensis
Tarenaya spinosa 2
Tarenaya spinosa 1
Tarenaya longicarpa 3
Tarenaya chapalensis
Tarenaya lilloi
Tarenaya trachycarpa
Tarenaya boliviensis 2
Tarenaya boliviensis 1
Tarenaya longicarpa 2
Tarenaya longicarpa 1
Tarenaya werdermannii
Tarenaya titubans
Tarenaya domingensis 2
Tarenaya domingensis 1
Rosea
Tarenaya curvispina
Tarenaya pernambucensis 2
Tarenaya pernambucensis 1
Tarenaya bicolor
Tarenaya horrida
Tarenaya rosea 1
Tarenaya rosea 2
Tarenaya sp. nov.
Tarenaya atropurpurea
Tarenaya siliculifera 1
Tarenaya siliculifera 2


Tarenaya siliculifera 1
Tarenaya siliculifera 2
Cleoserrata paludosa
Cleoserrata speciosa
Cleoserrata melanosperma
Cleoserrata
Melidiscus giganteus 1
Melidiscus giganteus 2
Cleome arborea
Melidiscus
Andinocleome pilosa
Podandrogyne chiriquensis
Podandrogyne macrophylla
Podandrogyne jamesonii
Cleome chilensis
Cleome limoneolens 1
Cleome limoneolens 2
Cleome glandulosa
Cleome moritziana
Cleome anomala
Andinocleome lechleri 1
Cleome longifolia
Andinocleome lechleri 2
Cleome stylosa
Andean
Physostemon rotundifolium
Physostemon tenuifolium
P. lanceolatum
Mitostylis macrorhiza
Physostemon stenophyllum
Dactylaena micrantha
Dactylaena pohliana
Dactylaena boliviensis 1
Dactylaena pauciflora
Dactylaena boliviensis 2
Dactylaena microphylla
Dactylaena
Cleome tenuis
Physostemon humilis
Tenues
Sieruela rutidosperma
Sieruela allamani
Sieruela breyeri
0.02

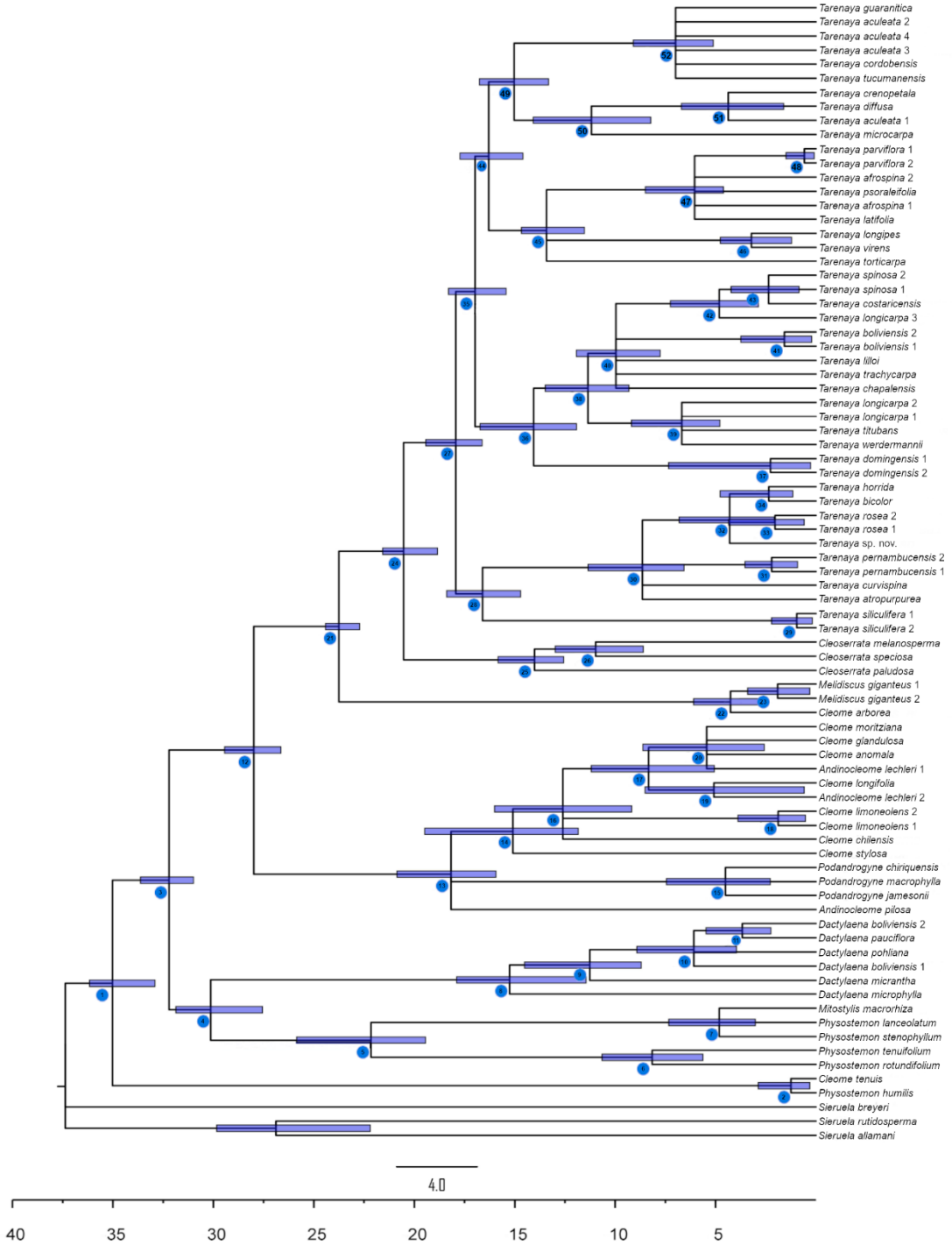
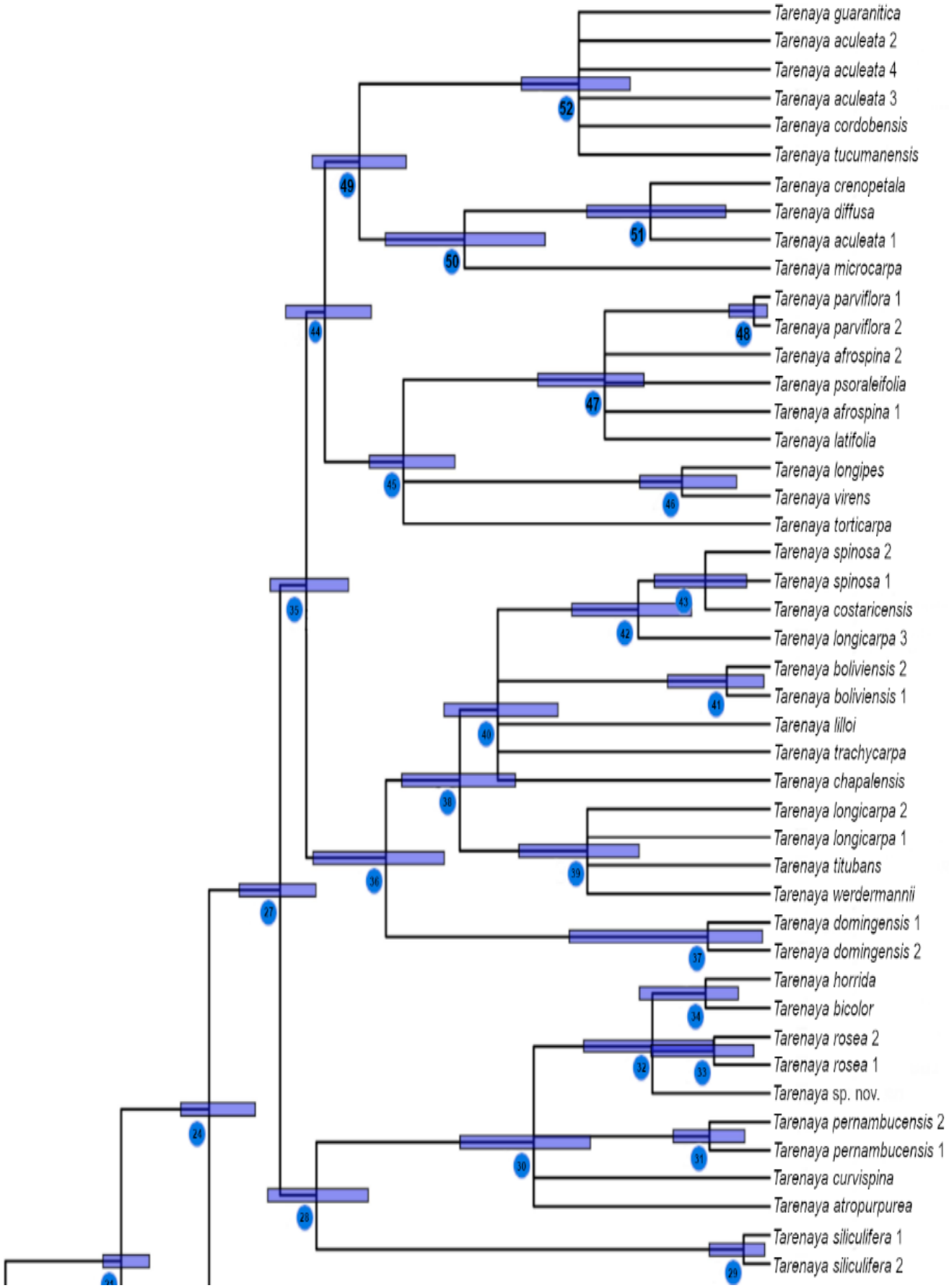


Figure 2. Divergence time estimates for New World Cleomaceae based on the 100 representatives combined ITS, *mat*K and *ndh*F Bayesian trees performed with treePL. Bars represent 95% highest posterior probabilities (HPD) estimates.


Tarenaya guaranitica
Tarenaya aculeata 2
Tarenaya aculeata 4
Tarenaya aculeata 3
Tarenaya cordobensis
Tarenaya tucumanensis
Tarenaya crenopetala
Tarenaya diffusa
Tarenaya aculeata 1
Tarenaya microcarpa
Tarenaya parviflora 1
Tarenaya parviflora 2
Tarenaya afrospina 2
Tarenaya psoraleifolia
Tarenaya afrospina 1
Tarenaya latifolia
Tarenaya longipes
Tarenaya virens
Tarenaya torticarpa
Tarenaya spinosa 2
Tarenaya spinosa 1
Tarenaya costaricensis
Tarenaya longicarpa 3
Tarenaya boliviensis 2
Tarenaya boliviensis 1
Tarenaya lilloi
Tarenaya trachycarpa
Tarenaya chapalensis
Tarenaya longicarpa 2
Tarenaya longicarpa 1
Tarenaya titubans
Tarenaya werdermannii
Tarenaya domingensis 1
Tarenaya domingensis 2
Tarenaya horrida
Tarenaya bicolor
Tarenaya rosea 2
Tarenaya rosea 1
Tarenaya sp. nov.
Tarenaya pernambucensis 2
Tarenaya pernambucensis 1
Tarenaya curvispina
Tarenaya atropurpurea
Tarenaya siliculifera 1
Tarenaya siliculifera 2
52
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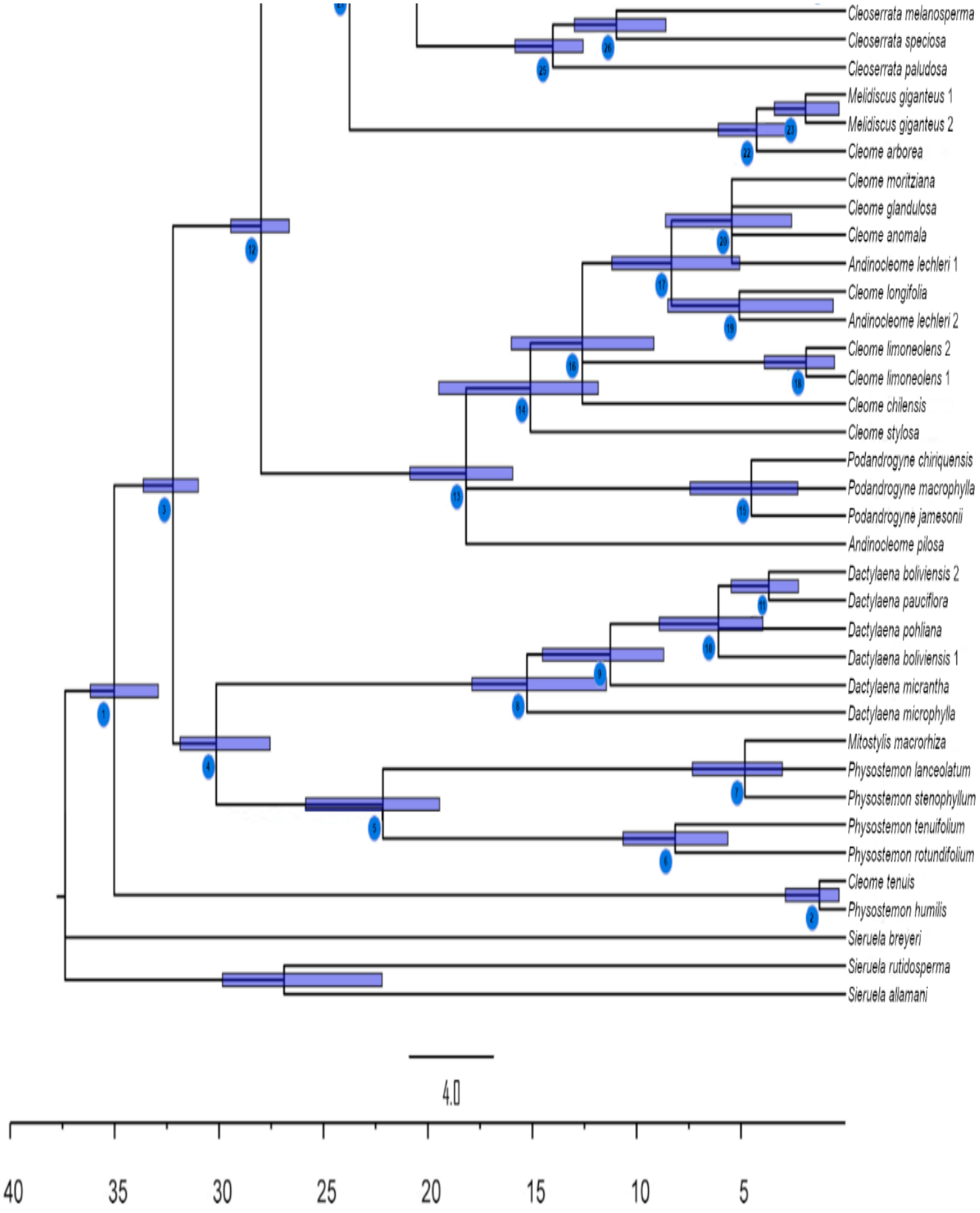
29


Cleoserrata melanosperma
Cleoserrata speciosa
Cleoserrata paludosa
Melidiscus giganteus 1
Melidiscus giganteus 2
Cleome arborea
Cleome moritziana
Cleome glandulosa
Cleome anomala
Andinocleome lechleri 1
Cleome longifolia
Andinocleome lechleri 2
Cleome limoneolens 2
Cleome limoneolens 1
Cleome chilensis
Cleome stylosa
Podandrogyne chiriquensis
Podandrogyne macrophylla
Podandrogyne jamesonii
Andinocleome pilosa
Dactylaena boliviensis 2
Dactylaena pauciflora
Dactylaena pohliana
Dactylaena boliviensis 1
Dactylaena micrantha
Dactylaena microphylla
Mitostylis macrorhiza
Physostemon lanceolatum
Physostemon stenophyllum
Physostemon tenuifolium
Physostemon rotundifolium
Cleome tenuis
Physostemon humilis
Sieruela breyeri
Sieruela rutidosperma
Sieruela allamani
4.0
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20
15
10
5

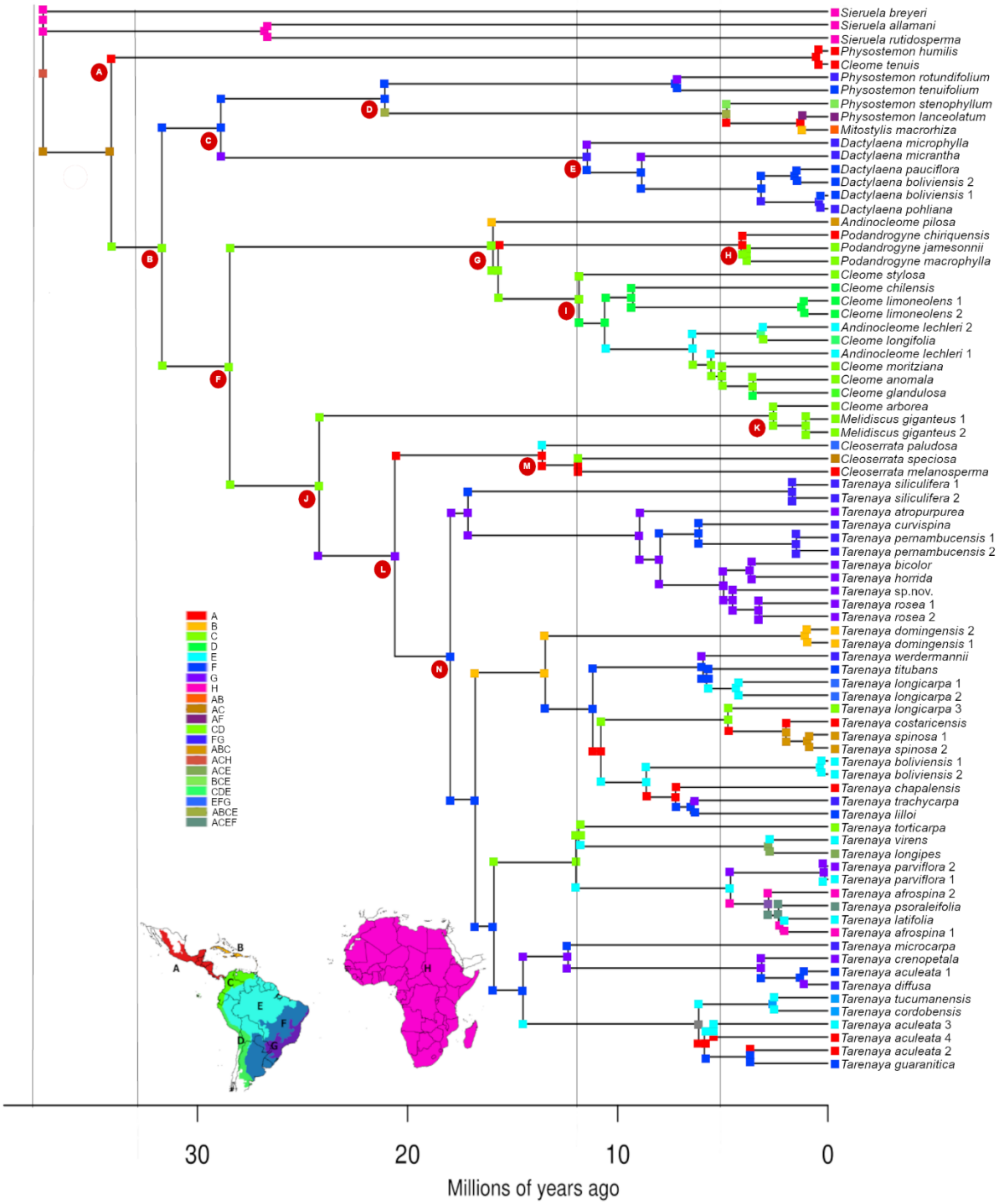
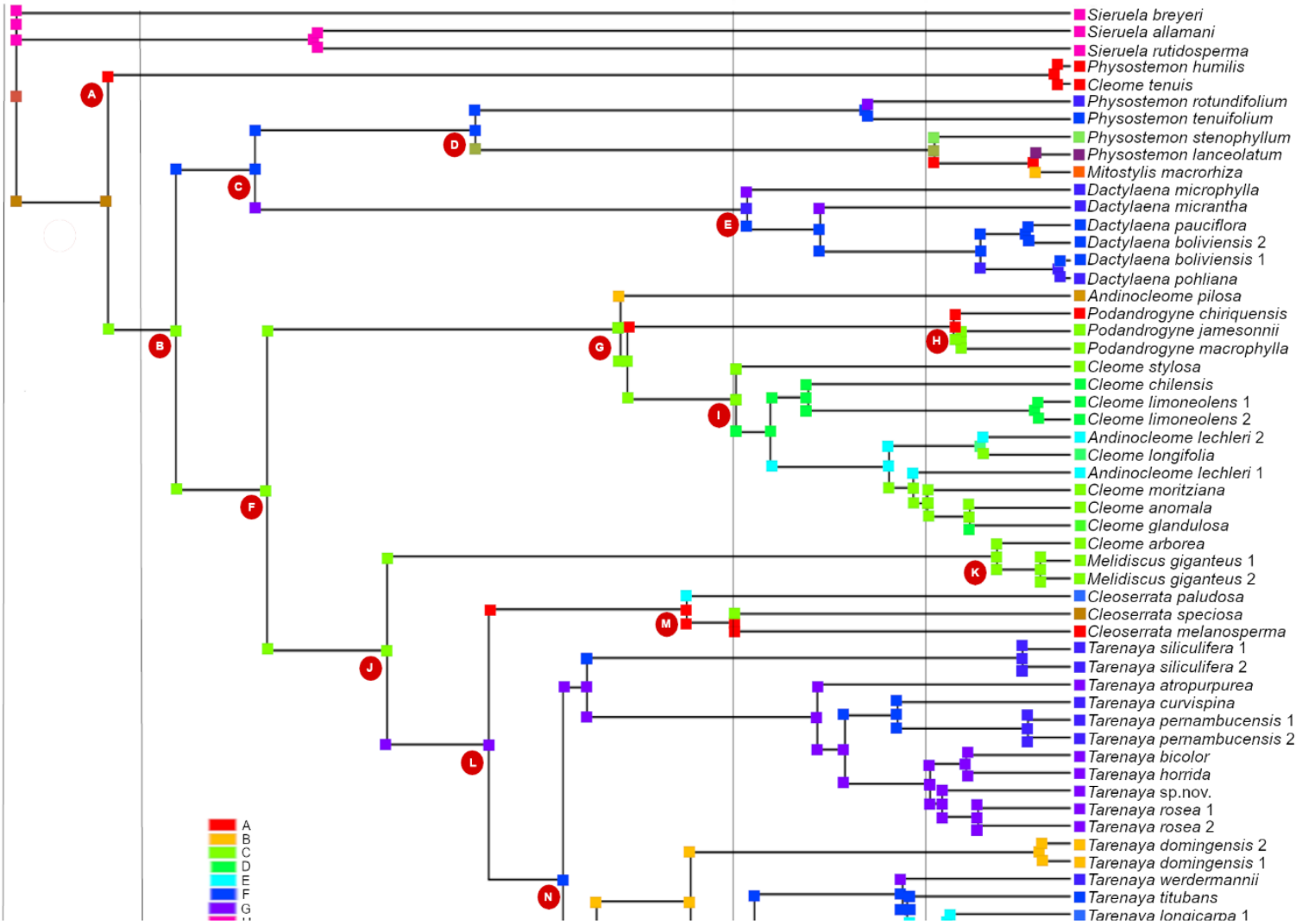
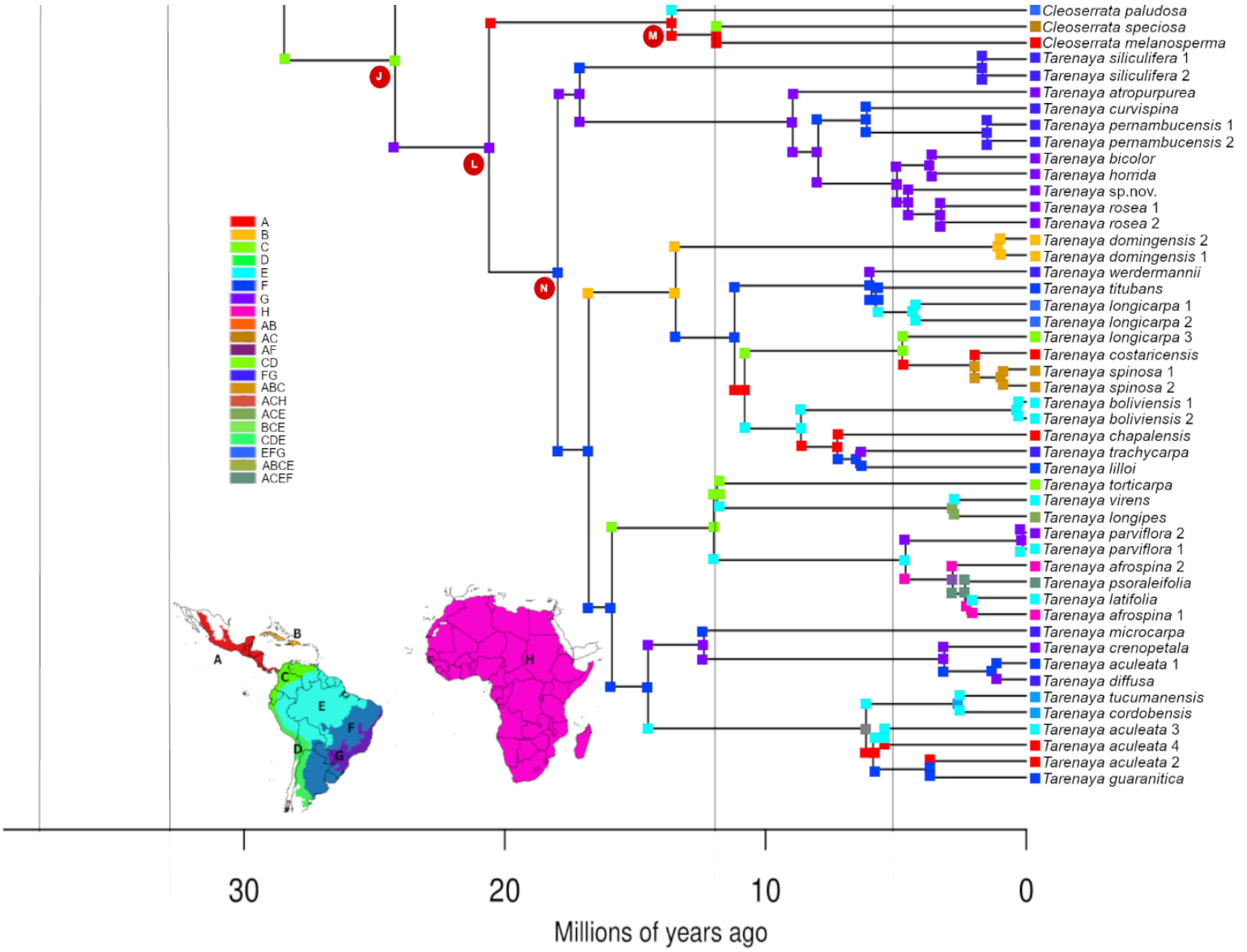


Figure 3. Ancestral area reconstruction on the New World Cleomaceae chronogram with BioGeoBEARS. Geographic distribution of each specie is assigned up to four areas based on their collection localities and present-day distribution. The boxes at nodes are colored coded following the area with the highest log-likelihood.


Sieruela breyeri
Sieruela allamani
Sieruela rutidosperma
Physostemon humilis
Cleome tenuis
Physostemon rotundifolium
Physostemon tenuifolium
Physostemon stenophyllum
Physostemon lanceolatum
Mitostylis macrorhiza
Dactylaena microphylla
Dactylaena micrantha
Dactylaena pauciflora
Dactylaena boliviensis 2
Dactylaena boliviensis 1
Dactylaena pohliana
Andinocleome pilosa
Podandrogyne chiriquensis
Podandrogyne jamesonnii
Podandrogyne macrophylla
Cleome stylosa
Cleome chilensis
Cleome limoneolens 1
Cleome limoneolens 2
Andinocleome lechleri 2
Cleome longifolia
Andinocleome lechleri 1
Cleome moritziana
Cleome anomala
Cleome glandulosa
Cleome arborea
Melidiscus giganteus 1
Melidiscus giganteus 2
Cleoserrata paludosa
Cleoserrata speciosa
Cleoserrata melanosperma
Tarenaya siliculifera 1
Tarenaya siliculifera 2
Tarenaya atropurpurea
Tarenaya curvispina
Tarenaya pernambucensis 1
Tarenaya pernambucensis 2
Tarenaya bicolor
Tarenaya horrida
Tarenaya sp.nov.
Tarenaya rosea 1
Tarenaya rosea 2
Tarenaya domingensis 2
Tarenaya domingensis 1
Tarenaya werdermannii
Tarenaya titubans
Tarenaya longicarpa 1
A
B
C
D
E
F
G


A
B
C
D
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G
H
AB
AC
AF
CD
FG
ABC
ACH
ACE
BCE
CDE
EFG
ABCE
ACEF
J
L
M
N
Cleoserrata paludosa
Cleoserrata speciosa
Cleoserrata melanosperma
Tarenaya siliculifera 1
Tarenaya siliculifera 2
Tarenaya atropurpurea
Tarenaya curvispina
Tarenaya pernambucensis 1
Tarenaya pernambucensis 2
Tarenaya bicolor
Tarenaya horrida
Tarenaya sp.nov.
Tarenaya rosea 1
Tarenaya rosea 2
Tarenaya domingensis 2
Tarenaya domingensis 1
Tarenaya werdermannii
Tarenaya titubans
Tarenaya longicarpa 1
Tarenaya longicarpa 2
Tarenaya longicarpa 3
Tarenaya costaricensis
Tarenaya spinosa 1
Tarenaya spinosa 2
Tarenaya boliviensis 1
Tarenaya boliviensis 2
Tarenaya chapalensis
Tarenaya trachycarpa
Tarenaya lilloi
Tarenaya torticarpa
Tarenaya virens
Tarenaya longipes
Tarenaya parviflora 2
Tarenaya parviflora 1
Tarenaya afrospina 2
Tarenaya psoraleifolia
Tarenaya latifolia
Tarenaya afrospina 1
Tarenaya microcarpa
Tarenaya crenopetala
Tarenaya aculeata 1
Tarenaya diffusa
Tarenaya tucumanensis
Tarenaya cordobensis
Tarenaya aculeata 3
Tarenaya aculeata 4
Tarenaya aculeata 2
Tarenaya guaranitica
30
20
10
0
Millions of years ago

APPENDIX 1. Species and samples included in this study. Sequences obtained in this study are noted with an asterisk (*). Previous sequences are indicated by GenBank numbers. Missing sequence data is indicated by an n-dash (—).

Taxon	Country, locality	Collector, collection number and herbarium acronym	ITS	*mat*K	*ndh*F
Andinocleome lechleri (Eichler) Iltis & Cochrane	Peru, Loreto	*E. Suclii et al. 1523* (MO)	X*	-	X*
Andinocleome lechleri (Eichler) Iltis & Cochrane	Bolivia, La Paz	*A. Fuentes 10471* (MO)	X*	X*	X*
Andinocleome pilosa (Benth.) Iltis & Cochrane	Venezuela, Aragua	*T. Ruiz 472*0 (MY)	DQ455799	-	-
Andinocleome pilosa (Benth.) Iltis & Cochrane	[no country listed]	*H.H. Iltis 30585* (WIS)	-	AY483231	AY122385
Cleome arborea Kunth	Venezuela, Merida	*T. Ruiz & L. Hernandez 4981* (MY)	DQ455783	-	-
Cleome chilensis DC.	Chile	*S. Tellier 434* (MO)	X*	-	X*
Cleome glandulosa Ruiz & Pav. ex DC.	Ecuador, Loja	*P.M. Jørgensen 949* (MO)	X*	-	X*
Cleome limoneolens J.F. Macbr.	Peru, Cuzco	*G. Calatayud 2141* (MO)	X*	-	-
Cleome limoneolens J.F. Macbr.	Peru, Cuzco	*A. Tupayachi 6355* (MO)	X*	-	-
Cleome longifolia Vahl ex DC.	Peru, Cajamarca	*O.L. Orozco 192* (MO)	X*	X*	X*
Cleome moritziana Klotzsch ex Eichler	Venezuela, Merida	*T. Ruiz & L. Hernandez 4984* (MY)	DQ455794	-	-
Cleome stylosa Eichler	Venezuela, Tachira	*T. Ruiz & L. Hernandez 4977* (MY)	DQ455812	-	-
Cleome tenuis S. Watson	Mexico	*T.R. Van Devender & D.A. Yetman 94-604* (MO)	X*	X*	X*
Cleoserrata melanosperma (S. Watson) Roalson & Soares Neto	Mexico, Sonora	*A.L. Reina G. 98-583* (NY)	HM044284	-	-
Cleoserrata paludosa (Willd. ex Eichler) Soares Neto & Roalson	Bolivia, Santa Cruz	*L. Sánchez 1136* (MO)	DQ455803	-	-
Cleoserrata paludosa (Willd. ex Eichler) Soares Neto & Roalson	Argentina	*R.H. Fortunato 2874* (MO)	-	KF923148	KF923107
Cleoserrata speciosa (Raf.) Iltis	Venezuela, Tachira	*T. Ruiz & L. Hernandez 4978* (MY)	DQ455806	-	-

Dactylaena sp. nov.	Bolivia, La Paz	*M. Lewis 35397* (MO)	X*	-	-
Dactylaena sp. nov.	Bolivia, Santa Cruz	*M. Nee 50049* (MO)	X*	X*	X*
Dactylaena micrantha Schrad. Ex Schult.f.	Cultivated	*T.S. Cochrane 8357* (MO)	X*	X*	X*
Dactylaena microphylla Eichler	Brazil, Bahia	*Callejas & A.M. De Carvalho 1729* (NY)	X*	X*	X*
Dactylaena pohliana Eichler	Brazil, Bahia	*R.M. Harley* 21992	X*	X*	X*
Dactylaena pauciflora Griseb.	Bolivia, Santa Cruz	*A. Fuentes 3385* (MO)	X*	X*	X*
Melidiscus giganteus (L.) Raf.	Prague Bot. Garden (WSUG)	*M. Smith s.n.* (WS)	HM044283	KF923135	KF923095
Melidiscus giganteus (L.) Raf.	Venezuela, Barinitas	*T. Ruiz & L. Hernandez 4987* (MY)	DQ455820	-	-
Melidiscus giganteus (L.) Raf.	[no country listed]	*Solomon s.n.* (MO)	-	AY483232	AY122386
Mitostylis machroriza (C.Wright) Iltis	Belize, Orange Walk	*J.D. Dwyer & C. Berry 15010* (MO)	X*	-	X*
Physostemon guianensis (Aubl.) malme	Nicaragua, Estelí	*W.D. Stevens & E. Duarte M. 29888* (MO)	-	-	X*
Physostemon humilis (Rose) Iltis	Guatemala	*M. García & A.J. Cóbar 757* (MO)	X*	X*	X*
Physostemon lanceolatum Mart. & Zucc.	Belize, Orange Walk	*Z.A. Goodwin & G.N. López 1682* (MO)	X*	X*	X*
Physostemon rotundifolium Mart. & Zucc.	Brazil, Bahia	*R.M. Harley & N.P. Taylor 27032* (MO)	X*	-	X*
Physostemon stenophyllum (Klotzsch ex Urb.) Iltis	Venezuela, Guarico	*T. Ruiz & R. Villafane 4987* (MY)	DQ455814	-	-
Physostemon tenuifolium Mart. & Zucc.	Brazil, Bahia	*R.M. Harley 16325* (NY)	HM044280	AY483233	AY122393
Podandrogyne chiriquensis (Standl.) Woodson	Costa Rica	*J. & H. Utley 4553* (MO)	HM044281	-	-
Podandrogyne decipiens (Triana & Planch.) Woodson	[no country listed]	*G. Mora 380*	-	-	EU373719
Podandrogyne jamesonii (Briq.) Cochrane	Ecuador	*G.P. Lewis et al. 3438* (MO)	HM044282	-	-

Podandrogyne macrophylla (Turcz.) Woodson	Venezuela, Merida	*T. Ruiz & L. Hernandez 4982* (MY)	DQ455815	-	-
Podandrogyne mathewsii (Briq.) Cochrane	[no country listed]	*J.R.I. Wood 11536* (K)	-	-	EU373720
Sieruela allamanii (Choiv.) Roalson & J.C. Hall	Kenya	*Agnew et al. 10879* (MO)	HM044270	KF923124	KF923082
Sieruela briquetii (Polhill) Roalson & J.C. Hall	Kenya	*R.B. & A.J. Faden 74* (MO)	KF923165	KF923127	KF923085
Sieruela rutidosperma (DC.) Roalson & J.C. Hall	Venezuela, Maracay	*T. Ruiz 4360* (MY)	DQ455802	-	-
Tarenaya aculeata (L.) Soares Neto & Roalson	Brazil, Paraíba	*R.L. Soares Neto 135* (JPB)	X*	X*	-
Tarenaya aculeata (L.) Soares Neto & Roalson	Mexico, Sinaloa	*F.W. Gould 12244* (WIS)	X*	X*	X*
Tarenaya aculeata (L.) Soares Neto & Roalson	Bolivia, Beni	*R.C. de Michel & M.E. Capra 2287* (MO)	X*	-	X*
Tarenaya aculeata (L.) Soares Neto & Roalson	Mexico, San Luis Potosí	*T.S. Cochrane 8646* (MO)	X*	-	X*
Tarenaya afrospina (Iltis) Soares Neto & Roalson	Congo	*D. Champluvier 5274* (MO)	X*	X*	-
Tarenaya afrospina (Iltis) Soares Neto & Roalson	Gabon	*J.J. Wieringa 4641* (MO)	X*	X*	X*
Tarenaya atropurpurea (Schott) Soares Neto & Roalson	Brazil, Rio de Janeiro	*C. Cronemberger et al. 7* (JPB)	X*	X*	-
Tarenaya bicolor (Gardner) Soares Neto & Roalson	Brazil, Rio de Janeiro	*T. Laessoe & T. Silva H52553* (JPB)	X*	X*	-
Tarenaya boliviensis (Iltis) Soares Neto & Roalson	Bolivia, Cochabamba	*J. Teran 1698* (MO)	X*	X*	-
Tarenaya boliviensis (Iltis) Soares Neto & Roalson	Bolivia, Cochabamba	*J.A. Peñaranda 369* (MO)	X*	X*	-
Tarenaya chapalensis (Iltis) Soares Neto & Roalson	Mexico, Michoacan	*H.H. Iltis et al. 500a* (WIS)	X*	X*	-

Tarenaya cordobensis (Griseb.) Arana & Oggero	Argentina, Salta	*E.M. Zardini et al. 1691* (MO)	X*	-	X*
Tarenaya costaricensis (Iltis) Iltis	Costa Rica, Alajuela	*B. Hammel 19376* (MO)	X*	X*	X*
Tarenaya crenopetala (A.DC.) Soares Neto & Roalson	Brazil, Paraná	*P. Dusen 7365* (MO)	DQ455788	-	-
Tarenaya curvispina M.B. Costa-e-Silva & Iltis ex Soares Neto & Roalson	Brazil, Bahia	*R.L. Soares Neto & J.G. Jardim 130* (JPB)	X*	X*	X*
Tarenaya diffusa (Banks ex DC.) Soares Neto & Roalson	Brazil, Pernambuco	*R.L. Soares Neto et al. 125* (JPB)	X*	X*	X*
Tarenaya domingensis (Iltis) Soares Neto & Roalson	Dominican Republic, La Vega	*A.H. Gentry & T.A. Zanoni 50663* (MO)	X*	-	X*
Tarenaya domingensis (Iltis) Soares Neto & Roalson	Dominican Republic, La Vega	*A.H. Gentry & T.A. Zanoni 50663* (MO)	X*	-	X*
Tarenaya eosina (J.F. Macbr.) Soares Neto & Roalson	Paraguay, Presidente Hayes	*E.M. Zardini & L. Guerrero 39366* (MO)	-	-	X*
Tarenaya guaranitica (Chodat & Hassl.) Soares Neto & Roalson	Paraguay, Paraguari	*E.M. Zardini & T. Tilleria 31084* (WIS)	X*	-	-
Tarenaya hassleriana (Chodat) Iltis	Harris seeds #2285, Rochester, New York	*E. Voznesenskaya 6* (WS)	-	-	KF923096
Tarenaya horrida (Mart. ex Scult.f.) Roalson & Soares Neto	Brazil, Minas Gerais	*W.C. Cardoso & A.M. Tedesco 1172* (JPB)	X*	X*	-
Tarenaya inermis (Malme) Soares Neto & Roalson	Brazil, Rio Grande do Sul	*I. Fernandes 690* (PACA)	-	X*	-
Tarenaya latifolia (Vahl ex DC.) Soares Neto & Roalson	Brazil, Pará	*C.A.C. Ferreira et al. 134a* (WIS)	X*	X*	X*
Tarenaya lilloi (S.A.Gómez) Arana & Oggero	Paraguay, Presidente Hayes	*M. Peña-Chocarro et al. 2562* (MO)	X*	X*	X*

Tarenaya longicarpa Soares Neto & Iltis	Brazil, Paraíba	*R. L. Soares Neto 134* (JPB)	X*	X*	-
Tarenaya longicarpa Soares Neto & Iltis	Brazil, Bahia	*R.M. Harley et al. 16463* (MO)	X*	X*	X*
Tarenaya longicarpa Soares Neto & Iltis	Venezuela, Aragua	*A. Castillo 1982* (MO)	X*	X*	X*
Tarenaya longipes (DC.) Iltis	Peru, Amazonas	*R.Rojas et al. 1* (MO)	X*	-	-
Tarenaya microcarpa (Ule) Soares Neto & Roalson	Brazil, Bahia	*R.L. Soares Neto & AF. Pontes-Pires 127* (MO)	X*	X*	-
Tarenaya parviflora (Kunth) Iltis	Peru, Loreto	*M. Rimachi 10685* (MO)	X*	X*	-
Tarenaya parviflora (Kunth) Iltis	Brazil, Espírito Santo	*L. Kollmann et al. 4123* (JPB)	X*	X*	-
Tarenaya pernambucensis Iltis & M.B. Costa-e-Silva ex Soares Neto & Roalson	Brazil, Pernambuco	*M.B. Costa-e-Silva 1523* (WIS)	X*	-	-
Tarenaya pernambucensis Iltis & M.B. Costa-e-Silva ex Soares Neto & Roalson	Brazil, Bahia	*L. Noblick & W.J. Hahn 3363* (MO)	X*	X*	-
Tarenaya psoraleifolia (DC.) Soares Neto & Roalson	Bolivia, Santa Cruz	*R. Seidel 321* (WIS)	KF923180	EU371801	EU373709
Tarenaya rosea (Vahl ex DC.) Soares Neto & Roalson	Brazil, Rio de Janeiro	*C. Farney & V.S. Fonseca 4485* (JPB)	X*	X*	-
Tarenaya rosea (Vahl ex DC.) Soares Neto & Roalson	Brazil, Espírito Santo	*H. Pinheiro et al. 18* (JPB)	X*	X*	-
Tarenaya siliculifera (Eichler) Soares Neto & Roalson	Brazil, Bahia	*M.L. Guedes et al. 18878* (EAC)	X*	-	X*
Tarenaya siliculifera (Eichler) Soares Neto & Roalson	Brazil, Bahia	*R.M. Harley 26987* (NY)	HM044286	-	-
Tarenaya spinosa (Jacq.) Raf.	Honduras, Francisco Morazán	*A. Molina & A.R. Molina 35155* (MO)	X*	-	-

Tarenaya spinosa (Jacq.) Raf.	Nicaragua, Chontales	*W.O. Stevens & O.M. Montiel 29987* (MO)	X*	-	X*
Tarenaya sp. nov.	Brazil, Espírito Santo	*V. Demuner et al. 3131* (JPB)	X*	X*	-
Tarenaya trachycarpa (Klotzsch ex Eichler) Soares Neto & Roalson	Argentina	*A. Krapovickas & C.L. Cristobal*	HM044297	KF923158	KF923116
Tarenaya titubans (Speg.) Soares Neto & Roalson	Argentina, Buenos Aires	*A. Krapovickas 2897* (MO)	X*	-	-
Tarenaya tucumanensis (Iltis) Arana & Oggero	Bolivia, Tarija	*M. Nee & I. Linneo 54140* (MO)	X*	-	X*
Tarenaya virens (J.F. Macbr.) Soares Neto & Roalson	Peru, Loreto	*S.T. McDaniel 22440* (MO)	X*	X*	X*
Tarenaya werdermannii (Alf.Ernst) Soares Neto & Roalson	Bolivia, Santa Cruz	*M. Nee 33473* (MO)	X*	-	X*

APPENDIX 2. Divergence time estimates and ancestral areas for nodes indicated at Figure 3. HPD = highest posterior probability; A= Mesomerica; B= Caribbean; C= Northern Andes; D= Southern Andes; E= Amazonia; F= Chacoan; G= Atlantic Forest; H= Africa.

NODE	Ages (Mya)		Ancestral areas		NODE	Ages (Mya)		Ancestral areas	
	Mean	95% HPD	Area	Probability		Mean	95% HPD	Area	Probability
1	35.02	32.90–36.16	AC	0.83	**27**	17.93	16.62–19.43	F	0.31
2	1.24	0.30–2.88	A	0.99	**28**	16.60	14.70–18.39	G	0.95
3	32.20	30.98–33.62	C	0.64	**29**	0.96	0.19–2.22	FG	0.77
4	30.13	27.55–31.86	F	0.77	**30**	8.64	6.56–11.34	G	0.94
5	22.15	19.44–25.85	F	0.17	**31**	2.20	0.92–3.53	FG	0.73
6	8.15	5.62–10.65	F	0.58	**32**	4.29	2.07–6.02	G	0.99
7	4.01	3.02–7.33	ABCE	0.57	**33**	2.03	0.59–4.35	G	0.99
8	15.25	11.44–17.89	FG	0.45	**34**	2.34	1.15–4.77	G	0.99
9	11.26	8.70–14.51	F	0.58	**35**	16.97	15.43–18.29	F	0.44
10	6.08	3.96–8.92	F	0.62	**36**	14.05	11.92–16.73	B	0.46
11	3.67	2.48–5.47	F	0.99	**37**	2.77	0.42–1.95	B	0.99
12	27.98	26.63–29.44	C	0.68	**38**	6.68	4.78–9.18	F	0.42
13	18.17	15.93–20.86	C	0.30	**39**	11.35	9.30–13.48	F	0.55
14	15.08	11.84–19.48	C	0.89	**40**	9.96	7.75–11.92	A	0.53
15	4.10	2.20–7.45	A	0.59	**41**	1.58	0.21–7.33	E	0.99
16	12.60	9.18–16.00	D	0.66	**42**	4.85	2.81–7.25	C	0.37

17	8.33	5.06–11.18	E	0.58	**43**	2.30	0.85–4.22	ABC	0.34
18	1.89	0.52–3.89	D	0.99	**44**	16.29	14.59–17.72	F	0.28
19	5.08	0.59–8.51	CE	0.43	**45**	13.41	11.53–14.66	C	0.33
20	5.44	2.58–8.62	C	0.99	**46**	3.21	1.22–4.76	ACE	0.43
21	23.75	22.71–24.41	C	0.21	**47**	6.04	4.60–8.50	E	0.15
22	4.06	2.48–6.09	C	0.99	**48**	0.58	0.09–2.15	G	0.44
23	1.90	0.31–3.40	C	0.99	**49**	15.02	13.31–16.75	F	0.70
24	20.53	18.83–21.57	G	0.22	**50**	11.18	8.23–14.07	G	0.66
25	14.01	12.55–15.83	A	0.20	**51**	4.37	1.61–6.70	G	0.66
26	10.97	8.60–12.98	A	0.87	**52**	6.99	5.11–9.09	AE	0.18

APPENDIX 3. Matrices for areas allowed by time slice implemented in biogeographical analysis. A–Mesoamerica, B–Caribbean region, C–Northern Andes, D–Southern Andes, E–Amazonia, F–Chacoan region, G–Atlantic Forest, and H–Africa. Time slice 1: 38–33 My; Time Slice 2: 33–12 My; Time Slice 12–4.5 Mya and Time Slice 4: 4.5–0 My.

Time slice 1

A	B	C	D	E	F	G	H
1	1	1	0	1	0	0	1
	1	1	0	0	0	0	1
		1	0	1	0	0	1
			1	0	0	0	0
				1	0	0	0
					0	0	0
						0	0
							1

Time slice 2

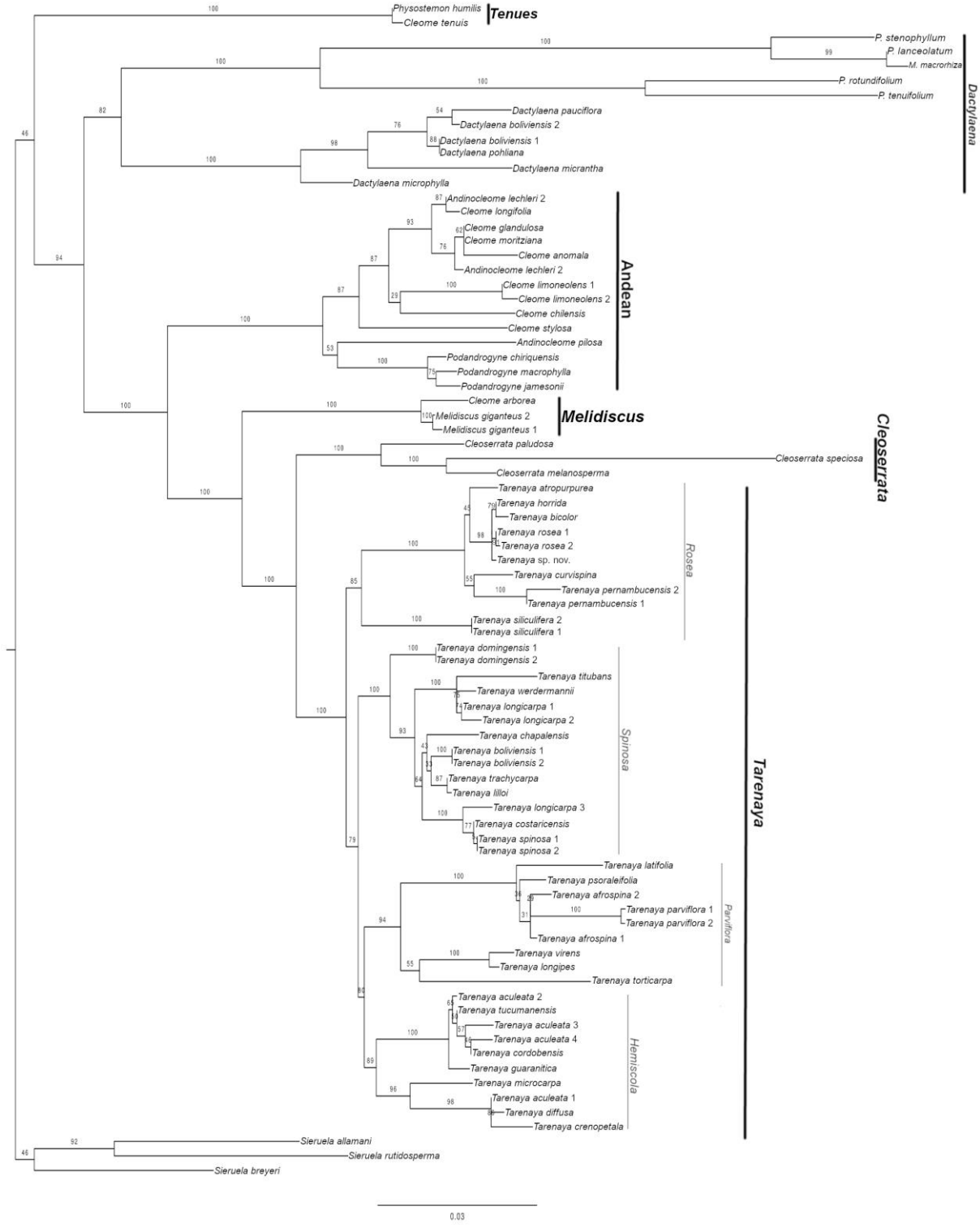
A	B	C	D	E	F	G	H
1	1	1	0	1	1	1	1
	1	1	0	1	1	1	1
		1	0	1	1	1	1
			1	0	0	0	0
				1	1	1	1
					1	1	1
						1	0
							1

Time slice 3

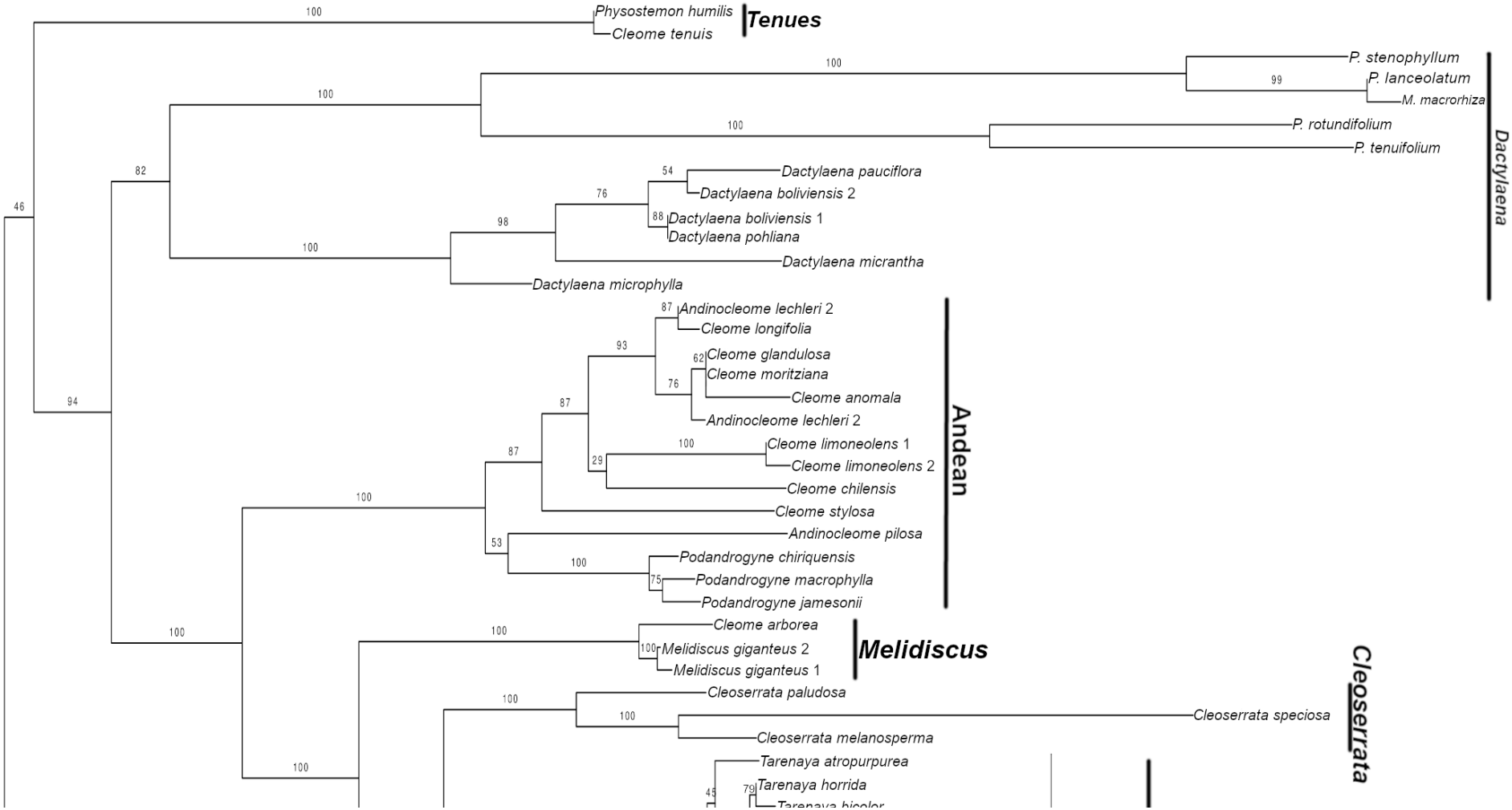
A	B	C	D	E	F	G	H
1	1	1	0	1	1	1	1
	1	1	0	1	1	1	1
		1	0	1	1	1	1
			1	0	0	0	0
				1	1	1	1
					1	1	1
						1	1
							1

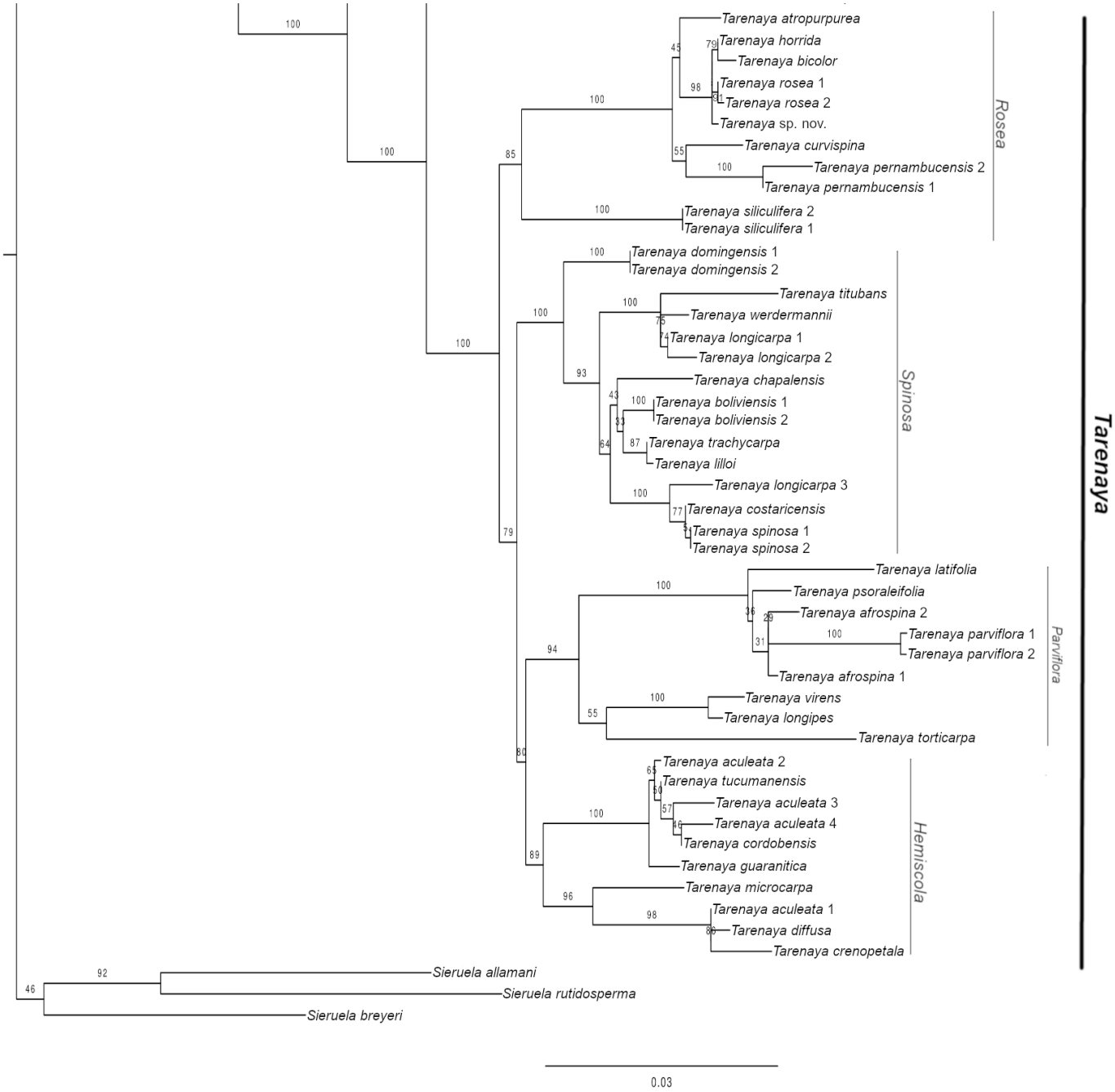
Time slice 4

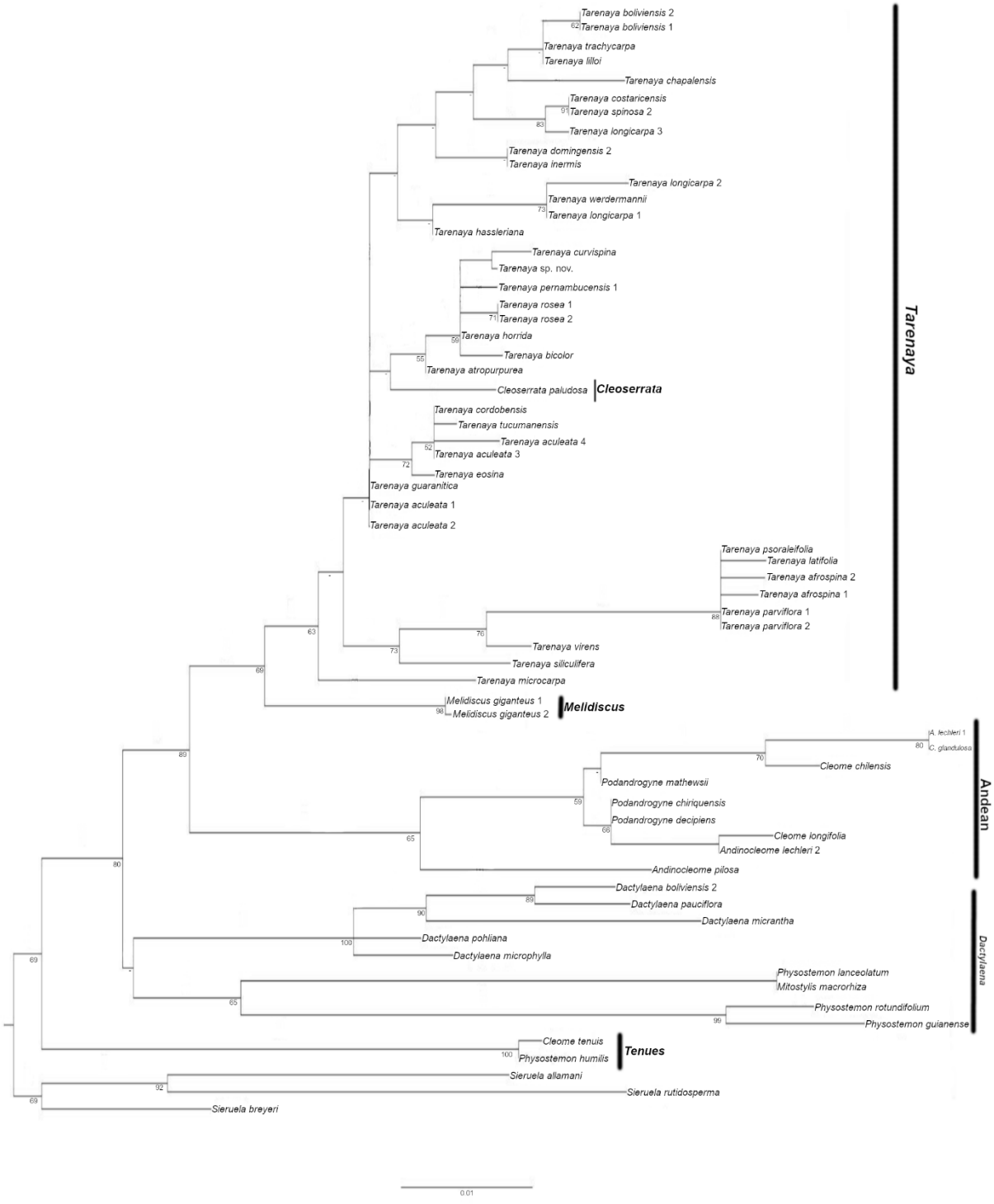
A	B	C	D	E	F	G	H
1	1	1	0	1	1	1	1
	1	1	0	1	1	1	1
		1	0	1	1	1	1
			1	0	0	0	0
				1	1	1	1
					1	1	1
						1	1
							1



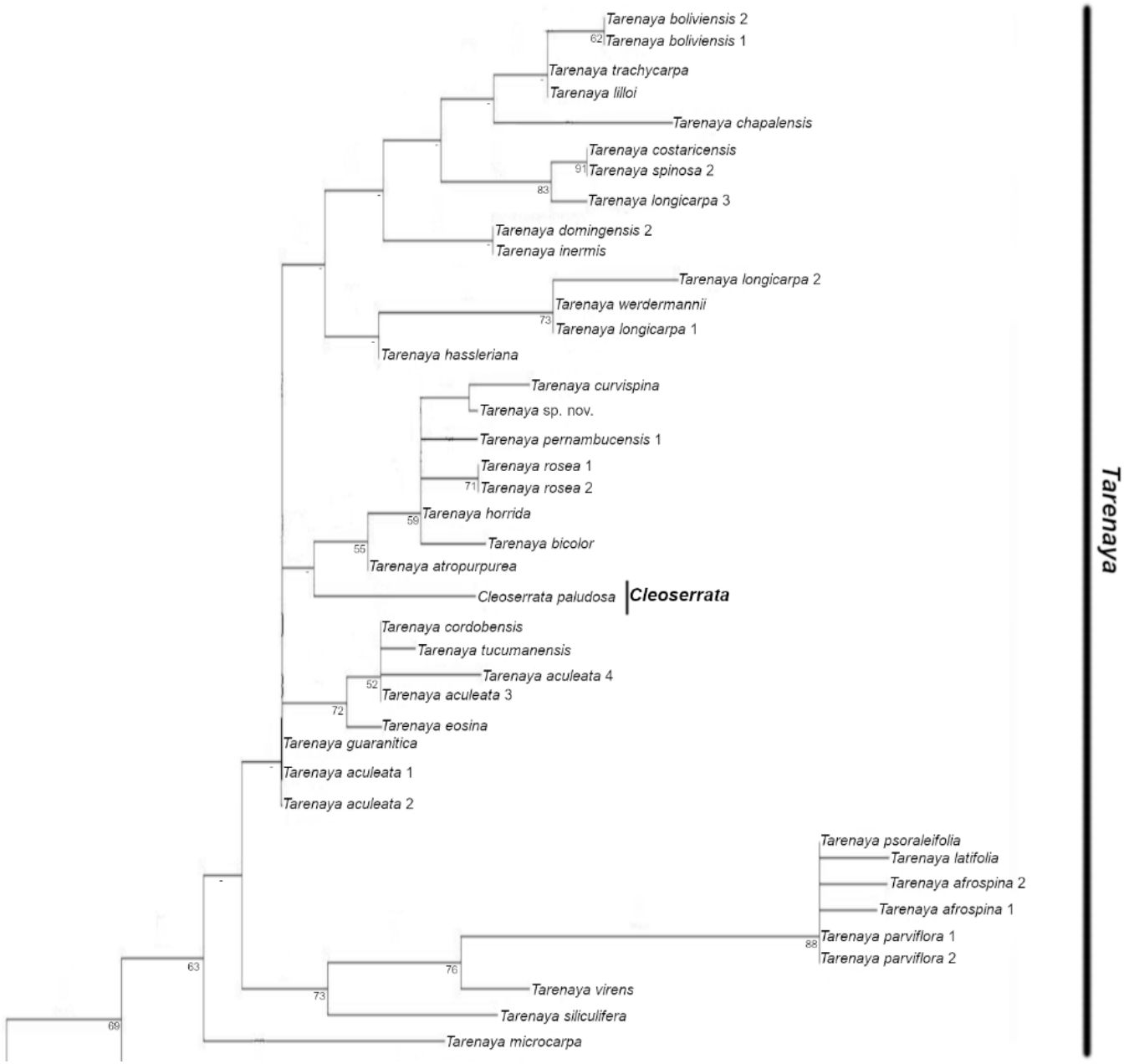
Supplementary Figure 1. Maximum likelihhod tree based on combined ITS, *mat*K and *ndh*F markers. ML bootstrap percentages are indicated above branches. Bootstraps values less than 50% are indicated as (-).

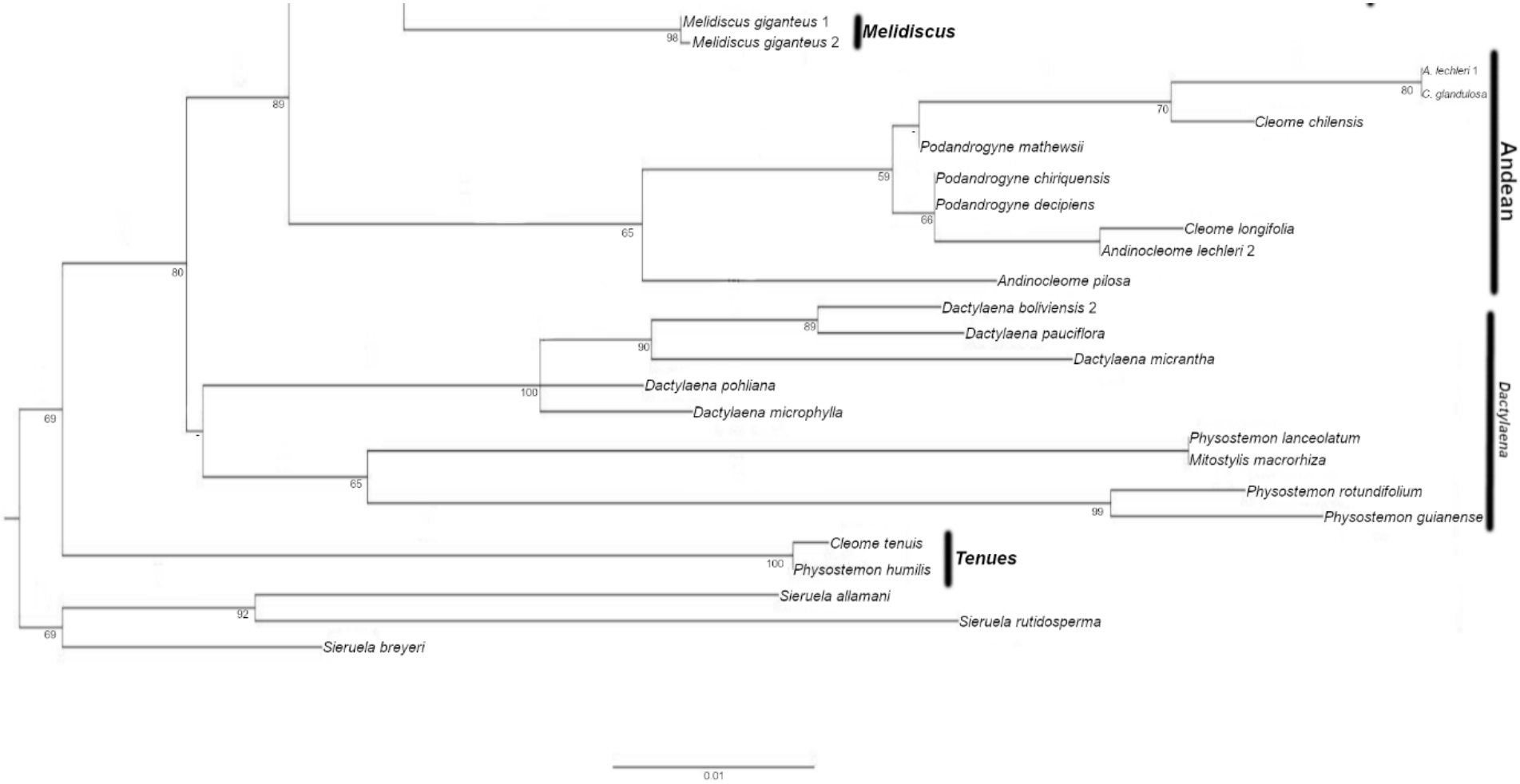

Physostemon humilis
Cleome tenuis
Tenues
P. stenophyllum
P. lanceolatum
M. macrorhiza
P. rotundifolium
P. tenuifolium
Dactylaena
Dactylaena pauciflora
Dactylaena boliviensis 2
Dactylaena boliviensis 1
Dactylaena pohliana
Dactylaena micrantha
Dactylaena microphylla
Andinocleome lechleri 2
Cleome longifolia
Cleome glandulosa
Cleome moritziana
Cleome anomala
Andinocleome lechleri 2
Cleome limoneolens 1
Cleome limoneolens 2
Cleome chilensis
Cleome stylosa
Andinocleome pilosa
Podandrogyne chiriquensis
Podandrogyne macrophylla
Podandrogyne jamesonii
Andean
Cleome arborea
Melidiscus giganteus 2
Melidiscus giganteus 1
Melidiscus
Cleoserrata paludosa
Cleoserrata speciosa
Cleoserrata melanosperma
Cleoserrata
Tarenaya atropurpurea
Tarenaya horrida


Tarenaya atropurpurea
Tarenaya horrida
Tarenaya bicolor
Tarenaya rosea 1
Tarenaya rosea 2
Tarenaya sp. nov.
Tarenaya curvispina
Tarenaya pernambucensis 2
Tarenaya pernambucensis 1
Tarenaya siliculifera 2
Tarenaya siliculifera 1
Rosea
Tarenaya domingensis 1
Tarenaya domingensis 2
Tarenaya titubans
Tarenaya werdermannii
Tarenaya longicarpa 1
Tarenaya longicarpa 2
Tarenaya chapalensis
Tarenaya boliviensis 1
Tarenaya boliviensis 2
Tarenaya trachycarpa
Tarenaya lilloi
Tarenaya longicarpa 3
Tarenaya costaricensis
Tarenaya spinosa 1
Tarenaya spinosa 2
Spinosa
Tarenaya latifolia
Tarenaya psoraleifolia
Tarenaya afrospina 2
Tarenaya parviflora 1
Tarenaya parviflora 2
Tarenaya afrospina 1
Tarenaya virens
Tarenaya longipes
Tarenaya torticarpa
Parviflora
Tarenaya aculeata 2
Tarenaya tucumanensis
Tarenaya aculeata 3
Tarenaya aculeata 4
Tarenaya cordobensis
Tarenaya guaranitica
Tarenaya microcarpa
Tarenaya aculeata 1
Tarenaya diffusa
Tarenaya crenopetala
Hemiscola
Sieruela allamani
Sieruela rutidosperma
Sieruela breyeri
0.03
Tarenaya



Supplementary Figure 2. Maximum likelihhod tree based on combined *mat*K and *ndh*F markers. ML bootstrap percentages are indicated above branches. Bootstraps values less than 50% are indicated as (-).


Tarenaya boliviensis 2
62
Tarenaya boliviensis 1
Tarenaya trachycarpa
Tarenaya lilloi
Tarenaya chapalensis
Tarenaya costaricensis
91
Tarenaya spinosa 2
83
Tarenaya longicarpa 3
Tarenaya domingensis 2
Tarenaya inermis
Tarenaya longicarpa 2
Tarenaya werdermannii
73
Tarenaya longicarpa 1
Tarenaya hassleriana
Tarenaya curvispina
Tarenaya sp. nov.
Tarenaya pernambucensis 1
Tarenaya rosea 1
71
Tarenaya rosea 2
Tarenaya horrida
59
Tarenaya bicolor
55
Tarenaya atropurpurea
Cleoserrata paludosa
Cleoserrata
Tarenaya cordobensis
Tarenaya tucumanensis
Tarenaya aculeata 4
52
Tarenaya aculeata 3
72
Tarenaya eosina
Tarenaya guaranitica
Tarenaya aculeata 1
Tarenaya aculeata 2
Tarenaya psoraleifolia
Tarenaya latifolia
Tarenaya afrospina 2
Tarenaya afrospina 1
Tarenaya parviflora 1
88
Tarenaya parviflora 2
63
76
Tarenaya virens
73
Tarenaya siliculifera
69
Tarenaya microcarpa
Tarenaya


Melidiscus giganteus 1
Melidiscus giganteus 2
Melidiscus
A. lechleri 1
C. glandulosa
Cleome chilensis
Podandrogyne mathewsii
Podandrogyne chiriquensis
Podandrogyne decipiens
Cleome longifolia
Andinocleome lechleri 2
Andinocleome pilosa
Andean
Dactylaena boliviensis 2
Dactylaena pauciflora
Dactylaena micrantha
Dactylaena pohliana
Dactylaena microphylla
Physostemon lanceolatum
Mitostylis macrorhiza
Physostemon rotundifolium
Physostemon guianense
Dactylaena
Cleome tenuis
Physostemon humilis
Tenues
Sieruela allamani
Sieruela rutidosperma
Sieruela breyeri
98
89
80
70
59
66
65
89
90
100
69
65
99
100
92
69
0.01

3.2 ARTIGO 2 - TAXONOMIC REVISION OF *TARENAYA* (CLEOMACEAE)[3]

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Abstract A taxonimc revision of the species circumscribed in *Tarenaya* Raf. is presented here. This monophyletic genus comprises 37 species ranging from Mexico to Argentina (except for Chile), in the West Indies, and with one species found in West Africa. We provide detailed descriptions of the genus and the species, an identification key to the species, geographic distribution data and preferred habitats, diagnostic features and morphological comments, as well as pictures, illustrations, and maps of distribution of the species. We also present the designation of 17 lectotypes and one neotype, and 34 new synonyms. Furthermore, a new species endemic to Espírito Santo, Brazil, is described here.

Keywords New World *Cleome*, nomenclature, *Tarenaya*, taxonomy, typification

INTRODUCTION

Tarenaya Raf. is one of the largest genera in Cleomaceae with 37 species distributed predominantly in the Neotropics, from Mexico to Argentina (except for Chile) and with one species found exclusively in West Africa (Soares Neto & al., 2018a). The maintenance of *Tarenaya* as a genus distinct from *Cleome* L. has been corroborated by molecular phylogenetic studies (Feodorova & al., 2010; Patchell & al., 2014; Barret & al., 2017; Soares Neto & al., in prep.).

[3] Os resultados desse capítulo serão submetidos ao periódico *Annals of the Missouri Botanical Garden*

Rafinesque (1838) was one of the pioneers who recognized *Cleome* as having a too broad circumscription and proposed instead the recognition of several genera. Therefore, he described *Tarenaya* based on *Cleome spinosa* Jacq., with *T. spinosa* (Jacq.) Raf. as its type species. At that time, however, botanists ignored Rafinesque's work (Merrill, 1948) and for a long time *Tarenaya* was treated as a synonym of *Cleome*.

Nevertheless, in an attempt to better organize the classification of New World *Cleome* species, Iltis (1952) completed a comprehensive taxonomic treatment for those species and proposed seven sections of *Cleome*, including the section *Tarenaya*, comprising 24 species and 22 subspecies characterized by the presence of spines, prickles and seeds characteristics, as one of those. However, this taxonomic treatment was never published. In it, he presented the problems of synonymy and typification, description of species, described taxonomic complexes, as well as furnished the description of several new species for section *Tarenaya*, which were only published many years later (Iltis 1998, 2005a, 2005b; Soares Neto & al., 2018b; Soares Neto & al., submit.).

Cleome sect. *Tarenaya* (Raf.) Iltis was used informally in local taxonomic treatments for Flora Malesiana (Jacobs, 1960), and for the revision of Brazilian *Cleome* species (Costa-e-Silva, 2000). The section was cited in the description of new species as *C. afrospina* Iltis (Iltis, 1967), *C. torticarpa* Iltis & T. Ruiz Zapata (Iltis & Zapata, 1997) and *C. costaricensis* Iltis (Iltis, 2005a). However, the section was formalized only in 2005, when Iltis described *C. boliviensis* (Iltis, 2005b), including 40 New World species and one African species, but not presenting any formal circumscription.

Phylogenetic molecular studies aiming to understand the relationships within Cleomaceae, have demonstrated that *Cleome* is not monophyletic (Hall & al., 2002; Hall, 2008; Inda & al., 2008; Feodorova & al., 2010; Riser & al., 2013; Patchell & al., 2014). Based on it, some species recognized under *Cleome* s.l. were transferred to reestablished genera and other segregated from *Cleome* as part of the purpose of a modern taxonomic treatment for Cleomaceae (Patchell & al., 2014; Roalson & al., 2015; Barret & al., 2017; Roalson & Hall, 2017; Thulin & Roalson, 2017). This deconstruction of *Cleome* s.l. has begun with a local floristic treatment for Flora of North America (Iltis & Cochrane, 2007; Tucker & Vanderpool, 2010), and for this treatment *Tarenaya* was reestablished including *T. spinosa* and *T. hassleriana* (Chodat) Iltis.

The more comprenhensive phylogenetic studies (Feodorova & al., 2010; Patchell & al., 2014; Barrett & al., 2017) recognized in Cleomaceae a supported clade named as *Tarenaya*. Based on the samples included in those studies, this clade comprises species sharing a pair of spines at base of petioles, delimited yet under *Cleome* s.l., *Tarenaya* and *Hemiscola* Raf, another Neotropical genus reestablished by Iltis & Cochrane (2007). Therefore, *Tarenaya* was recognized as not monophyletic because species of *Hemiscola* were nested within the genus, and the inclusion of these species into a broad concept of *Tarenaya* was proposed (Patchell & al., 2014; Arana & Oggero, 2016; Soares Neto & al., 2018b).

Based on this broad generic concept, more three species were transfered to *Tarenaya* in the taxonomic treatment of Flora Mesoamericana (Iltis & Cochrane, 2014, 2015): *T. costaricensis* (Iltis) Iltis, *T. longipes* (DC.) Iltis and *T. parviflora* (Kunth) Iltis. Afterwards, Arana & Oggero (2016) made three new combinations for Flora of Argentina: *T. cordobensis* (Eichler & Griseb.) Arana & Oggero, *T. lilloi* (S.A. Gómez) Arana & Oggero and *T. tucumanensis* (Iltis) Arana & Oggero. More recently, two new species, previously recognized but never published, were described for Brazil (Soares Neto & al., 2018b): *T. curvispina* M.B. Costa-e-Silva & Iltis ex Soares Neto & Roalson and *T. pernambucensis* Iltis & M.B. Costa-e-Silva ex Soares Neto & Roalson.

Based on the species included in previous phylogenetic studies (Patchell & al., 2014) and on the morphological dataset analyzed to develop this taxonomic revision, Soares Neto & al. (2018a) made 25 new combinations in *Tarenaya*. Furthermore, two new species are being described for the genus (Soares Neto & al., submit). So, the currently circumscription of *Tarenaya*, recognized as a monophyletic genus (Soares Neto & al., in prep.), comprises 37 species.

We present here a comprehensive monograph for *Tarenaya* following its current circumscription (Soares Neto & al., 2018a; Soares Neto & al., in prep.), including detailed morphological descriptions, synonymy, typification, geographic distribution maps, photoghraphs, illustrations and an identification key for the species of the genus.

MATERIAL AND METHODS

This revision is based on observations of populations in their habitats made during field expeditions and the analysis of circa of 6000 specimens, including type material, from the following herbaria: ALCB, ASE, BHCB, CEPEC, CVRD, EAC, ESAL, FLOR, HUEFS, HUESB, IAC, ICN, IPA, JPB, MBM, MBML, MO, NY, PACA, PEUFR, R, RB, TEPB, UESC,

UFRN, UPCB, VIES, WIS (acronyms according to Thiers [continuously updated]), and HST, not indexed. Images of types examined online were consulted on Jstor Global Plants (https://plants.jstor.org/). Types examined in person are noted with exclamation marks and those only examined online are noted as [image!], with barcode number when available. All the specimens examined are presented in the list of exsiccatae (Appendix 1).

The selected specimens examined represent the morphological variation and geographic range of each species. Vernacular names and uses are presented when that information is present on the specimen label or in the literature. Morphological nomenclature follows Radford & al. (1974), Harris & Harris (2000) and Stearn (2004). The abbreviation of the names of the authors and the original works follows The International Plants Names Index (IPNI) (www.ipni.org). Descriptions of seeds of *Tarenaya costaricensis* and *T. torticarpa* were based on the species protologue's (Iltis & Zappata, 1997; Iltis 2005a).

Distributions maps were elaborated using QuantumGis 2.18. Geographical coordinates were obtained from herbarium specimens. For those specimens without geographical coordinates, we determined the coordinates from the tools GeoLoc (http://splink.cria.org.br/geoloc) and Specimen Geographic Search (http://www.tropicos.org/SpecimenGeoSearch).

RESULTS AND DISCUSSION

DISTRIBUTION AND HABITATS

Tarenaya species are distributed predominantly in the Neotropical region, occurring from Mexico, Central America to Argentina, except for Chile, and in the West Indies (Figure 1). The major diversity of species is in South America, mainly in Brazil (22 species), Argentina, Bolivia, and Paraguay (9 species each).The only species distributed in Africa occurrs in Cameroon, Central African Republic, Gabon and Nigeria and would have originated circa six millions years ago, reaching the African continent by long-dispersal events, with ducks as possibly dispersors (Iltis, 1967, Soares Neto & al., in prep.). The species can be found from sea level as *Tarenaya rosea* to 3500 m high as *T. boliviensis*. The species occur commonly in decidual and semidecidual forests, border of woods, gallery forests, along rivers, under rocks, in restingas and roadsides. *Tarenaya aculeata* is a weed in the Old World. *T. hassleriana* is worldwide cultivated as ornamental in botanical gardens around the world. Some species as *T. boliviensis, T. curvispina,* and *T. longicarpa* are agricultural invaders. *T. aculeata* e *T.*

longicarpa are commonly found in anthropized areas. *T. latifolia*, *T. virens*, and the widespread *T. parviflora* are distributed in the Amazon, in *terra firme*, *várzea*, and *igapó* forests.

TAXONOMIC TREATMENT

Tarenaya Raf., Sylva Tellur., 111. 1838. TYPE: *Tarenaya spinosa* (Jacq.) Raf.

Hemiscola Raf., Sylva Tellur., 111. 1838. TYPE: *Hemiscola aculeata* (L.) Raf.

Scolosperma Raf., Sylva Tellur. 111., 1838. TYPE: *Scolosperma dendroides* (Schult.f.) Raf.

Lianoides Kuntze, Lex. Gener. Phaner. 129. 1903. nom. nud., nom. inval.

Neocleome Small, p.p., Man. S.E. Fl. 577. 1933. TYPE: *Neocleome spinosa* (Jacq.) Small.

Cleome sect. *Tarenaya* (Raf.) Iltis, Novon 15: 146. 2005.

Annual or perennial herbs to subshrubs or shurbs or rarely scandent shrubs; stems and braches puberulent, pubescent or glandular-puberulent, glandular-pubescent, glandular-pilose, velutinous, hirsute, pilose, glabrescent to glabrous. A pair of spines, known the stipular spines, at base of petioles; spines straight or curved, lacking in some individuals or absent as in *T. crenopetala*, *T. inermis* and *T. siliculifera*. Leaves alternate, palmately-compound 3–9(–12)-foliolate; petiolate, petioles covered by an indumentum or glabrous, unarmed or armed with slender or stout prickles; leaflets sessile or petiolulate; margin entire, ciliate, serreate, serrulate or sinuose; midrib and secondary veins glabrous or with an indumentum, without or with prickles on it abaxially. Racemes, corymbiform racemes or panicles (only in *T. longipes*), terminal and/or axillary; bracts subtending each flower or bracts subtending the lower flowers leaf-like, with 3–5-leaflets becoming 1-foliolate or filiform, caducous (in *T. longipes*) or absent (in *T. virens*); petioles without or with a pair of prickles at base. Flowers zygomorphic, tetramerous, pedicelates; sepals free, reflexed, may be persistent in fruit, greenish; petals unguiculate, unilateral and ascending or erect in open flower, all petals of same color or two pair of each color, cream, white, white at base becoming pink or purple at apex, yellow or yellow-greenish, green with yellowish hue, pink, deep pink, purple, purplish, purple at base becoming white at apex, red. Androgynophore enrolled by an annular nectary. Nectary fleshy or not, persistent or not in fruit. Stamens 6, elongated by the androgynophore; filaments glabrous, purple, purplish, wine, green or white; anthers dorsifixed, yellow. Ovary glabrous or covered by an indumentum when young, elongated by a long or short gynophore; style not elongated or when eloganted persistent in fruit; stigma sessile or elongated by the the style, capitate, truncated, discoid or not expanded. Capsules cylindric, fusiform, ellipsoid, oblongoid,

obovoid or oblanceoloid, slightly moniliform, greenish or purple; elongated by short to long stalks reported as gynophore. Seeds horseshoes-shaped longitudinally striate, transversely ridged with hard excrescence; cleft covered by a thin membrane; dry, or sometimes covered by a white aril or oil-filled cells.

Key to the species of *Tarenaya*

1a. Scandent subshrub to shrub or treelet; flora bracts filiform, caducous or absent; petals yellow, yellow-greenish, green with yellowish hue

2a. Stipular spines curved; midrib and secondary veins glabrescent, with prickles; style not elongated; gynophore 130–300 mm long ……...…… 23. ***T. longipes***

2b. Stipular spines straight; midrib and secondary veins glabrous, without prickles; style 1–5 mm long, persistent in fruit; gynophore (5–)10–25 mm long ……. 36. ***T. virens***

1b. Herb, subshrub or subshrub; floral bracts ovate, large-ovate, cordate, orbicular, suborbicular, oblong-elliptic, lanceolate, elliptic or oblanceolate; petals cream, white, white very faintly purple-tinged, white at base becoming pink at apex, white at base becoming purple at apex, white to dark pink to reddish strips or spots at apex, pink, deep pink-purple, purple, purplish, purple at base becoming pink at apex, red

3a. Stipular spines absent

4a. Racemes terminal; filaments 6–9 mm long; anthers 1 mm long; style 1 mm long, persistent in fruit; capsules 2–2.5 mm long, ellipsoid to obovoid, inflated, glabrous ……..…… 30. ***T. siliculifera***

4b. Corymbiform racemes terminal; filaments 10–30 mm long; anthers 2–4 mm long; style not elongated; capsules (13–)23–55 mm long, fusiform or cylindric, puberulent, glandular-puberulent to glabrescent

5a. Pedicels 10–12(–15) mm long; petals suborbicular, 3–4 × 2–3 mm; nectary disciform; capsules fusiform ……..… 10. ***T. crenopetala***

5b. Pedicels 18–22 mm long; petals elliptic to oblanceolate, 8–10 × 2–2.5 mm; nectary conic; capsules cylindric ……..…… 19. ***T. inermis***

3b. Stipular spines straight, curved, slightly curved at apex, sometimes lacking, or very short, almost inconspicuous or inconspicuous

6a. Branches velutinous to pilose or pubescent to glandular-pubescent, covered with many short slender to stout prickles throughout

7a. Branches velutinous to pilose; leaves 7–9(–12)-foliolate; petioles unarmed; pedicels 20–29 mm long; filaments 60–70 mm long; anthers 10–12 mm long … 3. ***T. atropurpurea***

7b. Branches pubescent to glandular-pubescent, covered with many short slender to stout prickles throughout; leaves 3–5-foliolate; petioles armed with slender prickles; pedicels 45–55 mm long; filaments 25–40 mm long …… 34. ***T. trachycarpa***

6b. Branches puberulent, glandular-puberulent, pubescent, glandular-pubescent, glandular-pilose, hirsute to glabrescent or glabrous

8a**.** Leaves 3-foliolate

9a. Branches glabrescent to glabrous; margin of leaflets long-ciliate to serreate-ciliate; style elongated, 1–2 mm long, persistent in fruit; stigma not expanded; capsules cylindric or fusiform, twisted 1-2 times; endemic to Falcón, Venezuela ……...…...… 33. ***T. torticarpa***

9b. Branches glandular puberulent to puberulent indumentum; margin of leaflets entire, ciliate or slightly sinuose; style not elongated; stigma discoid, capitate or strongly capitate; capsules slightly moniliform or straight; ranging from Mexico to Argentina

10a**.** Petioles unarmed; nectary disciform; gynophore 1–10 mm long or not elongated …… 1. ***T. aculeata***

10b. Petioles discreetly armed to armed, rarely unarmed; nectary conic; gynophore 12–48 mm long

11a. Leaflets lanceolate to elliptic or oblanceolate-elliptic, apically acuminate; capsules puberulent; Venezuela, Guiana, French Guiana, Suriname, north of Brazil ……. 20. ***T. latifolia***

11b. Leaflets ovate to elliptic, apically acute; capsules glabrous; Bolivia, Argentina and Paraguay

12a. Filaments 13–15 mm long; capsules fusiform; gynophore 12–15(–25) mm long; occurs in Bolivia, Argentina and Paraguay …… 8. ***T. cordobensis***

12b. Filaments 27–43 mm long; capsules cylindric; gynophore 40–48 mm long; endemic to Paraguay…..……..…….. 15. ***T. guaranitica***

8b. Leaves 3–7-foliolate

13a. Petals 30–33 × 8–12; filaments 95–110 mm long ……..... 21. ***T. lilloi***

13b. Petals 1.5–25 × 0.5–10 mm; filaments 1–75 mm long

14a. Nectary disciform

15a. Sepals 1–2.5 × 0.5–1.5 mm

16a. Filaments 10–16 mm long; capsules 47–80 mm long …… 25. ***T. parviflora***

16b. Filaments 1–7 mm long; capsules 13–40 mm long

17a. Stipular spines curved; margin serrulate-ciliate; margin of sepals minutely serrulate; capsules oblongoid to oblanceoloid …… 11. ***T. curvispina***

17b. Stipular spines straight, sometimes lacking; margin entire, ciliate; margin of sepals ciliate; capsules cylindric, ellipsoid to fusiform

18a. Nectary conspicuous fleshy; petals white; filaments 6–7 mm long; gynophore 7–20 mm long ……..…. 4. ***T. bernadetiana***

18b. Nectary inconspicuous fleshy; petals white to purple or purple; filaments 2–5 mm long; gynophore 1–5 mm long

19a. Style 2 mm long, persistent in fruit; capsules ellipsoid to fusiform ……. 24. ***T. microcarpa***

19b. Style not elongated; capsules cylindric ……... 26. ***T. pernambucensis***

15b. Sepals 3–6 × 0.5–1 mm

20a. Petals red; style 1–2 mm long; capsules cylindric; Cuba ….…… 18. ***T. houstonii***

20b. Petals white; style not elongated; capsules fusiform; Brazil and Parguay

21a. Petioles unarmed; margin of leaflets entire to slightly serrulate-ciliate; floral bracts sometimes with a pair of prickles at base of petioles; sepals puberulent abaxially; petals oblanceolate to spathulate; stigma capitate ……... 12. ***T. diffusa***

21b. Petioles discreetly armed; margin of leaflets entire, ciliate; floral bracts without a pair of prickles at base of petioles; sepals puberulent on both sides; petals oblong-elliptic; stigma not expanded ……...……. 14. ***T. eosina***

14b. Nectary conic

22a. Style short elongated, 1–2 mm long

23a. Margin of leaflets entire, ciliate; filaments 6–10 mm long; capsules 25–30 mm long; gynophore 6–8 mm long ……. 28. ***T. regnellii***

23b. Margin of leaflets sinuose-ciliate to serrulate-ciliate; filaments (17–)20–30 mm long; capsules 50–90 mm long; gynophore 10–25 mm long

24a. Midrib and secondary veins glabrous, with prickles; leaflets with petiolules 2–3 mm long; sepals 2.5–3 × 1 mm; pedicels 17–19 mm long, glabrescent; nectary conspicuous fleshy, persistent in fruit ……. 27. ***T. psoraleifolia***

24b. Midrib and secondary veins puberulent-glandular; without prickles; leaflets sessile; sepals 5–7 × 1 mm; pedicels 16–27, densely puberulent; nectary inconspicuous fleshy, not persistent in fruit ……. 37. ***T. werdermannii***

22b. Style not elongated

25a. Petioles unarmed

26a. Petals 9–20 × 4–8 mm; filaments 35–50 mm long; anthers 8–12 mm long; capsules 110–195 mm long; gynophore 45–70 mm long ..... 22. ***T. longicarpa***

26b. Petals 6–10 × 2–4 mm; filaments (15–)19–35 mm long; anthers (2.5–)3–5 mm long; capsules 30–87 mm long; gynophore (13–)15–40 mm long

27a. Branches glabrous; capsules cylindric; gynophore (13–)15–25 mm long …….. 29. ***T. rosea***

27b. Branches densely glandular-puberulent to glabrescent; capsules ellipsoid to fusiform; gynophore 30–40 mm long ……...….. 35. ***T. tucumanensis***

25b. Petioles armed or rarely unarmed

28a. Margin of leaflets minutely serrulate-ciliate

29a. Sepals 7–10 × 1–1.5 mm; filaments green; stigma strongly capitate; capsules (35–)47–120 mm long, slightly curved, puberulent to glabrescent; Bolivia and Peru ……...……...…. 6. ***T. boliviensis***

29b. Sepals 5–7 × 1 mm; filaments wine; stigma discoid; capsules 50–100 mm long, glabrous; Brazil, Paraguay and Argentina …… 16. ***T. hassleriana***

28b. Margin of leaflets ciliate, serrate or serrulate-ciliate

30a. Midrib and secondary veins without prickles

31a. Nectary conspicuous fleshy, persistent in fruit ……. 13. ***T. domingensis***

31b. Nectary inconspicuous fleshy, obsolete in fruit

32a. Filaments 40–52 mm log; anthers 10–12 mm long; capsules fusiform (32–)50–55 mm long, fusiform; Mexico ……... 7. ***T. chapalensis***

32b. Filaments 21–33 mm long; anthers 6–9 mm long; capsules 50–120 mm long, cylindric; Mexico, Central America, Colombia, Venezuela, Ecuador and West Indies ……. 31. ***T. spinosa***

30b. Midrib and secondary veins with prickles

33a. Petioles of floral bracts without a pair of prickles at base

34a. Pedicels 22–42 mm long; sepals 6–7 × 1–1.5 mm; filaments 25–50 mm long; West Africa ……... 2. ***T. afrospina***

34b. Pedicels 11–18 mm long; sepals 2–3(–3.5) × 0.5–1 mm; filaments (9–)15–21 mm long; Brazil ……. 5. ***T. bicolor***

33b. Petioles of floral bracts with a pair of prickles at base or sometimes with a pair of prickles at base

35a. Filaments 25–60 mm long; capsules fusiform 37–50 mm long ……..… 32. ***T. titubans***

35b. Filaments 7–12 mm long; capsules cylindric 80–145 mm long

36a. Pedicels 17–22 mm long; filaments 25–30 mm long; gynophore 20–25 mm long; Costa Rica and Panama ……. 9. ***T. costaricensis***

36b. Pedicels 32–40 mm long; filaments 50–60 mm long; gynophore 50–60 mm long; Brazil …….. 17. ***T. horrida***

1. **Tarenaya aculeata** (L.) Soares Neto & Roalson, Acta Bot. Brasil. 32: 541. 2018. *Cleome aculeata* L., Syst. Nat., ed. 12. 3: 232. 1768. *Hemiscola aculeata* (L.) Raf., Sylva Tellur. 111. 1838. TYPE: Habitat in America, *D. Zoega s.n.* (lectotype: BM-LINN 850.17 [image!], designated by Al-Shehbaz, in Howard, R.A. (ed.), Fl. Lesser Antilles 4: 301. 1988).

Cleome affinis DC., Prodr. 1: 241. 1824. TYPE: [BRAZIL. Rio de Janeiro, *G. Banks & D.C. Solander s.n.*] (holotype: BM 000573978 [image!]).

Cleome triphylla Vell., Fl. Flumin. 272. 1829[“1825”], nom. ileg. hom., non *Cleome triphylla* L. 1763. TYPE: BRAZIL. (lectotype, designated here: tab. 113., in Fl. Flumin. Icon. 6. 1831[“1827”]).

Cleome malhadensis Mart. ex Schult. & Schult.f., Syst. Veg. ed. 15 bis [Roemer & Schultes] 7(1): 43. 1829. TYPE: [BRAZIL]. [Bahia], [Malhada] flumen S. Francisci prope Malhada provinciae Bahiensis, *C.F.P. von Martius s.n.* (lectotype, designated here: M-0240927 [image!]; isolectotypes: M-0240928 [image!], M-0240929 [image!], WIS v 0259056!).

Cleome fugax Schrad., Ind. Sem. Hort. Gotting. 1830. TYPE: Cultivated, *M. Fischer s.n.* (holotype: GOET005860 [image!]).

Cleome surinamensis Miq., Linnaea 18: 239. 1845. TYPE: SURINAME. October, *H.C. Focke 555* (holotype: U 0239085 [image!]).

Cleome potosina B.L. Rob., Proc. Amer. Acad. Arts 27: 165. 1892. TYPE: MEXICO. San Luis Potosi, Tamasopo Cañon, June 1890, *C.G. Pringle 3538* (holotype: GH 00042306 [image!]; isotype: VT UVMVT024481 [image!]). **syn. nov.**

Cleome sinaloensis Brandegee, Zoë 5(10): 198. 1905. TYPE: MEXICO. Sinaloa, Collected in the vicnity of Culiacan, 16 October 1904, *T.S. Brandegee s.n.* (holotype: UC 83263 [image!]; isotypes: GH 00042310 [image!]).

Herb 0.5–0.6 m tall or subshrub to more than 1 m tall; branches glandular-puberulent throughout. Stipular spines (0.5–)2–3 × 1.5–2 mm, straight, sometimes lacking or very short, almost inconspicuous. Leaves 3-foliolate; petioles 1.7–6.5 cm long, glandular-puberulent, unarmed; leaflets ovate to lanceolate, elliptic to rhombic, basally cuneate, apically acute to

acuminate, margin entire, ciliate; surfaces with scattered short pointed eglandular hairs to glabrous on both sides; midrib and secondary veins glabrous, without prickles; the central leaflet 1.7–6.3 × 1–2.5 cm, the other 1.2–4.2 × 0.6–2.4(–3) cm; petiolule 0.5–2(–3.5) mm long, glandular-puberulent, unarmed. Racemes terminal and/or axillary, 4.5–13 cm long. Floral bracts 10–23 × 5–10 mm, ovate, basally obtuse, apically acute, glabrescent, margin ciliate; petioles 3–8 mm long, puberulent. Pedicels 15–28 mm long, glabrescent. Sepals 2.5–3 × 0.5–1 mm, triangular to lanceolate, apically acuminate, margin ciliate, puberulent abaxially. Petals 3.5–5 × 2–2.5 mm, spathulate, apically rounded to obtuse, glabrous, white. Nectary disciform, inconspicuous fleshy, obsolete in fruit. Filaments 3.5–7 mm long, purple; anthers 1–3 mm long. Ovary 3.5–4.5 mm long, cylindric, glabrescent to glabrous; style not elongated; stigma sessile, capitate. Capsules 22–69 mm long, cylindric, slightly moniliform, glabrous; gynophore 1–10 mm long or not elongated, glabrous. Seeds 2–2.5 × 1–1.5 mm, subcochlear, longitudinally striate, transverse ridges apically covered by simple hairs; cleft covered by a thin membrane; white aril connecting the claws of seeds. Figure 2A–B.

***Phenophase*.** Flowers and fruits throughout the year.

***Distribution and habitat*.** Species a widely distributed weed through the Neotropics and the Old World tropics (Figure 3). Found in tropical deciduous forests, thorn forests, forest edges, roadsides, disturbed areas, rock outcrops, river banks, savannas, periodically flooded forests, gallery forest, sandy dunes and restingas.

***Vernacular names*.** In Brazil it is called "cecê" (*M.J.S. Lemos 66*); "erva de rato" (*D.A. Folli 3782*), "marambê (pequeno)" (*F.J.A. Matos s.n.*-EAC 17108), "muçambezinho" (*F.C.S. Oliveira et al 234*). In Paraguay "rabanito kokue" (*M. Bolson 249*). In Venezuela "bruca" (*R.L. Liesner 6844*).

Nomenclatural notes. We are designating the illustration presented by Velloso in *Flora Fluminensis* (1829) as the lectotype of *Cleome triphylla* because there are no extant specimens of Velloso's type material. The 3-foliolate leaves, details of fruits highlighting the variation of sessile to fruits elongated by a short stalk and the arillate seed are good characters to identify this species.

No specimens were clearly designated as type for *Cleome malhadensis* when proposed by either Martius or Schults & Schults f. The specimen M-0240927 is being designated as the lectotype because it bears diagnostic characters clearly identifying this species.

Discussion. *Tarenaya aculeata* is recognized by its 3-foliolate leaves, the ovate to lanceolate, elliptic to rhombic leaflets and the cylindric, slightly moniliform capsules. The stipular spines, when present, show a large variety in their size. Furthermore, the length of the gynophore also varies, from sessile, or short, to elongate capsules as can be found in Mexico, Paraguay, Bolivia, and in some Brazilian populations. The specimens found in Argentina and Paraguay present a densely hair-covering and flowers with larger petals and longer capsules than the typical specimens. This large morphological variation associated with a broadly geographic distribution had resulted in the application of many different names to this taxon. Also, unpublished infraspecifc names proposed by Iltis (1952) are commonly found on sheet labels in many herbaria, leading to more confusion.

Specimens Selected. ARGENTINA. **Chaco:** 1° de Mayo, Colonia Benítez, Dec 1930, *A.G. Schulz 424* (WIS). **Corrientes:** Mburucuyá, Estancia Santa Teresa,12 Dec 1950, *T.M. Pedersen 897* (NY). **Formosa:** Patiño, 15 km N del cruce entre ruta 95 y 81, por ruta 95, 29 Mar 1992, *R.H. Fortunato et al. 3356* (MO). **Jujuy:** Ledesma, entre Rio de Aguas Negras y Calilegua, 20 Jan 1994, *J. Hunziker et al. 12747* (MBM); Santa Bárbara, camino a Águas Calientes, 14 Dec 1986, *F. Zuloaga et al. 2871* (MO). **Salta:** Anta, 19 Feb 1937, *J. West 8388* (MO); Orán, camino de General Ballivan a Río Seco, 10 Dec 1986, *F. Zuloaga et al. 2661* (MO). **San Luis:** Libertador General San Martín, 32°18'26"S 65°41'27"W, 21 Feb 2010, *F.O. Zuloaga et al. 12129* (MO). BOLÍVIA. **Beni:** Ballívan, espiritu en la zona de influencia del rio Vacuma, 18 Aug 1985, *St.G. Beck 5682* (MO); Iténez, Buen Retiro, Rio Blanco, 20 Dec 1947, *R. Scolnik & R. Luti 679* (WIS); Vaca Diez, E side of Riberalta, 11°00'S 66°05'W, 15 Sep 1981, *J.C. Solomon 6272* (MO). **Chuquisaca:** Hernando Siles, Huacareta, 20°19'09"S 64°03'03"W, 28 Dec 2005, *M. Serrano et al. 7034* (MO, WIS). **La Paz:** Abel Iturralde, San Buenaventura, 14°26'20"S 67°32'11"W, 16 Dec 2003, *A. Fuentes 6167* (MO); Nor Yungas, Caranavi, grounds of the Hotel Prefectural, 15°44'S 67°35'W, 30 Oct 1984, *J.C. Solomon & M. Nee 12615* (MBM, MO); Sud Yungas, 2 km N of center of Chulumani, along road to Irupana, 16°23'S 67°31'W, 28 Sep 1985, *M. Nee & J. Solomon 32004* (NY). **Pando:** Nicolas Suaréz, 18 Oct 1988, *St.G. Beck 17108* (WIS). **Santa Cruz:** Andrés Ibáñez, 13 km (by air) NE of Cotoca, 17°41'S 62°55'W, 18 Dec 1992, *M. Nee 43142* (NY); Chiquitos, Serranias, Sansas, 17°50'S 59°45'W, 9 Nov 1997, *F. Mamani & A. Jardim 1143* (MO, WIS); Cordillera, canal al frente del Restaurant Urkupinã, 18°47'24"S 63°18'57"W, 5 Aug 2001, *A.L. Sánchez & A. Fuentes 1137* (MO, NY); Ichilo, a 800 km W de Buena Vista, camino hacia Cairo, 17°27'49"S 63°40'33"W, 21 Jun 2001, *A.L. Sánchez & F. Morales 1117* (MO, NY); Nuflo de Chaves, Estancia San Miguelito, 17°4'S

61°47’W, 30 Nov 1995, *A. Fuentes 1323* (MO). BRAZIL. **Alagoas:** Maceió, praia de Ponta Verde, 30 Sep 1972, *M. Ataíde 68* (EAC, IPA). **Amapá:** Macapá, Museu Costa Lima, 18 Nov 1979, *D.F. Austin et al. 7449* (RB). **Amazonas:** Canumã, E side of rio Canumã, 4°2’S 59°4’W, 28 Jun 1983, *S.R. Hill et al. 12893* (NY); Manaus, Escola Agrotécnica Federal de Manaus, 29 Nov 2008, *V.F. Kinupp et al. 3469* (RB). **Bahia:** Feira de Santana, 14 May 1984, *M.J.S. Lemos 66* (HUEFS); Ilhéus, área do CEPEC, 12 Aug 1978, *S.A. Mori 10407* (CEPEC, NY); Itacaré, 17 Apr 1970, *T.S. Santos 731* (CEPEC, WIS); Salvador, próximo a divisa com Lauro de Freitas, dunas do aeroporto, 11 Jun 1986, *M. Luceño et al. 64* (IPA, TEPB); Santa Cruz de Cabrália, Área da Estação Ecológica do Pau-Brasil, 13 Nov 1985, *F.S. Santos 527* (CEPEC, UFRN); Uruçuca, área da EMARC, Reserva Gregório Bondar, 14°36’8”S 39°16’27”W, 23 Sep 2000, *S.C. Sant’Ana et al. 978* (CEPEC, NY). **Ceará:** Fortaleza, Papicu, 1 Feb 1991, *F.J.A. Matos s.n.* (EAC); Ubajara, Chapada da Ibiapaba, 28 Jun 1980, *A. Fernandes & Matos s.n.* (EAC). **Espírito Santo:** Linhares, 19 Dec 2000, *D.A. Folli 3782* (CVRD); Vitória, Reserva Ecológica de Camburi, 21 Jan 1998, *A.M. Assis 361* (UFRN, VIES). **Goiás:** Piranhas, 22 Jun 1966, *H.S. Irwin et al. 17574* (MBM, MO). **Maranhão:** Barra do Corda, village of Copaíba, 5°28’S 45°34’W, 12 Jan 1970, *G. Eiten & L.T. Eiten 10290* (NY); Pastos Bons, 26 Km da cidade na BR 230 em direção a São Domingos de Azeitão, 6°41’45”S 44°12’21”W, 26 Jan 2012, *R.M. Harley et al 56484* (HUEFS). **Mato Grosso:** Aquidauana, Dec 1931, *R. Reiss s.n.* (NY); Poconé, Distrito de Pirizal, Baía dos Cavalos, 8 Nov 2002, *P.H.A. Melo & F.A. Carvalho 151* (BHCB); Rio Verde, Serra da Pimenteira, 12 Nov 1973, *G. Hatschbach & C. Koczicki 33143* (MBM, WIS). **Mato Grosso do Sul:** Corumbá, 15 Sep 1984, *V.J. Pott 43* (CGMS, PEUFR); Porto Esperança, cerca de 70 km de Corumbá, 29 Oct 1993, *M.A. da Silva & V.L. Klein 1903* (RB). **Minas Gerais:** Araxá, Barreiro, 22 Nov 1943, *G.M. Magalhães 5434* (BHCB); Governador Valadares, 23 Sep 1941, *G.M. Magalhães 788* (BHCB). **Pará:** Belém, 26 Aug 1983, *T.S.M. Grandi 1441* (BHCB); Óbidos, 11 Sep 1928, *A.J. Sampaio 19014* (R, WIS); Tucuruí, 3 Oct 1983, *J. Revilla et al. 8475* (NY). **Paraíba:** João Pessoa, Jardim Botânico, 7°6’S 34°52’W, 24 Aug 2006, *P.C. Gadelha Neto et al. 1576* (JPB); Mataraca, Millenium Inorganic Chemicals Mineração LTDA, 6°29’37”S 34°58’43”W, 26 Sep 2007, *P.C. Gadelha Neto et al. 1829* (JPB). **Pernambuco:** Barra de Guabiraba, Cachoeira do Galo, 20 Oct 1998, *M.F.A. Lucena 695* (PEUFR); Goiana, entrada para a cidade de Ponta de Pedra, 16 Jun 1998, *A. Laurênio et al. 1080* (PEUFR); Igarassu, Borda do Fragmento, 7°48’30”S 34°58’49”W, 18 Dec 2009, *E. Pessoa & J.A.N. Souza 237* (JPB); Nazaré da Mata, Engenho Alcaparra, 5 Jun 1997, *A. Laurênio et al. 643* (PEUFR); Paulista, 27 Oct 1999, *M.B. Costa-e-Silva 1533* (WIS); Recife, Dois Irmãos, *Campus* da UFRPE ao lado do laboratório de Ecologia, 28 Nov 1994, *M.B. Costa*

e Silva 296 (PEUFR). **Piauí:** Cocal, Gameleira, 23 Feb 2003, *E.M.F. Chaves 157* (TEPB); Oeiras, Brionia, 19 Jan 2008, *F.C.S. Oliveira 234* (IPA, TEPB); Teresina, *Campus* da Ininga, 27 Mar 1979, *F.M.T. Freire s.n.* (TEPB); Uruçuí, Próximo ao Rio Uruçuí, 21 Jan 2005, *A.M. Miranda et al. 4686* (TEPB). **Rio de Janeiro:** Jardim Botânico do Rio de Janeiro, Gávea saída para o Shopping Gávea, 18 Oct 1996, *M.B. Costa e Silva 1276* (PEUFR); Niterói, Prainha, 9 Jan 1894, *J. Vidal et al. 61624* (R, WIS). **Rio Grande do Norte:** Natal, Campus UFRN, 3 Jul 2002, *M.I.B. Loiola 745* (UFRN). **Rondônia:** Pimenta Bueno, estrada do rio Pimenta Bueno, Km 11, 12°45'S 60°10'W, 8 Nov 1979, *M.G. Vieira et al. 1038* (NY); Porto Velho, arredores de Porto Velho, 4 Jan 1941, *L.P. Xavier s.n.* (JPB). **Roraima:** Taiano Village, 65km NW of Boa Vista, 11 Oct 1977, *L. Coradin & M.R. Cordeiro 598* (NY, WIS). **Sergipe:** São Cristóvão, Campus Universitário, 17 Aug 1983, *G. Viana 718* (ASE); Santa Luzia do Itanhy, Mato do Castro, 11°22'38"S 37°25'46"W, 22 May 2013, *L.A. Gomes et al. 1071* (ASE, JPB). **Tocantins:** Paranã, Rio Paranã, 10 Nov 1991, *G. Hatschbach et al. 56053* (MBM, MO). COLOMBIA. **Valle:** Cali, Avenida Simón Bolívar, 23 Oct 1986, *A. Silverstone-Sopkin 2457* (WIS). DOMINICA. **Saint George:** Goodwill, 29 Apr 1965, *C.A. Shillingford 230* (MO); Roseau Valley, 1903, *F.E. Lloyd 552* (NY); Shore road from Roseau to Canefield, 5 Aug 1938, *W.H. Hodge 430* (NY). **Saint John:** West Cabrit, hills north of Prince Rupert Bay, 28 Mar 1956, *A.C. Smith 10330* (NY). DOMINICAN REPUBLIC. **San Cristobal:** Boruga (de San Cristobal), 11 km N of main plaza of San Cristobal on road to Medina, 18°28'N 70°07W, 15 Jan 1981, *M. Mejía et al. 10338* (MO). **Santo Domingo:** Santo Domingo, Dec 1909, *H. von Türckheim 2635* (NY). ECUADOR. **Guayas:** Guayaquil, 2°11'S 79°53'W, 15 Jun 1999, *X. Cornejo & C. Bonifaz 6862* (WIS). FRENCH GUIANA. **Cayenne:** Montjoly, 8 km of Cayenne, 4°55'N 52°17'W, 29 Jan 1978, *A.J.M. Leeuwenberg 11672* (NY); Ville de Cayenne, 15 Aug 1961, *R. Schnell 11192* (NY). **Iracoubo:** Route Cayenne-St. Laurent, PK 128, entre Trou Poisson et Iracoubo, 27 Dec 1986, *G. Cremers 9533* (NY). **Mana:** Estuaire de la Mana, 5°40'S 53°47'W, 14 Apr 1989, *G. Cremers & M. Hoff 10606* (NY). GRANADA. St. George, 13 Mar 1905, *W.E. Broadway 1730* (NY). GUADELOUPE. Basse-Terre, 1892, *P. Duss 2276* (MO, NY). GUATEMALA. **Chiquimula:** Chiquimula, Transecto La Hondonada, 14°51'03"N 89°31'08"W, 8 Jul 2003, *M. Véliz & F. Ramirez 13716* (MO). **Peten:** La Libertad and vicinity, Aug-Nov 1933, *M. Aguillar 116* (MO, NY). GUYANA. **Demerara-Mahaica:** Georgetown, in the park called Promenade Gardens, 1919, *A.S. Hitchcock 16952* (NY). HAITI. **Oeste:** Entre Rue Harry Truman et la mere n face de Port-au-Prince, 28 May 1979, *W.G. D'Arcy 13395* (MO, NY). HONDURAS. **Atlantida:** vicinity of La Ceiba, 14 Jul 1938, *T.G. Yuncker et al. 8425* (MO). **Colon:** Alonh highway between Bonito Oriental and La Ceiba, 15°39'N 86°00'W, 9 Feb

1987, *T.B. Croat & D.P. Hannon 64535* (MO); Trujillo, Barrio Cristales, 15°55'N 86°W, 17 Jul 1973, *C. Nelson & J.R. Martínez 1234* (MO). **Cortés:** San Pedro Sula, 22 Aug 1972, *W.G. D'Arcy & J.J. D'Arcy 6875* (MO, WIS). **Comayagua:** Matorrales húmedos del Taladro, Río Selguapa, 27 Jun 1964, *A. Molina 14315* (NY). JAMAICA. **St. Andrew:** Mona, 29 Jan 1968, *C.D. Adams 13061* (MO). MARTINIQUE. Le Prêcheur, 1 km south on coast highway, Jul 1962, *C. Kimber 604* (WIS); Fort de Frence, 23 Jul 1897, *G. Debeaux s.n.* (NY). MEXICO. **Campeche:** Ciudad del Carmen, 12 Apr 1933, *C.D. Mell 2057* (NY). **Chiapas:** Chiapa de Corzo, 30 Apr 1966, *R.M. Laughlin 785* (WIS); Rayón, in the Selva Negra 10 km above Rayón Mezcalapa along road to Jitotol, 13 Jul 1972, *D.E. Breedlove 26137* (MO); Tapachula, Sochimilco, 23 Jul 1984, *E. Ventura & E. López 26* (MO). **Jalisco:** La Huerta, Estación de Biología CHAMELA (UNAM), 19°30'N 105°03'W, 10 Oct 1982, *E.J. Lott 1431* (MO). **Oaxaca:** Puerto Ángel, 18 Jul 1910, *C.R. Orcutt 5013* (NY); Santa María Huatulco, Distrito Pochutla, 1 km al norte de la zona hotelera, 15°46'39"N 96°5'36"W, 12 Aug 2003, *M. Elorsa 7039* (MO); Tuxtepec, Chiltepec, 19 Jul 1965, *G.M. Calderón 131* (NY). **Querétaro:** Arroyo Seco, 2 km al NW de Arroyo Seco, 2 Aug 1987, *R. Fernández 4150* (NY); Pinal de Amoles, 2 km east of Ahuacatlán de Guadalupe, along MEX 120, 28 Jun 2001, *V.W. Steinmann & E. Carranza 1720* (MO). **San Luis Potosi:** Santa María del Río, 23 Jun 1954, *Rzedowski 3197* (WIS). **Sinaloa:** 9.2 km E of Villa Union, on Hwy 40, 23°14'N 106°08'W, 18 Aug 1988, *A.C. Sanders et al. 8028* (WIS). **Tabasco:** 10 km SE Villahermosa, 26 Dec 1978, *R. Conway & C.D. Johnson 385* (MO, WIS); El Tulipán, 23 Jul 1984, *F. Ventura 21143* (NY); Teapa, casi frente a Teapa, al otro lado del río, 8 Jul 1983, *F. Ventura 20370* (MO). **Tamaulipas:** Aldama, 25 km NE of Aldama on road to Barra del Tordo, 22 Sep 1981, *P.A. Fryxell 3707* (MO); North of Limon, 15 Jun 1935, *O.M. Clark 6827* (MO); Nuevo Laredo, 6 Sep 1935, *O.M. Clark 6627* (NY). **Veracruz:** Playa Vicente, Cosamaloapan, 16 Aug 1969, *G. Martinéz 1966* (MO); San Andrés Tuxtla, 18°25'N 95°10'40"W, 4 Dec 1981, *M. Nee 23706* (WIS). **Yucatán:** San Anselmo, s.d., *G.F. Gaumer 2060* (MO, NY). MONTSERRAT. Plymouth, 15 Feb 1980, *R.A. Howard & E.S. Howard 19596* (NY). NICARAGUA. **Boaco:** 1 km E of Santa Cruz, W of Teustepe, 12°25'S 85°49'W, 5 Aug 1984, *W.D. Stevens 22999* (MO). **Esteli:** Faldas del cerro La Mocuana, al E de La Trinidad, 12°58'N 86°13'W, 23 Jun 1981, *P.P. Moreno 9453* (MO). **Matagalpa:** Darío, Valle el Jícaro, carretera a Terrabona a 6 km de la Carretera Panamericana, 12°45'N 86°03'W, 18 Jun 1981, *P.P. Moreno 9236* (MO). PARAGUAY. **Amambay:** afueras de Bellavista, 12 Feb 1982, *J.F. Casas & J. Molero 6277* (NY); Estancia Santa Teresa, 9 Dec 1991, *N. Soria 4963a* (MO). **Asunción:** 12 Nov 1888, *T. Morono 117* (NY). **Boquerón:** Puerto Casado, 19 Oct 1956, *T.M. Pedersen 4098* (NY). **Central:** Ñemby, Nepheline quarry 15 km

SE of Asunción, 25°31'S 57°72'W, 31 Jan 1996, *R.R. Brooks & E.M. Zardini MS358* (MO); Piquete Cué, 12 Jun 1984, *M.M. Arbo et al. 2608* (WIS); Tavarory, 2.5 km from administration on the direction to Arroyo Abai, 16 Dec 1991, *E.M. Zardini & T. Tilleria 29460* (MO). **Concepción:** Distrito de Belén, 12 Dec 2008, *M. Bolson 249* (MBM). **Cordillera:** Caá-cupé, 26 Sep 1967, *A.G. Schulz 16135* (WIS); Cabaña Maria Auxiliadora, between Eusebio Ayala and Itacurubi de la Cordillera, Km 80, 25°26'06"S 56°54'38"W, 26 Nov 1997, *E.M. Zardini & L. Guerrero 47673* (MO); Tobatí, 25°12'S 57°07'W, 9 Mar 1991, *E.M. Zardini & C. Velázquez 27180* (MO, WIS); Ypacaraí, 6 Dec 1950, *S.Y. Vervooret 810* (MO). **Itapua:** Isla Yacyreta, 27°25'S 56°45'W, 21 Jan 1997, *E.M. Zardini & L. Villate 46288* (MO, NY). **Ñeembucú:** Pilar, 16 Dec 1950, *A.G. Schulz 7883* (WIS). **Paraguarí:** Arroyo Yuquity, a 7 km E of Nueva Italia, 25°36'S 57°25'W, 23 Jun 1990, *E.M. Zardini & U. Velázquez 21529* (MO, WIS); Estero del Ypoá, 25°37'S 57°24'W, 11 Nov 1991, *E.M. Zardini & P. Aquino 28614* (MO, WIS); Parque Nacional Ybycuí, 26°03'S 56°50'W, 18 Mar 1989, *E.M. Zardini 12129* (MO, WIS). **San Pedro:** Primavera, s.d., *A.L. Woolston 1640* (NY). PERU. **Cajamarca:** San Ignacio, Distrito Chirinos, La Catahua, 5°24'S 78°47'W, 24 Jan 1996, *J. Campos & O. Díaz 2163* (MO, WIS). **Cusco:** Calca, Dist. Yanatile, Estrella, 12°26'50"S 72°30'05"W, 19 Oct 2005, *E. Suclli et al. 2527* (MO, WIS); La Convención, Distrito Quellouno, 12°25'40"S 72°29'59"W, 16 Sep 2007, *G. Calatayud et al. 4521* (MO, WIS); Quebrada, Quebrada Onda, 12°41'06"S 72°16'33"W, 13 Sep 2002, *W. Galiano et al. 4346* (MO). **Huánuco:** Leoncio Prado, Rupa Rupa, 15 May 1978, *J. Schunke 10148* (WIS); Palo de Acuro, 25 Oct 1962, *F. Woytkowski 7669* (MO). **Junin:** Out skirts of San Ramón, 11°10'S 75°20'W, 11 Jul 1988, *Al Gentry et al. 63560* (MO). **Loreto:** Coronel Portillo, Yarinacocha, 31 Mar 1977, *Al Gentry & D. Daly 18931* (WIS); Mayna, Dtto. Iquitos, Jardin del Instituto Botanico, Sgto. Lores 684 Iquitos, 2 Oct 1991, *M. Rimach 10005* (MBM). **San Martín:** San Martín, Granja El Porvenir, near Juan Guerra, 3 Jan 1970, *M.S. Chrostowski 70-7* (WIS); Tarapoto, along Río Cumbaza, 6°29'S 76°24'W, 7 Nov 1980, *T.B. Croat 51144* (MO, WIS). PUERTO RICO. **Carolina:** Urbanizacion Valle Arriba Heights, 18 Mar 1990, *C.M. Taylor 9921* (MO). **Dorado:** 1 Sep 1979, *R.O. Woodbury s.n.* (MO). **Fajardo:** NNW of Fajardo in hills just S of Playa El Convento, 1 Jun 1990, *C.M. Taylor 10104* (MO). **Humacao:** Playa de Humacao, 1 Jan 1968, *G.P. DeWolf Jr. 1922* (NY). **Salinas:** Rte 712 at Rte 706, 4 Nov 1989, *C.M. Taylor 9595* (MO). **San Juan:** Botanic Garden, Río Piedras, Aug 1983, *A.H. Liogier 34422* (MO). **Vieques:** Vicinity Isabel Segunda, Jan 1914, *J.A. Shafer 2421* (NY). SURINAME. 1841, *M. Berthoud-Coulon 442* (MO). **Marowjine:** 7 Feb 1949, *J. Lanjouw & J.C. Lindeman 1956* (NY). **Paramaribo:** Paramaribo, 6 Jun 1913, *Soprapto 34b* (WIS). TRINIDAD & TOBAGO. **Saint George:** 19 Jun 1981, *Y.S. Baksh & C.D. Adams 465*

(NY); Woodbrook, 25 Oct 1923, *W.E. Broadway 5155* (MO, NY). VENEZUELA. **Amazonas:** San Carlos de Rio Negro, 25 Aug 1982, *T.R. Zapata 4008* (NY); 20 km S of confluence of Rio Negro and Brazo Casiquiare, 1°56'N 67°03'W, 21 Apr 1979, *R.L. Liesner 6844* (WIS). **Aragua:** San Sebastián, 9 Sep 2001, *T.Ruíz 4973* (MO). **Bolívar:** Heres, Jardín Botánico del Orinoco, 8°15'N 63°29'W, 22 Apr 1999, *L. Chacon 868* (NY). **Monagas:** Maturín, 4 Aug 1979, *M. Nee & M.D. Whalen 17174* (WIS). **Portuguesa:** Guanare, Guanare, 26 Feb 1984, *F. Ortega 1958* (NY).

2. **Tarenaya afrospina** (Iltis) Soares Neto & Roalson, Acta Bot. Brasil. 32: 541. 2018. *Cleome afrospina* Iltis, Amer. J. Bot. 54 (8): 955. 1967. TYPE: REPUBLIC of CONGO. Environs Coquilhatville, Ile du Fleuve [du R. Congo], 28 September 1928 [1925], *W. Robyns 767* (holotype: BR 88677575 [image!]; isotypes: BR 8867063 [image!], BR 88677070 [image!], BR 8867520 [image!], GH GH00042345 [image!], K K000230602 [image!], US US00100469 [image!]).

Subshrub 1–2 m tall; branches glandular-puberulent- to glabrescent or glabrous. Stipular spines 1–4 × 1–2.5 mm, straight. Leaves 5–7-foliolate; petioles 3–13 cm long, pubescent to glabrescent, armed with few stout or slender prickles; leaflets elliptic to narrow-elliptic, basally cuneate, apically acute to acuminate, margin serrulate-ciliate; surfaces with scattered eglandular hairs on both sides; midrib and secondary veins densely covered with eglandular hairs and slender prickles; the central leaflet 5.8–10 × 1.8–2.5 cm, the other 3.3–7 × 1–1.8 cm; sessile. Corymbiform racemes terminal, 20–37 cm long. Floral bracts 7–23 × 3–8 mm, ovate, basally rounded, apically acuminate, with scattered eglandular hairs on both sides, margin serrulate-ciliate; petioles 1–3 mm long, pubescent, without a pair of prickles at base. Pedicels 22–42 mm long, glandular-pubescent. Sepals 6–7 × 1–1.5 mm, triangular-lanceolate, apically acuminate, margin ciliate, puberulent abaxially. Petals 12–14 × 4–5 mm, oblong-elliptic, apically obtuse, glabrescent with few scattered short pointed eglandular hairs abaxially, pink to purple. Nectary conic, inconspicuous fleshy, obsolete in fruit. Filaments 25–50 mm long, purple; anthers (3–)5–6 mm long. Ovary ca. 1.5 mm long, fusiform, glabrous; style not elongated; stigma sessile, truncate. Capsules 40–68 mm long, fusiform, glabrous; gynophore 17–22 mm long, glabrous. Seeds 2–2.5 × 1.2–1.5 mm, suborbicular, one extremity longer and thiner than the other, smooth; cleft covered by an opaque membrane connecting the claws. Figure 5A.

Phenophase. Flowers from February to May, July and November. Fruits from March to May and in November.

Distribution and habitat. Distributed from Cameroon in West Africa to Central African Republic, Gabon, Nigeria and Republic of the Congo (Figure 4). Found on roadsides, close to river banks, along riversides, in forest borders and in coastal forests, at elevations up to 350 m.

Vernacular name. "Boulu", "Bonsosole na M'pete" and "Likanga" (Iltis 1967).

Discussion. *Tarenaya afrospina* resembles *T. hassleriana*, a species native to South America, by the 5–7-foliolate leaves, the armed petioles, the corymbiform racemes with flowers aggregated at the tip, exserted stamens and the capsules with a long gynophore. It differs by the smaller and narrower petals 12–14 × 4–5 mm (*vs*. 18–20 × 7–8 mm), the filaments 25–50 mm long (*vs*. 50–70 mm long) and the fusiform capsules with a gynophore 17–22 mm long (*vs*. cylindric, 40–80 mm long).

Specimens Selected. CAMEROON. **Southwest Province:** Collections made along the footpath from Esukutang to Ekogate, 5°25'S 9°04'E, 30 May 1988, *W.D. Thomas 8090* (MO). CENTRAL AFRICAN REPUBLIC. **Sangha Economique:** Ndakan, 2°23'N 16°07'E, 22 May 1988, *D.J. Harris & J.M. Fay 738* (MO). GABON. About 50 km on the road from Tchibanga to Voungou, SE of Tchibanga, ranch of "Agrogabon", 3°12'S 11°25'E, 20 Feb 1983, *J.J.F.E. de Wilde et al. 696* (MO); Massif du Chaillu, 11°55'S 11°24'E, 29 Nov 1983, *A.M. Louis et al. 1021* (MO). **Ogooué-Maritime:** Monts Doudou, galerie forestière et bord de la rivière Mbani au sud de Doussala, 2°31'S 10°34'E, 21 Sep 2000, *H.P. Bourobou et al. 411* (MO). NIGERIA. Albinsi Vicinity, 18 Jul 1912, *J.M. Dalziel 742* (MO); *sine loc*., Mar 1918, *M. Gocker 46* (MO). **Ijebu Province:** Shasha Forest Reserve, 17 Feb 1935, *R. Ross 21* (MO); [Sapoba?, Benin Prov. ?] A 140/29, *J.D. Kennedy 365* (MO).

3. **Tarenaya atropurpurea** (Schott) Soares Neto & Roalson, Acta Bot. Bras. 32: 541. 2018. *Cleome atropurpurea* Schott, in Schreib. Nachr. Oestr. Naturf. 1: 129. 1820. TYPE: BRAZIL. Sine loco, *H.W. Schott s.n.* (lectotype: W 0060314 [image!], designated by Soares Neto & al., Acta Botanica Brasilica 32: 541. 2018). Additional syntype: BRAZIL. Rio de Janeiro, *H.W. Schott 4442* (W 0060315 [image!]).

Cleome dendroides Schult.f., Syst. Veg., ed. 15 bis 7(1): 28. 1829. Replaced name: *Cleome arborea* Weinm., Syll. Pl. Nov. 1: 227. 1824, nom. illeg., non *C. arborea* Schrad. 1821. *Scolosperma dendroides* (Schult.f.) Raf., Sylva Tellur. 111. 1838. TYPE: (neotype: t. 3296 in Curtis's botanical magazine, v. 61. ser.2: v.8. 1834, designated by Soares Neto & al., Acta Botanica Brasilica 32: 541. 2018).

Cleome dodecaphylla Vell., Fl. Flum. 271. 1829[“1825”]. TYPE: BRAZIL. [Rio de Janeiro] Habitat silvis mediterraneis ad loca inaquosa. (lectotype, designated here: tab. 110. In Fl. Flum. Icon. 6. 1831[“1829”]).

Subshrub to shrub up to 2 m tall; branches velutinous to pilose throughout. Stipular spines 1–2 × 1.5 mm, straight. Leaves 7–9(–12)-foliolate; petioles 3.5–9 cm long, velutinous, unarmed; leaflets elliptic, basally attenuate, apically acuminate to long acuminate, margin entire, ciliate; surfaces velutinous to pilose on both sides; midrib and secondary veins velutinous to pilose, without prickles; the central leaflet 11–14.5 × 2.2–3(–5) cm, the other 7.5–11 × 2–2.5 cm; sessile. Corymbiform racemes terminal, 22 cm long. Floral bracts 17–25 × 7–8 mm, ovate, basally rounded, apically acute to acuminate, velutinous to glabrescent, margin ciliate; petioles 1–2 mm long, velutinous. Pedicels 20–29 mm long, velutinous. Sepals 5–10 × 1–2 mm, lanceolate, apically acuminate to long acuminate, margin ciliate, sparsely velutinous abaxially. Petals 22–30 × 4–6 mm, oblanceolate to obovate, apically rounded, glabrous, purplish. Nectary conic, slightly fleshy, obsolete in fruit. Filaments 60–70 mm long, purple; anthers 10–12 mm long. Ovary 5–10 mm long, cylidric to oblongoid, velutinous; style not elongated; stigma sessile, capitate. Capsules 95–125 mm long, cylindric to oblongoid, the younger densely velutinous and the older glabrescent; gynophore 50–60 mm long, glabrous. Seeds 1.6–2.5 × 1 mm, suborbicular, densely echinulate with acute, flattened soft protuberances; cleft covered by an opaque membrane connecting the claws. Figure 5B.

Phenophase. The species was collected with flowers from March to November and with fruits from February to May and from August to December.

Distribution and habitat. Species endemic to Brazil (Espírito Santo and Rio de Janeiro states), Figure 7. Found in rocky habitats, restingas and roadsides.

Nomenclatural notes. The plate related to the name *Cleome dodecaphylla* is being designated here as its lectotype because no herbarium holds Vellozo’s collection from Flora Fluminensis. This plate highlights the fruits of *C. dodecaphylla* wich is a diagnostic character to identify the species.

Discussion. *Tarenaya atropurpurea* is a distinct species characterized by its shrubby habit reaching up to 2m high, velutinous to pilose indumentum, leaves with 7–9(–12) leaflets, purplish petals, cylindric to oblongoid capsules, and seeds densely echinulate with acute, flattened soft protuberances.

Specimens Selected. BRAZIL. **Espírito Santo:** Mimoso do Sul, Conceição do Muqui, Pontões, 8 Jul 2004, *L. Kollman et al. 6809* (IPA). **Rio de Janeiro:** Guapimirim, Granja Monte Olivete, margem de rio Bananal, 17 Nov 1993, *J.M.A. Braga et al. 883* (RB); Maricá, Itaipuaçu, Serra da Tiririca, 20 Feb 1986, *J.R. Pirani et al. s.n.* (PEUFR); Niterói, Parque Estadual da Serra da Tiririca, na clareira antes de subir o afloramento rochoso da pedra da Itacoatiara, 21 May 1999, *A.M.P. Guimarães et al. 7* (RB); Nova Friburgo, Parque de Furnas, 3 Jun 1987, *L.C. Giordano & D.P. Costa 316*; Nova Iguaçu, Tinguá, 1987, *sine collector* (RB 530475); Paraty, lado direito da estrada Paraty-Mirim, 28 Nov 1988, *R. Marquete et al. 163* (RB); Petrópolis, May 1882, *J. Saldanha 5538* (R); Rio de Janeiro, Monumento Natural das Ilhas Cagarras, ilha de Palmas, 23°01'60"S 43°12'20"W, 3 Apr 2012, *M.G. Bovini & M. Faria 3683* (RB); Teresópolis, Excursão à trilha do Rancho Frio, Sede Teresópolis do PARNASO, 15 Sep 2010, *C. Cronemberger et al. 7* (JPB, RB).

4. ***Tarenaya bernadeteana*** Soares Neto, sp. nov. TYPE: BRAZIL. Espírito Santo, Águia Branca, Santa Luzia, prop: Ciro Ferreira, 18°59'5"S 40°39'44"W, 150–270 m, 20 December 2007, *V. Demuner et al. 4832* (Holotype: JPB!; Isotype: MBML!).

Species resembling Tarenaya bicolor (Gardner) Soares Neto & Roalson, *differing by the combination of smaller sepals, 1.5–2 ×0.5–1 mm, oblong-elliptic to oblanceolate petals, disciform fleshy nectary, and short elongated style, 1 mm long.*

Herb 0.5 m tall; branches puberulent throughout. Stipular spines less than 1 × 1 mm, straight. Leaves 3–5-foliolate; petioles 2.5–3.7 cm long, puberulent, unarmed; leaflets elliptic, basally attenuate, apically acute to acuminate, margin entire, ciliate; surfaces with scattered short pointed eglandular hairs on both sides; midrib and secondary veins puberulent on both faces, without prickles; the central leaflet 2.2–4.3 × 0.8–1.3 cm, the other 2–3 × 0.8–1.2 cm; petiolules 1 mm long, puberulent, unarmed. Corymbiform racemes terminal, 20–24 cm long. Floral bracts 5–14 × 3–6 mm, ovate, basally rounded, apically acuminate, puberulent on both faces, margin ciliate; petioles 1 mm long, puberulent, without prickles at base. Pedicels 12–15 mm long, glabrous. Sepals 1.5–2 × 0.5–1 mm, lanceolate, apically acuminate, margin ciliate, puberulent abaxially. Petals 2.5–3 × 1–2 mm, oblong-elliptic to oblanceolate, apically obtuse, glabrous, white. Nectary disciform, conspicuous fleshy, obsolete in fruit. Filaments 6–7 mm long, purple; anthers 1.5–2 mm long. Ovary 2–2.5 mm long, cylindric, glabrous; style short elongated, 1 mm long, persistent in fruit; stigma strongly capitate. Capsules immature 23–40 mm long, cylindric, glabrous; gynophore 7–20 mm long, glabrous. Seeds 1.5 × 1 mm, suborbicular, inconspicuous longitudinally striate, very conspicuous transversed ridges, the

ridges very close to each other, glabrous at apex; cleft covered by an opaque membrane connecting the claws. Figure 6 A–D.

Phenophase. Collected with flowers and fruits in February, March and December.

Distribution and habitat. Species endemic to state of Espírito Santo, Brazil, occurring on limestone, inselbergs or other outcrops (Figure 7). Between 150–270 m high.

Etymology. The epithet is an honor to Maria Bernadete Costa-e-Silva whom dedicated her research to Brazilian *Cleome*.

Discussion. This species is known from few collections. During the analysis of *Tarenaya* species for this taxonomic revision, this unusual species was found. Due the morphological traits do not match with any other species, its identification intrigued the first author, whom based on morphological characters already proposed it as a new species. The addition of a sample from the holotype in the phylogenetic studies confirmed *T. bernadeteana* as a new species (Soares Neto et al. in prep.).

Tarenaya bernadeteana is distinguished from *T. bicolor* by the unarmed petioles (vs. armed); absence of prickles on midribs and secondary veins (vs. prickles on midrib and secondary veins); shorter lanceolate sepals 1.5–2 ×0.5–1 mm (vs. narrowly-triangular to ovate-lanceolate 2–3(–3.5) × 0.5–1 mm); oblong-elliptic to oblanceolate blades of petals 2.5–3 × 1–2 mm (vs. elliptic 4–11 × 2–4(–4.5) mm); nectary disciform conspicuous fleshy (vs. nectary conic, inconspicuous fleshy), shorter filaments 6–7 mm long (15–21 mm long), style short elongated 1 mm (vs. style not elongated) and stigma strongly capitate (vs. capitate).

Additional Specimens Examined (paratypes). BRAZIL. **Espírito Santo:** Nova Venécia, APA Pedra do Elefante, Fazenda Santa Rita, trilha da capela, 18°45’50”S 40°26’29”W, 190 m, 29 Mar 2009, *A.M. Assis et al. 2399* (JPB, MBML); Nova Venécia, Área de Proteção Ambiental da Pedra do Elefante, Serra de Baixo, 18°46’1”S 40°27’28”W, 19 Feb 2008, *C.N. Fraga et al. 1905* (IPA, MBML, RB); São Roque do Canaã, Misterioso, Pedra dos Três Carneiros, 730 m, 24 Dec 2003, *R.R. Vervloet et al. 2586* (MBML).

5. **Tarenaya bicolor** (Gardner) Soares Neto & Roalson, Acta Bot. Brasil. 32: 542. 2018. *Cleome bicolor* Gardner, London J. Bot. 2: 330. 1843. TYPE: BRAZIL. [Rio de Janeiro] Organ Mountains, hab. in open rocky and cultivated places, April 1837, *G. Gardner 309* (lectotype: BM000573983 [image!], designated by Soares Neto & al., Acta Botanica Brasilica 32: 542. 2018; isolectotypes: E00326206 [image!], E00326207 [image!], F,

G00226190 [image!], G00226191 [image!], GH 00042326 [image!], K000220447 [image!], K000220448 [image!], P00076106 [image!], NY00215151!, US 00100471 [image!], WIS 0258903!).

Herb 0.4–0.8 m tall; branches glandular-puberulent to glabrescent. Stipular spines less than 1 × 1 mm, straight. Leaves 3–7-foliolate; petioles 3–5 cm long, glandular-puberulent, armed with slender prickles; leaflets narrowly elliptic to elliptic, basally attenuate, apically acuminate, margin ciliate to serrulate-ciliate; pubescent adaxially, glabrous abaxially; midrib and secondary veins glabrous with prickles; the central leaflet 3–6.7 × 1–2.2 cm, the other 2–5.4 × 0.7–1.7 cm; sessile. Corymbiform racemes terminal, 20–50 cm long. Floral bracts 4–15 × 2–8 mm, ovate or cordate, basally obtuse or cordiform, apically obtuse or acute, puberulent on both faces, margin ciliate; petioles 1–2 mm long, puberulent or sessile, without prickles at base. Pedicels 11–18 mm long, puberulent to glabrescent or glabrous. Sepals 2–3(–3.5) × 0.5–1 mm, narrowly triangular to ovate-lanceolate, apically acute to acuminate, margin ciliate, puberulent to glabrescent abaxially. Petals 4–11 × 2–4(–4.5) mm, elliptic, apically obtuse, glabrous, white, pink or white at base becoming pink at apex. Nectary conic, inconspicuous fleshy, obsolete in fruit. Filaments (9–)15–21 mm long, purple; anthers (1.5–)2–3(–3.5) mm long. Ovary 2–10 mm long, cylindric, puberulent; style not elongated; stigma sessile, capitate. Capsules 18–60 mm long, cylindric, puberulent to glabrescent; gynophores 12–25 mm long, glabrous. Seeds 1–1.5 × 0.5–1 mm, suborbicular, longitudinally striate, with sparsely transversed ridges tuberculate; cleft covered by an opaque membrane connecting the claws. Figures 2C, 8 A–C.

Phenophase. Flowers and fruits throughout the year.

Distribution and habitat. Species endemic to Brazil, from Bahia to Rio Grande do Sul (Figure 9). Found at rock outcrops and upon rocks in open areas, in elevations between 200–1000 m.

Vernacular names. Known as “mussambê” (*L.C. Giordano et al. 777*)

Discussion. *Tarenaya bicolor* differs from *T. rosea* by its glandular-puberulent to glabrescent indumentum (vs. glabrous); stipular spines of less than 1 × 1 mm (vs. stipular spines 1.5 × 1.5 mm); pubescent adaxially, glabrous abaxially leaflets, with prickles on the midrib and secondary veins (vs. surfaces with scattered short hairs adaxially, glabrous abaxially and without prickles on midrib and secondary veins); puberulent to glabrescent capsules 18–60 mm long (vs. glabrous capsules (35–)50–87 mm long). Furthermore, *T. bicolor* occurs at 200 to 1100 m elevation while *T. rosea* is distributed at sea level along the coast.

Specimens Selected. BRAZIL. **Bahia:** Abaíra, Tijuquinho, 13°16'S 41°54'W, 17 Mar 1992, *T. Laessoe & T. Silva 52553* (CEPEC); Camacan, Ramal da torre da EMBRATEL, 8 Jul 1980, *L.A. Mattos & H.S. Brito 935* (CEPEC, HUEFS); Itamarajú, Fazenda Pau-Brasil, 5 km ao NW de Itamarajú, 17°1'S 39°33'W, 3 Jul 1979, *L.A.M. Silva et al. 547* (CEPEC); Itarantim, Serra da Felicissima, Fazenda Bom Jardim, 15°49'01"S 40°06'57"W, 8 Oct 2003, *A. Salino et al. 9162* (BHCB); Miguel Calmon, Serra das Sete Passagens, Parque Estadual das Sete Passagens, 11°24'27"S 40°33'16"W, 5 Apr 2001, *H.P. Bautista et al. 3033* (HUEFS). **Espírito Santo:** Cariacica, Estrada do entorno da reserva em acesso a Alegre, 20°18'9"S 40°28'55"W, 11 Apr 2009, *A.M.A. Amorim et al. 7833* (RB); Domingos Martins, Estrada Domingos Gehardt Km 1, 16 Jun 1984, *O.J. Pererira 312* (PEUFR); Ibitirama, Santa Marta, Trilha a direita após a ponte ao lado do alojamento do ICMBio, 23 Oct 2012, *J. Kuntz-Galvão & O.R. Campos 1478* (RB); Nova Venécia, Área de Proteção Ambiental da Pedra do Elefante, Serra de Baixo, 18°46'57"S 40°25'58"W, 14 Apr 2009, *R.C. Forzza et al. 5503* (RB); Santa Leopoldina, 20°5'31"S 40°32'23"W, 10 Sep 2009, *A.M. Assis & F.M. Flores 2058* (MBML); Santa Maria de Jetibá, Pedra do Garrafão, 21 Apr 2003, *L. Kollmann & M.V.S. Berger 6135* (MBML); Santa Teresa, 2 Jan 2007, *L. Kollmann & A.P. Fontana 8516* (MBML); Serra, APA Mestre Álvaro, 10 Mar 2012, *P.H.D. Barros et al. 139* (HUEFS, VIES); Vila Velha, Ilha das Garças, 6 Jul 1996, *J.M.L. Gomes 2132* (PEUFR). **Minas Gerais:** Belo Horizonte, Nascente de água na Serra do Pico, 10 Feb 1927, *F.C. Hoehne s.n.* (PEUFR); Brumadinho, Serra da Calçada, Retiro das Pedras, 20°8'S 44°13'W, 13 Jan 1994, *L.A. Martens s.n.* (PEUFR); Caldas, APA-Pedra Branca, 21°58'15"S 46°22'13"W, 12 Apr 2017, *D.R. Gonzaga et al. 969* (RB); Conceição do Mato Dentro, Parque Natural Municipal do Ribeirão do Campo, 19°07'20"S 43°36'W, 14 Nov 2003, *R.C. Mota et al. 2105* (BHCB); Itabirito, Pico do Itabirito, 4 Jun 1994, *W.A. Teixeira s.n.* (BHCB); Jaboticatubas, Serra do Cipó, 23 Mar 1940, *M. Barreto 10745* (BHCB); Nova Lima, Serra do Curral, 10 Mar 1933, *M. Barreto 2235* (BHCB); Santana do Riacho, Serra do Cipó, 19°15'27"S 43°33'01"W, 18 Dec 2014, *I. Akemi-Borges et al. 9* (SPF); Serra da Mutuca, 3 Mar 1964, *A.P. Duarte s.n.* (RB). **Paraná:** Pinhão, Rio dos Touros, 9 Mar 1967, *J. Lindeman & H. Haas 4721* (MBM, WIS). **Rio de Janeiro:** Itatiaia, Estrada para Mau, 5 Mar 1962, *E. Pereira 7009* (MBM); Paraty, margem do rio dos Meros, APA-Cairuçu, 21 Aug 1995, *A. Castellar et al. 3* (RB); Petrópolis, Distrito de Corrêas, Bonfim, 17 Aug 1989, *L.C. Giordano 777* (PEUFR, RB); Santa Maria Madalena-Bom Jesus, Nov 1938, *S. Lima 404* (RB); Teresópolis, estrada para a caixa d'água, 10 Sep 1977, *L.F Carvalho s.n.* (RB). **Rio Grande do Sul:** Caçapava do Sul, Guaritas, estrada Caçapava-Minas do Camaquã, 6 Dec 1993, *J.R. Stehmann et al. 1226* (BHCB); São Leopoldo, above Porto Alegre, 28 Jan 1947, *E. Henz s.n.* (PACA). **Santa**

Catarina: Florianopólis, Tijucas, 14 Jan 1948, *A. Sehnem s.n.* (PACA); Jaraguá do Sul, 10 Oct 1929, *F.C. Hoehne s.n.* (PEUFR); Pinheiral, herba ad viam publica, 14 Jan 1948, *A. Sehnem* 3064 (PACA); Rod. BR-282, 10–12 km O de Ponte Serrada, 19 Feb 1992, *G. Hatschbach et al. 56395* (MBM); Timbó do Sul, Serra da Rocinha, 18 Nov 2008, *J.M. Silva et al. 7360* (MBM). **São Paulo:** Caraguatatuba, Serra de Caraguatatuba, 21 Dec 1938, *C.A. Krug s.n.* (UEC); Cunha, 23°15'20"S 45°02'30"W, 14 Dec 1996, *J.P. Souza et al. 871* (UEC).

6. **Tarenaya boliviensis** (Iltis) Soares Neto & Roalson, Acta Bot. Brasil. 32: 542. 2018. *Cleome boliviensis* Iltis, Novon 15(1): 147. 2005. TYPE: BOLIVIA. La Paz: "Plantae Andium Boliviensium, Prov. Larecaja, vicinus Sorata, Challapampa, ad rivum, in schistosis, Reg.[ion] temp[lada], 2600 m, September 1857– January 1958", *G. Mandon 938* (holotype: WIS0258904!; isotypes: BM, F, G00226276 [image!], G00226277 [image!], GH 00042328 [image!], K000220474 [image!], LE 00001884 [image!], LE 00001885 [image!], LPB, MPU 013699 [image!], MPU 013700 [image!], NY!, P00076103 [image!], P00741914 [image!], P00741915 [image!], PR, S [image!], W, WIS0258905!).

Subshrub 1–2 m tall; branches glandular-pubescent to glabrescent throughout. Stipular spines 2.5–4.5 × 1.5–4 mm, straight. Leaves 5–7-foliolate; petioles 4–7.5 cm long, glandular-pubescent, armed with stout prickles; leaflets narrowly elliptic to elliptic, basally attenuate, apically acute to acuminate, margin minutely serrulate-ciliate; surfaces with densely to scattered short pointed hairs on both sides; midrib and secondary veins densely pubescent abaxially, with thin hairs and short stout prickles; the central leaflet 4.5–9 × 1.2–2.3 cm, the other 4.2–7.5 × 1.7–2 cm; petiolule 1 mm long, pubescent, unarmed. Corymbiform racemes terminal, more than 40 cm long. Floral bracts 24–50 × 8–20 mm, lanceolate to elliptic, basally cuneate, apically mucronate, pubescent, margin ciliate; petioles 2–3 mm long, pubescent to glabrescent, sometimes with a pair of prickles at the base. Pedicels 32–40(–45) mm long, pubescent. Sepals 7–10 × 1–1.5 mm, linear-triangular to lanceolate, apically acuminate, margin ciliate, pubescent abaxially. Petals 13–25 × 5–10 mm, elliptic to oblanceolate, apically obtuse, glabrous, white. Nectary conic, inconspicuous fleshy, obsolete in fruit. Filaments 40–75 mm long, green; anthers 7–12 mm long. Ovary 9 mm long, cylindric, slightly curved, puberulent to glabrescent; style not elongated; stigma sessile, strongly capitate. Capsules (35–)47–120 mm long, cylindric, slightly curved, puberulent to glabrescent; gynophore 34–78 mm long, glabrous. Seeds 1.5–2 × 1 mm, suborbicular, longitudinally minutely striate, seemingly smooth, not transversed ridged; cleft covered by a membrane with aggregated small oil cells, spreading to testa of the seed.

Phenophase. Flowers and fruits throughout the year.

Distribution and habitat. Known from Bolivia and Peru (Figure 9), along riversides, roadsides, and in the edges of lowland rainforests, in elevations from 200 to 3500 m. In Bolivia it also occurs in the wet, semideciduous or deciduous forests known as the "Bosque Tucumano Boliviano". It is also found close to agricultural areas.

Vernacular names. In Bolivia, it is called "hierba playa" (*A. Serato 124*), "kichita" (*A.F. Fuentes et al. 14387*, *D. Ugent 4593*); in Peru, "barba de chivo" (*A. Sagástegui 7879*).

Uses. Used popularly to heal scared and moody children (*A.F. Fuentes et al*. 14387). The juice of leaflets is used to heal ear aches (*D. Ugent 4593*).

Discussion. *Tarenaya boliviensis* resembles *T. hassleriana* as both species share the number of leaflets, similar size of stipular spines, and floral and fruits features. However, they are allopatric species, with *T. boliviensis* occurring at high elevations in Bolivia and Peru, and *T. hassleriana* from Argentina to South of Bahia, Brazil. *T. boliviensis* has a glandular-pubescent to glabrescent indumentum, stout and abundantly prickles on the petioles, puberulent capsules and seeds covered by aggregated oil-cointaing bulliforms cells surrounding the testa and the cleft.

Specimens Selected. BOLIVIA. **Beni:** Ballivan, Serrania del Pilón Lajas, 15°17'S 67°04'W, *D.N. Smith et al. 13202* (MO, WIS). **Chuquisaca:** Belisario Boeto, Vila Serrano, 18°59'09"S 64°17'25"W, 29 Nov 2005, *J. Villalobos et al. 425* (MO, WIS); Hernando Siles, San Pablo de Huacareta, 19°56'35"S 64°13'19"W, 25 Dec 2007, *J. Villalobos et al. 1091* (MO); Luis Calvo, Villa Vaca Guzmán, 19°15'53"S 63°51'42"W, 20 Nov 2008, *J. Villalobos et al. 1742* (MO, WIS); Oropeza, 16 km NE of Sucre on the road Sucre-Aiquile road, 11 Apr 1963, *D. Ugent & M. Cardenae 4895* (WIS). **Cochabamba:** Arce, Chapini llegando al puente del Río Caine, 17°50'51"S 65°57'03"W, 9 Feb 1999, *M.D.C. Ramirez 59* (MO); Ayopaya, Cerro Independencia, 17°05'09"S 66°49'20"W, 31 Oct 2007, *J. Teran et al. 1642* (WIS); Carrasco, Cochabamba 142 kms hacia Santa Cruz, 24 Mar 1981, *St.G. Beck 6830* (WIS); Chapare, Legando a la entrada de Incachaka, 17°12'38"S 65°49'21"W, 6 Jul 2001, *A.L. Sánchez & S. Aizama 1123* (MO); Cercado, Cerveceria Colón, about 2 km N of Cochabamba, 3 Apr 1963, *D. Ugent 4593* (WIS); Mizque, outside E of town, 17°56'49"S 65°20'15", 27 Dec 2002, *L. Rico & T. Windsor-Shaw 1191* (WIS); Quillacollo, Tiquipaya, about 10 km NW of Cochabamba, 17°20'S 66°15'W, *D. Ugent & V. Ugent 5003* (WIS); San Benito, cerca de San Benito, a unos 44 km de la capital en dirección a Santa Cruz, 25 Dec 1982, *J.F. Casas 7721* (MO); Tunari, del

Valle del Cercado de Cochabamba, 23 Apr 1966, *R.F. Steinbach 117* (MO). **La Paz:** 15 min upstream from Rurrenabaque, 14°28'S 67°30'W, 25 May 1990, *D.C. Daly et al. 6638* (NY, WIS); Abel Iturralde, Madidi, alrededores de San Buenaventura, 14°26'20"S 67°32'11"W, 2 Dec 2004, *A. Araujo et al. 1298* (MO); Franz Tamayo, Area Natural de Manejo Integrado Madidi, San Marcos, 14°36'52"S 68°26'11"W, 18 Sep 2006, *A. Araujo et al. 2968* (MO); Inquisivi, ca. 5 km N caminho hacia Circuata, 16°53'43"S 67°08'36"W, 12 Jul 2001, *A.L. Sánchez & J. León 1134* (MO); Nor Yungas, 12.4 km below Yolosa on road to Caranavi, 16°09'S 67°43'W, 13 Nov 1982, *J.C. Solomon 8889* (MO); Sud Yungas, Puente Villa, 21 Sep 1990, *S.G. Beck 17781* (MO). **Santa Cruz:** Chiquitos, San Jose de Chiquitos, 17°49'S 60°44'W, 6 Feb 1995, *J.R. Abbott & B. Mostacedo 16139* (WIS); Cordillera, Caraparicito, ca 40 km de Camiri, 15 Jan 1982, *R. De Michel 181* (WIS); Ichilo, Parque Nacional Amboro, 17°40'S 63°43'30"W, 20 Dec 1988, *M. Nee & M. Saldias 37270* (MO, NY, WIS); Manueal Maria Caballero, ca. 400m NW del pueblo, 17°54'51"S 64°31'57"W, 20 Jun 2001, *A.L. Sánchez & F. Morales 1116* (MO); Vallegrande, alrededores de la catarata de Postrervalle aproximadamente 4 Km desde el Pueblo de Postrervalle, 18°36'51"S 63°45'37"W, 28 Oct 2011, *L. Arroyo & Y. Inturias 6215* (MO). **Tarija:** Gran Chaco, near the Yacuiba-Santa Cruz railroad, 21°12'59"S 63°23'56"W, 12 Feb 2006, *M. Nee & I.I. Linneo 54140* (WIS). PERU. **Cuzco:** Anta, Santa Ana, el Chacan, 26 Mar 1973, *G.R. Brunel 584* (MO, WIS); Convencion, Amaibamba-Liucumayo, 22 Jul 1944, *C. Vargas 4562* (WIS); Cuzco, Dist. Camisea, Campamento Armihari, 11°51'48"S 72°46'44"W, 28 Jan 1997, *P. Acevedo-Ródriguez et al. 9230* (WIS); Paucartambo, Pilcapata, La Baya, 6 Aug 1956, *C. Vargas 11320* (WIS); Quispicanchis, Quince mil, forested hills 292 km from Cusco, 13°13'S 70°45'W, 24 Jul 1991, *P. Núñez 13902* (MO). **La Libertad:** On E side of Trujillo, 28 Nov 1974, *J. Hudson 1036* (MO, WIS); Trujillo, Barraza, 4 Dec 1973, *A. Sagástegui 7879* (MO). **Puno:** Sandia, 13 Nov 1987, *L. Hoogte & C. Roersch 3447* (MO).

7. **Tarenaya chapalensis** (Iltis) Soares Neto & Roalson, Acta Bot. Bras. 32: 542. 2018. *Cleome chapalensis* Iltis, Bol. Inst. Bot. Univ. Guadalajara 5: 428. 1998. TYPE: [MEXICO] Wet roadsides and shallow water courses, on road to La Barca, 1/3 km N of the R.R. station at Zamora, 19°58'N 102°16'W, 1520 m, 29 July 1960, *H.H. Iltis et al. 490* (holotype: WIS0258906!; isotypes: BM000629040 [image!], ENCB, F [image!], G, GH 00042307 [image!], GUADA, IBUG0001788 [image!], IEB 000157790 [image!], K000220427 [image!], LE, LIL, MEXU 00140923 [image!], MICH 112011 [image!], MO-107291!, MSC, NY00387673!, SMU, TEX, UC 1332256 [image!], US 00170323 [image!], US

00811488 [image!], US 00811489 [image!], WIS0258907!, WIS0259808!, WIS0258909!, WIS0258910!, WIS0258911!, WIS0258912!, WIS0258913!, XAL0106658 [image!], ZEA).

Herb to subshrub 2–3 m tall; branches glandular-pubescent throughout. Stipular spines 1.5–5 × 1–2 mm, straight. Leaves 5–7-foliolate; petioles 3.5–8.3 cm long, glandular-pubescent, armed with slender prickles or rarely unarmed; leaflets elliptic to oblanceolate, basally attenuate, apically acute, margin serrulate-ciliate; glabrescent to glabrous adaxially, sparsely pubescent abaxially; midrib and secondary veins glandular-pubescent abaxially, without prickles; the central leaflet 2.8–3.5 × 1 cm, the other 1.5–3.5 × 0.7–1.2 cm; petiolules 1–2 mm long, glandular-pubescent, armed or unarmed. Corymbiform racemes terminal, 17–65 cm long. Bracts subtendng the lower flowers leaf-like, with 3-leaflets becoming 1-foliolate, the other 10–30 × 3–8 mm, ovate to lanceolate, basally rounded, apically obtuse, glabrescent, margin serrulate-ciliate; petioles 2–8 mm long, pubescent, without prickles at base. Pedicels 15–20 mm long, glandular-puberulent. Sepals 5–7 × 1–2 mm, triangular to lanceolate, apically acuminate, margin ciliate, pubescent abaxially. Petals 12–15 × 4–5 mm, oblong-elliptic, apically rounded, glabrous, puberulent at the apex when in bud, deep pink-purple. Nectary conic, inconspicuous fleshy, obolete in fruit. Filaments 40–52 mm long, purple; anthers 10–12 mm long. Ovary 4–5 mm long, fusiform, puberulent; style not elongated; stigma sessile, capitate. Capsules (32–)50–55 mm long, fusiform, inflated, glabrescent to glabrous; gynophore 35–40 mm long, glabrous. Seeds 1.5–2 × 1–1.5 mm, suborbicular, longitudinally striate, transversed ridged, seemingly sulcate; cleft covered by an inconspicuous membrane.

***Phenophase*.** Flowering and fruiting all the year.

Distribution and habitat. Species endemic to Mexico, known only from Jalisco and Michoacan (Figure 9). Found in roadside ditches, wetlands, and deciduous forests near Lago de Chapala at 1500–1600 m elevation. Only one population was found at 300 m elevation, in an open thorn forest at Apatzingán, southwest of Michoacan.

***Vernacular name*.** "Volantin", "barba de índio" (*H.H. Iltis et al. 490*).

***Discussion*.** *Tarenaya chapalensis* resembles *T. hassleriana*. However, *T. chapalensis* bears small, 15–20 mm long, glandular-puberulent pedicels (vs. 20–50 mm long, pubescent), oblong-elliptic deep pink-purple petals (vs. oblong to oblanceolate white to purplish), and fusiform, inflated capsules (vs. cylindric in *T. hassleriana*).

Specimens Selected. MEXICO. **Jalisco:** 13 miles southeast of Guadalajara, 18 Aug 1959, *U.T. Waterfall 15632* (WIS); Jocotepec, Arroyo la Presa, abajo de la Presa de El Molino, al W de El Molino, 1 Apr 1990, *J.A. Machuca & Y.M. Cházaro 6458* (WIS); La Barca, Carretera libre Ocotlán-La Barca, 24 Aug 1996, *M. Harker et al. 698* (WIS). **Michoacan:** 1 km E of Jiquilpan on road to Zamora, 29 Jul 1960, *H.H. Iltis 518* (WIS); 11–13 km west-southwest of Apatzingán, along the road to Dos Aguas and Aguililla, Sep 1972, *J.V.A. Dieterle 4331* (NY); Briseñas 1 km S de Vista Hermosa, 20°10'N 102°40'W, 24 Aug 1996, *M. Harker et al. 703* (WIS); Emiliano Zapata, 29 Jul 1960, *H.H. Iltis et al. 509* (WIS); Low moist grazed ditch 3 km SW of Zamora, on road to Jacoma, 29 Jul 1960, *H.H. Iltis et al. 507* (WIS); Roadside and shallow wet ditch, 2 km N of Sahuayo, on road to La Barca, 10 Aug 1960, *H.H. Iltis et al. 832* (NY, WIS); Zamora, 25 May 1901, *C.G. Pringle 9667* (MO).

8. **Tarenaya cordobensis** (Eichler & Griseb.) Arana & Oggero, Phytotaxa 267 (2): 162. 2016. *Cleome cordobensis* Eichler & Griseb., Abh. Königl. Ges. Wiss. Göttingen 19: 73. 1874. *Cleome aculeata* L. var. *cordobensis* (Eichler ex Griseb.) Kuntze, Revis. Gen. Pl. 3[3]: 7. 1898. TYPE: ARGENTINA. Córdoba, Depto. Rio Cuarto, in collibus rupestris raro prope Las Peñas, más abundante cerca de las Mollas, San Francisco, February 1871, *P.G. Lorentz 267* (holotype: GOET009590 [image!]; isotypes: BM000629073 [image!], CORD00005797 [image!], CORD00005798 [image!], NY00215153!, PRC 454083 [image!], SP000455 [image!], UVMVT024480 [image!]).

Cleome trollii Alf.Ernst, Notizbl. Bot. Gart. Berlin-Dahlem 13: 380. 1936. TYPE: BOLIVIA. Quinore, westlich Vallegrande, 1900 m ü. M., Tipuana-gehölze, 1 February 1928, *C. Troll 1113* (lectotype, designated here: B 10 0242718 [image!]; isolectotypes: B 10 0242712 [image!], M-0240943[image!], WISv0259086!).

Cleome eyerdamii Standl. & F.A. Barkley, Madroño 9: 150. 1948. TYPE: BOLIVIA. Cochabamba, about 5 km southeast of Cochabamba, 20 March 1939, *W.J. Eyerdam 24917* (holotype: F V0053138F [image!], photo at MO; isotypes: G00226170 [image!], GH 00042330 [image!]).

Herb 0.3 m tall; branches glandular-puberulent. Stipular spines less than 1 mm long or 1.5 × 1 mm, straight. Leaves 3-foliolate; petioles 1.7–2 cm long, puberulent, discreetly armed with slender prickles; leaflets ovate to elliptic, basally obtuse to attenuate, apically acute, margin entire, ciliate; surfaces densely puberulent on both sides; midrib and secondary veins puberulent without prickles; the central leaflet 2.2–5.7 × 1.4–2 cm, the other 2–4.5 × 0.8–2 cm; petiolules

1–2 mm long, puberulent, unarmed. Corymbiform racemes terminal and/or axillary, 16 cm long. Floral bracts 9–18 × 3.5–6 mm, ovate, basally obtuse, apically acute, densely puberulent to glabrescent, margin ciliate; petioles 1 mm long, puberulent, without prickles at base. Pedicels 14–17 mm long, puberulent to glabrescent. Sepals 3–4 × 0.5 mm, linear-triangular, apically acute, margin ciliate, densely puberulent abaxially. Petals 5–7 × 1.5–3 mm, oblong-elliptic, apically obtuse, glabrous, white or cream. Nectary conic, inconspicuous fleshy, obsolete in fruit. Filaments 13–15 mm long, purple; anthers 2.5–3 mm long. Ovary 3–4 mm long, fusiform, glabrous; style not elongated; stigma sessile, discoid. Capsules 25–40 mm long, fusiform, glabrous; gynophore 12–15(–25) mm long, glabrous. Seeds 1.5 × 1 mm, suborbicular, longitudinally striate and minutely transversed ridged; cleft covered by a thin membrane connecting the claws, with a white aril attached to the membrane.

Phenophase. Found with flowers and fruits from January to March, November and December.

Distribution and habitat. Occurs at high elevations, between 2086–2800 m, in Argentina and Bolivia (Figure 10), in deciduous disturbed forests on rocky hills. There is a disjunct distribution in Cordoba, Argentina, at 300 m elevation.

Nomenclatural notes. *C. Troll 1113* has duplicates in B, M and WIS, with B holding two specimens. However, only B 10 0242718 has Ernst's handwriting "spec. nov.". Therefore, it is being designated here as the lectotype.

Discussion. *Tarenaya cordobensis* is characterized by its 3-foliolate leaves, relatively large flowers with glandular-puberulent to glabrescent pedicels; oblong-elliptic petals and fusiform capsules with relatively long gynophores (12–15(–25) mm long). It is similar to *Tarenaya aculeata*, from which it can be distinguished by its armed petioles (vs. unarmed), conic nectaries (vs. disciform), filaments 13–15 mm long (vs. 3.5–7 mm long); fusiform capsules (vs. cylindric) with gynophores 12–15(–25) mm long (vs. gynophore not elongated or short elongated up to 10 mm long).

Specimens Selected. ARGENTINA. **Cordoba:** Santa Maria, 20 Jan 1951, *A.T. Hunziker 8763* (WIS); Unquillo, s.d., *C. Bruch 1926* (NY). **Jujuy:** Ledesma, Calilegua, toma del Río Zora, 21 Mar 1979, *A.L. Cabrera et al. 30386* (MO); Santa Bárbara, NE of Libertador, 23°54'S 64°08'W, 24 Mar 1994, *C.M. Taylor et al. 11471* (MO). **San Luís:** Junín, entre Los Molles y Carpintería, 12 Dec 1992, *M. Múlgara 1144* (MO). **Salta:** Capital, Río Vaqueros, 5 km al W del punta Ruta 9, 10 Feb 1982, *L.J. Novara 2362* (MO); Santa Victória, Santa Victoria Oeste, 21 Jan 1983, *E.M. Zardini et al. 1691* (MO). BOLIVIA. **Chuquisaca:** Oropeza, at km 28,

19°1’S 65°7’W, 2 May 1963, *D. Ugent et al. 5207* (WIS); Sur Cinti, Pucca Pampa, 20°44’44”S 64°39’53”W, 12 Feb 2004, *J. Gutiérrez et al. 595* (WIS); Zudañez, Tarabuco ca. 30 km hacia Zudañez, 7 Mar 1981, *S.G. Beck 6237* (WIS). **Cochabamba:** About 5 km southeast of Cochabamba, 20 Mar 1939, *W.J. Eyerdam 24917* (MO); Campero, Mizque, 21 Feb 1963, *R.F. Steinbach 724* (MO, NY, WIS); Quillacollo, around Cerro de Urkipiña and the Virgen de Urkipiña, 17°25’S 66°17’W, 20 Nov 1999, *M. Nee 50523* (NY). **Tarija:** Aniceto Arce, Bermejo, 15 Nov 1903, *K. Fiebrig 2029* (WIS).

9. **Tarenaya costaricensis** (Iltis) Iltis, Novon 23(1): 57. 2014. *Cleome costaricensis* Iltis, Brenesia 63–64: 1. 2005. TYPE: COSTA RICA. Cartago, costado oeste del campus del Instituto Tecnológico de Costa Rica, 1400m, 25 November 1986, *N. Zamora 1309* (holotype: CR; isotypes: B 10 0242711 [image!], BM000629021 [image!], BRIT 04338 [image!], C, CAS 214469 [image!], CM 0711 [image!], CR, DUKE 10000461 [image!], F, GH 00076833 [image!], K000220428 [image!], MEXU00757028 [image!], MICH 1210134 [image!], MO-107290!, NY00000707!, P00094686 [image!], PMA 664 [image!], S-R-8189 [image!], SMU, TEX, UC, US 00588883 [image!], WIS v0258919!, WIS v0258920!, WIS v0258921!, WIS v0258922!, WIS v0258923!, WIS v0258924!, WIS v0258925!).

Subshrub 1 m tall; branches glabrescent to glabrous. Stipular spines 2–3 × 1–1.5 mm, slightly curved at apex. Leaves 5-foliolate; petioles 2.5–4 cm long, puberulent to glabrescent, armed with few slender prickles; leaflets elliptic-oblanceolate, basally cuneate to attenuate, apically acute, margin serrate; surfaces sparsely pilose or glabrous on both sides; midrib and secondary veins with prickles; the central leaflet 2.1–3.4 × 0.7–1.3 cm, the other 1.6–2.6 × 0.7–0.8 cm; petiolules 1–2 mm long, puberulent, armed or unarmed. Corymbiform racemes terminal, 40 cm long. Floral bracts 14–21 × 5–15 mm, ovate to lanceolate, basally rounded, apically acute or obtuse, glabrescent, margin serreate; petioles 4–15 mm long, puberulent, sometimes with a pair of prickles at the base. Pedicels 17–22 mm long, puberulent. Sepals 4.5–7 × 1 mm, lanceolate, apically acuminate, margin ciliate, glabrescent abaxially. Petals 11–15 × 3–4 mm, oblong-elliptic, apically obtuse, glabrous, white dark purple to reddish strips or spots at the apex. Nectary conic, inconspicuous fleshy, obsolete in fruit. Filaments 25–30 mm long, purple; anthers 7–11 mm long. Ovary 5 mm long, cylindric, glabrous; style not elongated; stigma sessile, capitate. Capsules 80–110 mm long, cylindric, slightly moniliform, glabrous; gynophore 20–25 mm long, glabrous. Seeds 2.4–3 × 1.6–1.7 mm, tuberculate, with blister-like scurf on the back; cleft membrane smooth, slightly or not beveled.

Phenophase. *Tarenaya costaricensis* flowers and fruits in February to April, June to August, November and December.

Distribution and habitat. It occurs in tropical moist forests at high elevations, between 1200–1400 m, in Costa Rica and Panama (Figure 10).

Vernacular names. "Espuela de Caballero" (Iltis 2005a).

Discussion. *Tarenaya costaricensis* is a distinct species from Central America distinguished by its glabrescent to glabrous indumentum, 5-foliolate leaves, ovate to lanceolate bracts, white petals with dark purple to reddish strips or spots at the apex and short, 1–4 mm long, style, occurring at high elevations, 1200–1400m, in Costa Rica and Panama.

Specimens Selected. COSTA RICA. **Cartago:** Alto de Ochomogo, 12 Jul 1955, *J. León 4603* (WIS); Ca. 0.25 km SE of Coris, 8 Dec 1982, *W.S. Alverson 2008* (WIS); roadside ditch along San Jose-Cartago, 21 Jun 1949, *R.W. Holm & H.H. Iltis 77* (WIS); Vicinity of Cartago, at turnoff from route 228 into Tobosi, on NW side of village, near church, 9°52'N 83° 55'W, 9 Dec 1982, *W.S. Alverson 2009* (WIS). **San José:** environs de San José, Mar 1887, *P. Biolley 69* (WIS); La Sabana, 7 Jul 1935, *F.S. Rojas 286* (MO). PANAMA. **Chiriqui:** Dos Lagunas, 4 km W of El Hato del Volcan, 23 Jul 1975, *S. Mori & A. Bolten 7403* (MO, WIS); Más o menos 5.4 km del Hato de Volcán em el caminho a Las Lagunas, 26 Apr 1969, *M.D. Correa & R. Lazor 1445* (MO); roadside open pasture between El Hato de Volcán and Dos Lagunas, 9 Aug 1972, *W.G. D'Arcy & J.J. D'Arcy 6614* (WIS); Volcán, at Hotel Howard, 13 Feb 1978, *B. Hammel 1554* (MO, WIS).

10. **Tarenaya crenopetala** (A. DC.) Soares Neto & Roalson, Acta Bot. Bras. 32: 542. 2018. *Cleome crenopetala* A. DC., Mém. Soc. Phys. Genève 6 (1), 220: 1833. TYPE: (lectotype: t. 2., in DC. & A. DC. Cinq. notice sur. les pl. rares du Jardin de Genève, Mém. Soc. Phys. Genève 6 (1). 1833, designated by Soares Neto & al., Acta Botanica Brasilica 32: 542. 2018).

Herb 0.5 m tall; branches glandular-puberulent. Stipular spines absent. Leaves 3–5-foliolate; petioles 1.3–2.5 cm long, puberulent-glandular, unarmed; leaflets elliptic to oblanceolate, basally cuneate to attenuate, apically acute to obtuse, margin ciliate to serrulate-ciliate; surfaces puberulent to glabrescent on both sides; midrib and secondary veins glandular-puberulent to glabrous, without prickles; the central leaflet 2.8–3 × 0.5–0.8 cm, the other 2–2.5 × 0.5–0.6 cm; sessile. Corymbiform racemes terminal, 40 cm long; bracts subtending the lower

flowers leaf-like, with 3-leaflets, or becoming 1-foliolate, the other 6–8 × 2–2.5 mm, ovate to lanceolate, basally obtuse, apically obtuse or acute, puberulent, margin ciliate to serrulate-ciliate; petioles 1–4 mm long, puberulent, without prickles at base. Pedicels 10–12(–15) mm long, puberulent. Sepals 1.5–2(–2.5) × 1 mm, ovate-lanceolate, apically acuminate, margin ciliate, puberulent abaxially. Petals 3–4 × 2–3 mm, suborbicular, apically rounded, margin slightly sinuose, glabrous, white at base becoming pink at apex. Nectary disciform, inconspicuous fleshy, obsolete in fruit. Filaments 10–15 mm long, purple; anthers 2–2.5 mm long. Ovary 2.5–3 mm long, fusiform, puberulent; style not elongated; stigma sessile, slightly capitate or not expanded. Capsules (13–)23–32 mm long, fusiform, glandular-puberulent to glabrescent; gynophore 10–20 mm long, glabrous. Seeds 2–2.2 × 1, suborbicular, longitudinally striate, with irregular transverse ridges; cleft cavity narrow, closed at the mouth by the equal longer claws.

Phenophase. *Tarenaya crenopetala* flowers and fruits in January, February, September and December.

Distribution and habitat. Rare species with occurrence confirmed in Brazil, in the states of Paraná and Rio Grande do Sul (Figure 10). It may probably occurs in Uruguay.

Discussion. *Tarenaya crenopetala* is a distinct species because it does not have stipular spines and has sessile leaflets, suborbicular glabrous petals, slightly sinuose, glandular-puberulent to glabrescent fusiform capsules.

Specimens Selected. BRAZIL. **Paraná:** Campina Grande do Sul, Capivari, 28 Jan 1973, *N. Imaguire 741* (MBM). **Rio Grande do Sul:** Bom Jesus, Passo da Guarda, 14 Jan 1952, *B. Rambo s.n.* (PACA); Pelotas, 21 Feb 1952, *A. Sehnem 5806* (PACA); São Leopoldo, ad montem Sapucaia, 25 km N of Porto Alegre, 5 Oct 1934, *B. Rambo s.n.* (PACA).

11. **Tarenaya curvispina** M.B. Costa-e-Silva & Iltis ex Soares Neto & Roalson, Phytotaxa 334: 28. 2018. TYPE: BRAZIL. Bahia: Ilhéus, Quadra D do CEPEC, 9 September 2015, *R.L. Soares Neto & J.G. Jardim 130* (holotype: JPB!, isotypes: CEPEC!, RB!).

Herb 0.25 to 1.2 m tall; branches glabrescent to glabrous. Stipular spines 1.5–2 × 1–1.5 mm, curved. Leaves 3–5-foliolate; petioles 3.5–8 cm long, glabrous, armed with slender to stout prickles; leaflets elliptic to oblanceolate, basally long attenuate, apically acuminate, margin serrulate-ciliate; surfaces with scattered short pointed hairs on both sides; midrib and secondary

veins glabrous with prickles; the central leaflet 5.5–7.8 × 1.8–2.3 cm, the other 2–5.5 × 0.8–1.7 cm; petiolules 3–8 mm long, glabrous, sometimes armed. Corymbiform racemes terminal, 7–15 cm long. Bracts subtending the lower flowers leaf-like, with 3-leaflets, becoming 1-foliolate, the other 4–17 × 2–10 mm, ovate to elliptic, basally cuneate to rounded, apically acute, glabrescent, margin serrulate-ciliate; petioles 1–5 mm long, glabrous, without prickles at base. Pedicels 7–13 mm long, glabrous. Sepals 1 × 0.5 mm, lanceolate, apically acute, margin minutely serrulate, glabrescent to glabrous abaxially. Petals 1.5–2 × 1 mm, oblong, apically obtuse, glabrous, white at base becoming purple at the apex. Nectary disciform, inconspicuous fleshy, obsolete in fruit. Filaments 1–2 mm long, white; anthers ca. 1 mm long. Ovary 2 mm long, oblongoid to oblanceoloid, glabrous; style short elongated, 1 mm long; stigma subsessile, capitate. Capsules 18–32 mm long, oblongoid to oblanceoloid, glabrous; gynophore ca. 0.5 mm long, glabrous. Seeds 1–1.2 × 1 mm, orbicular, finely longitudinally striate, pronouncedly transverse ridged; cleft narrow, covered by a porous membrane. Figure 2D.

Phenophase. *Tarenaya curvispina* flowers and fruits from June to October.

Distribution and habitat. This species has a disjunct distribution between the states of Bahia and Ceará (Figure 10). It is registered as an agriculture invasive in areas of cocoa plantations in Bahia, and in mountainous areas of Ceará.

Discussion. *Tarenaya curvispina* is related to *T. pernambucensis*, differing by the glabrescent to glabrous indumentum (vs. glandular-puberulent), 3–5-foliolated leaves (vs. 3–7-foliolated) with the leaflet margin serrulate-ciliate (vs. entire, ciliate), and white filaments 1–2 mm long (vs. purple, 2.5–3.5 mm long).

Specimens Selected. BRAZIL. **Ceará:** Maranguape, Serra de Maranguape, 3°50’S 38°45’W, 28 Jun 1981, *P. Martins & E. Nunes s.n.* (EAC); Pacoti, arredores, 4°12’S 38°55W, Jun 1988, *F.J.A. Matos s.n.* (EAC); Redenção, Manoel Dias, Sítio Furna da Onça, 29 Mar 2015, *M.I.B. Loiola et al. 2579* (EAC). **Bahia:** Ilhéus, área do CEPEC, Km 22 da Rodovia Ilhéus/Itabuna (BR 145), 4 Aug 1981, *J.L. Hage 1150* (CEPEC, RB); Ilhéus, CEPEC, 26 Aug 1970, *T.S. Santos 1027* (CEPEC); Ilhéus, CEPEC, 28 Oct 1978, *S.A. Mori 10994* (CEPEC); Ilhéus, área do CEPEC, Km 22da Rodovia Ilhéus/Itabuna (BR 415), 30 Jun 1981, *J.L. Hage & E.B. dos Santos 1013* (CEPEC, RB); Ilhéus, área do CEPEC, Km 22 rodovia Ilhéus/Itabuna, Quadra D, 12 Aug 1978, *S.A. Mori 10405* (CEPEC); Ilhéus, CEPEC, Km 7 da rodovia Itabuna-Ilhéus, 9 Jul 1964, *C.M. Magalhães 33* (CEPEC).

12. **Tarenaya diffusa** (Banks ex DC.) Soares Neto & Roalson, Acta Bot. Bras. 32: 542. 2018. *Cleome diffusa* Banks ex DC., Prodr. 1: 241. 1824. *Cleome aculeata* var. *diffusa* (Banks ex DC.) Kuntze. Revis. Gen. Pl. 3(3): 7. 1898. *Hemiscola diffusa* (Banks ex DC.) Iltis. Novon 17(4): 448. 2007. TYPE: BRAZIL. Rio de Janeiro, [1768], *G. Banks s.n.* (holotype: BM000573979 [image!]).

Cleome dichotoma Turcz., Bull. Soc. Imp. Naturalistes Moscou 27: 318. 1854. TYPE: BRAZIL. Bahia, In ruderatis, *P. Salzman s.n.* (holotype: KW001000296 [image!]; isotypes: E00326211 [image!], G00226270 [image!], G00226271 [image!], HAL0117684 [image!], HAL0117685 [image!], LE 00001886 [image!], MO-2185647!, P00745103 [image!], P00745106 [image!], P00745122 [image!], R 000024542!, WIS v0258928!).

Cleome perplexa Briq., Annuaire Conserv. Jard. Bot. Genève 17: 380. 1914. TYPE: BRAZIL. Env. de Bahia, *J.S. Blanchet 48* (lectotype, designated here: G00226221 [image!]; isotypes: BM000573980 [image!], F [image!], G00226220 [image!], W).

Herb 0.5–0.6 m tall; branches glandular-puberulent. Stipular spines ca. 1 × 1 mm, straight. Leaves 3–5-foliolate; petioles 1.3–8.3 cm long, puberulent, unarmed; leaflets elliptic to oblanceolate, basally cuneate to attenuate, apically acute to acuminate or obtuse, margin entire to slightly serrulate-ciliate; surfaces with scattered short pointed hairs on both sides; midrib and secondary veins puberulent-glandular, without prickles; the central leaflet (1–)1.3–9 × 0.5–3.2 cm, the other (0.7–)1.5–7.2 × 0.5–2.3 cm; petiolules ca. 0.5 mm long, puberulent, sometimes armed, or sessile. Corymbiform racemes terminal and/or axillary, 13–17 cm long. Floral bracts 12–20 × 6–10 mm, elliptic or ovate, basally cuneate or obtuse, apically acute to acuminate, glabrescent, margin ciliate; petioles (0.5–)1–4 mm long, puberulent, sometimes with a pair of prickles at the base. Pedicels 8–15 mm long, puberulent. Sepals 3–5 × 0.5–1 mm, linear-triangular, apically acute, margin ciliate, puberulent abaxially. Petals 2–6 × 2.5–4 mm, oblanceolate to spathulate, apically obtuse, glabrous, white. Nectary disciform, inconspicuous fleshy, obsolete in fruit. Filaments 4.5–11 mm long, purplish; anthers 1.5–3 mm long. Ovary (1.5–)3.5–4.5 mm long, fusiform to ellipsoid, glabrous; style not elongated; stigma sessile or subsessile, capitate. Capsules 13–30 mm long, fusiform, glabrous; gynophore 3–10 mm long, glabrous. Seeds 2–2.5 × 1–1.5 mm, subcochlear to piriform, longitudinally striate, with transverse ridges covered by simple hair; cleft covered by a membrane and a white aril attaching the claws. Figure 2 E–F.

***Phenophase*.** Flowering and fruiting throughout the year.

***Distribution and habitat*.** Distributed in Eastern Brazil, from Ceará to Santa Catarina, including the Archipelago of Fernando de Noronha (Figure 11). It occurs in the deciduous thorn vegetation known as *caatinga*, on rocky outcrops, in gallery forests, and in the sandy coastal vegetation known as *restinga*. Introduced in the United States (Iltis & Cochrane 2007).

***Vernacular names*.** It is known as "canela-do-mato" (*A.M. Miranda et al 2243*), "cecê" (*Grupo Pedra de Cavalo 900*), "erva-gambá" (*R. Patzlaff 14*), "mussambê fedorento" (*E.L.P.G. de Oliveira 736*), "mussambê pequeno" (*D.M. Coelho 434*), "mussambê das rochas" (*B. Pickel 1265*), "pimenta braba" (*D. Cardoso 506*), "pimentinha" (*D.J. Gomes 33*), "pimentinha-da-roça" (*F.P. Bandeira 174*), "pimenta-de-macaco" (*S. Leal 54*), "oficial-de-sala" (*E. de A. Dutra 2*).

***Uses*.** Used as medicinal for fever (*Grupo Pedra de Cavalo 900*).

Nomenclatural notes. A lectotype is being designated for *Cleome perplexa* because *Blanchet 48* is distributed among different herbaria. G holds two specimens for that collection and G00226221 is being designated as lectotype because bears Briquets's handwriting identyfing this material as *Cleome perplexa* and it is supposed to be used to describe the species.

***Discussion*.** *Tarenaya diffusa* is commonly confused with *T. aculeata*, differing by the leaves 3–5-foliolate (vs. 3-foliolate), by the petioles of bracts sometimes with a pair of prickles at base (vs. without prickles), and fusiform capsules (vs. cylindric, slightly moniliform).

***Specimens Selected*.** BRAZIL. **Alagoas:** Delmiro Gouveia, na margem da estrada, 14 Jul 2014, *A.M. Miranda 6707* (HST). **Bahia:** Bom Jesus da Lapa, Morro de Bom Jesus, 15 May 2001, *F. França 3541* (CEPEC, HUEFS); Cachoeira, Porto Castro Alves, 14 Nov 1980, *Grupo Pedra do Cavalo 900* (CEPEC, HUEFS); Castro Alves, ca. 4km W de Castro Alves, na estrada para Santa Terezinha, 26 Apr 1994, *L.P. Queiroz & N.P. Nascimento 3838* (HUEFS, PEUFR); Feira de Santana, BR 116, área brejosa entre o retorno da cidade nova, 7 Sep 1983, *L.R. Noblick 2742* (CEPEC, HUEFS); Iaçu, Fazenda Suibra, 18 Km a leste da cidade, seguindo a ferrovia, 12°43'S 40°07'W, 12 Mar 1984, *L.R. Noblick & Lemos 3589* (CEPEC, HUEFS, PEUFR); Ipirá, Fazenda Macambira, 12 May 1994, *E.A. Dutra 02* (HUEFS, PEUFR); Itatim, Morro do Agenor ou da Madeira, 17 Dec 1975, *E. Melo 1416* (CEPEC, HUEFS); Lajedinho, 26 Dec 2014, *G.E.L. Macedo & G.S. Silva 2364* (HUESB); Milagres, Tartaruga, arredores, 18 Jul 1982, *G. Haschback & O. Guimarães 45133* (CEPEC); Morro do Chapéu, Vila do Ventura, 11°40'08"S 41°00'83"W, 20 Aug 2015, *R.L. Soares Neto & A.F.P. Pires 128* (JPB); Porto Seguro, ao N da cidade, 21 Mar 1974, *R.M. Harley 17276* (CEPEC). **Ceará:** Canindé, BR 020, km 183, 18 Feb

1981, *L. Vale & R. Kirmse s.n.* (EAC); Santa Quitéria, Fazenda Itataia, 26 Apr 1984, *A. Fernandes et al. s.n.* (EAC). **Espírito Santo:** Linhares, Reserva Natural Vale, Estrada Flamengo, 19 Jul 2000, *D.A. Folli 3782* (RB). **Minas Gerais:** Monte Azul, Serra do Espinhaço, subida via Montevidiu, 14 Jan 1997, *G. Deodato 65768* (MBM). **Paraíba:** Alagoinha, Estação Experimental, 2 Oct 1942, *L.P. Xavier s.n.* (JPB); *ibidem*, São José da Mata, próximo a Campina Grande, 28 Jun 1990, *M.F. Agra 1148* (JPB), João Pessoa, Praia do Cabedelo, 21 Jul 2006, *Silva 34* (ASE); Pocinhos, 9 Jul 1994, *L.P. Félix & A.M. Miranda 6553* (HST, PEUFR); São José da Mata, 1 Jan 1990, *M.F. Agra 1148* (JPB); Soledade, 13 Mar 1986, *M.F. Sales et al. 74* (PEUFR). **Pernambuco:** Águas Belas, na estrada entre Águas Belas e Saloá, Povoado Ribeira do Alto, 9°07'38"S 37°03'13"W, 30 Jun 2015, *R.L. Soares Neto et al. 125* (JPB); Buíque, Vale do Catimbau, Alcoçaba, Sítio Serrote Preto margeando o Riacho Salgado, 19 Jun 2008, *R. Pereira et al. 2717* (HUEFS, IPA); Esperança, 12 Oct 1990, *A.M. Miranda et al. 3594* (HST); Parnamirim, no Km 06 da estrada Parnamirim-Cupiará, 21 Jun 1984, *F.Araújo 174* (PEUFR); Pesqueira, Estrada Pesqueira-Arcoverde, 8°24'03"S 36°47'36"W, 28 Jun 2015, *R.L. Soares Neto et al. 121* (JPB); Sanharó, entrada do Sítio das Roças, próximo ao posto da Shell Evolux, 8°22'05"S 36°34'57"W, 28 Jun 2015, *R.L. Soares Neto et al. 120* (JPB); Santa Maria da Boa Vista, Margem da PE 04, em direção a Jutaí, 29 Apr 1971, *E.P. Heringer et al. 382* (PEUFR); Triunfo, Lagoa Nova, 27 Feb 1995, *A.M. Miranda et al. 2243* (HST, PEUFR); Venturosa, Parque Municipal Pedra Furada, 1 July 2007, *P. Gomes et al. 403* (HUEFS, UFP); Vertentes, Areias, Pacaré, 18 Oct 1941, *L.P. Xavier & U. Veloso s.n.* (JPB). **Rio de Janeiro:** Armação dos Búzios, Restinga de Manguinhos, 12 Nov 1999, *D. Fernandes 320* (RB); Cabo Frio, Entre os loteamentos Nova Califórnia e Frecheiras, 23 Aug 1972, *D. Sucre 9537* (RB); Rio de Janeiro, Monumento Natural das Ilhas Cagarras base da ilha Redonda, 2 Jul 2011, *M.G. Bovini 3556* (RB); Saquarema, Boqueirão, 20 Apr 1986, *C.L.B. Abreu 184* (RB). **Rio Grande do Norte:** Florânia, Sítio Cajueiro, Serra de Santana, próximo ao curral, 7 Mar 2009, *A.M.S. Araújo 41* (EAC); Natal, Campus Central da UFRN, ao lado do biotério do CB, 1 Oct 2004, *R.T. Queiroz 109* (JPB, UFRN); Serra Negra do Norte, Estação Ecológica do Seridó, ESEC trilha grande, 18 April 2006, *R.T. Queiroz 761* (JPB, UFRN). **Santa Catarina:** Penha, Praia da Paciência, 26°46'27"S 48°35'58"W, 14 Jul 2012, *L.A. Funez 661* (PACA); Trindade para Florianopólis, 25 Feb 1945, *A. Rohr s.n.* (PACA). **Sergipe:** Poço Redondo, 25 Jun 1984, *M.C. Santana 236* (ASE).

13. **Tarenaya domingensis** (Iltis) Soares Neto & Roalson, Acta Bot. Bras. 32: 542. 2018. *Cleome domingensis* Iltis, Brittonia 10: 56. 1958. Replaced name: *Cleome erosa* Urb.,

Symb. Antill. (Urban) 7(2): 224. 1912, nom. illeg., non *Cleome erosa* (Nutt.) Eaton, 1836. TYPE: DOMINICAN REPUBLIC. [Santo Domingo] Hab. In Sto. Domingo ad Rio Jimenoa, 1190 m alt., in margine sylvarum, May 1910, *H. von Türckhein 3303* (holotype: B B100242710 [image!]; isotype: NY 00074435!).

Shrub 1–2 m tall; branches glandular-pubescent to glabrescent. Stipular spines 4–5 × 2–2.5 mm, straight. Leaves 5–7-foliolate; petioles 4.2–9 cm long, pubescent to glabrescent, discreetly armed with short prickles; leaflets narrowly lanceolate to narrowly elliptic, basally cuneate, apically acute, margin serrulate-ciliate; surfaces glabrous on both sides; midrib and secondary veins densely to sparsely pubescent abaxially, without prickles; the central leaflet 6.3–7.5 × 1.1–1.7 cm, the other 4.3–5.6 × 0.8–1 cm; sessile. Corymbiform racemes terminal, 40 cm long. Floral bracts 8–13 × 3–5 mm, ovate, basally rounded, apically acute, puberulent to glabrescent, margin ciliate; petioles 2–4 mm long, puberulent, without prickles at base. Pedicels 25–30 mm long, puberulent to glabrescent. Sepals 8–10 × 1–1.5 mm, lanceolate, apically acuminate, margin ciliate, puberulent to glabrescent abaxially. Petals 15–18 × 7–10 mm, obovate, apically rounded, glabrous, purple at base becoming pink at apex. Nectary conic, conspicuous fleshy, persistent in fruit. Filaments 50–55 mm long, purple; anthers 8–10 mm long. Ovary 8–10 mm long, ellipsoid, glabrous; style not elongated; stigma sessile, capitate. Capsules 47–76 mm long, ellipsoid, glabrous; gynophore 50–55 mm long, glabrous. Seeds 1.5–2 × 1–1.3 mm, suborbicular, conspicuously longitudinally striate, not conspicuously transversed ridged, forming a net; cleft covered by an opaque, thin membrane.

Phenophase. Flowering from February to May, August, November and December. Fruits in April, August and November.

Distribution and habitat. Species endemic to the Dominican Republic (Figure 11). Inhabits mountains between 1200–2000 m elevation. Occurs in moist forests, at the border of woods, on riverbanks and and along roadsides.

Discussion. *Tarenaya domingensis* is a distinct species among the other species of *Tarenaya*, characterized by the narrowly lanceolate to narrowly elliptic sessile leaflets, the conspicuous fleshy conic nectary persistent in the fruit, and the long (47–76 mm long) ellipsoid capsules.

Specimens Selected. DOMINICAN REPUBLIC. **La Vega:** de 5 a 5.4 km oeste de La Culata en el camino a La Ciénaga de La Culata, 18°59’N 70°47’W, 23 Feb 1982, *T. Zanoni et al. 19271* (NY); El Montazo, from Constanza to Valle Nuevo, 29 May 1969, *A.H. Liogier 15461* (NY); en la orilla del Río Los Tablones, a la casa del Parque Nacional en Los Tablones, 19°03’N

70°54’W, 13 May 1987, *T. Zanoni et al. 39311* (NY); Jarabacoa, base of La Cotorra, Ciénaga de Manabao, 15 Aug 1968, *A.H. Liogier 12118* (NY); Pinar Parejo, 18°50’N 70° 45’W, 24 Nov 1986, *T. Zanoni & B. Boom 37084* (NY, WIS). **Peravia:** 3 km SW of La Nuez, upper Río Las Cuevas, 18° 40’N 70° 36’W, 6 Aug 1990, *S.A. Thompson & J.E. Rawlins 7701* (WIS); 24 km al Noroeste de Rancho Arriba, 18° 47’N 70° 31’W, 1 Mar 1983, *M. Mejía & J. Pimentel 486* (NY); San José de Ocoa, La Horma Arriba, 1 May 1972, *A.H. Liogier 18599* (NY).

14. **Tarenaya eosina** (J.F. Macbr.) Soares Neto & Roalson, Acta Bot. Bras. 32: 542. 2018. *Cleome eosina* J.F. Macbr., Publ. Field Mus. Nat. Hist., Bot. Ser. 4: 170. 1929. Replaced name: *Cleome microcarpa* Hassl., Repert. Spec. Nov. Regni Veg.12: 254. 1913, nom illeg., non *Cleome microcarpa* Ule. 1908. TYPE: PARAGUAY. Bella Vista, *E. Hassler 11013* (holotype: G; isotype: MPU013707[image!]).

Herb 0.6 m tall; branches glandular-puberulent to glabrescent. Stipular spines 1 × 1 mm, straight or lacking. Leaves 3–5-foliolate; petioles 2–3.8 cm long, puberulent, discreetly armed with slender prickles; leaflets elliptic to oblanceolate, basally cuneate, apically acute, margin entire, ciliate; surfaces with scattered short pointed hairs on both sides; midrib and secondary veins densely glandular, without prickles; the central leaflet 2.3–3 × 1–1.5 cm, the other 1.5–2 × 0.8–1 cm; petiolules 1–3 mm long, puberulent, unarmed. Corymbiform racemes terminal and/or axillary, 8–14 cm long. Floral bracts 8–20 × 6–10 mm, ovate or cordate, basally obtuse or cordate, apically acute, puberulent, margin ciliate; petioles 2–3 mm long, puberulent, without prickles at base or sessile. Pedicels 6–15 mm long, glandular-puberulent. Sepals 3–4 × 1 mm, lanceolate, apically acuminate, margin ciliate, puberulent on both sides. Petals 5–7 × 1.5 mm, oblong-elliptic, apically obtuse, glabrous, white. Nectary disciform, inconspicuous fleshy, obsolete in fruit. Filaments 4.5–6 mm long, white; anthers 2.5–3 mm long. Ovary 3–3.5 mm long, fusiform, glabrous; style not elongated; stigma sessile, not expanded. Capsules 15–27 mm long, fusiform, inflated, glabrous; gynophore 3–5 mm long, glabrous. Seeds 2–2.5 × 1–1.5 mm, orbicular, conspicuously longitudinally striate, with transverse ridges expanded like short spines; cleft covered by an opaque membrane. Figure 14A.

Phenophase. Flowering and fruiting in January, February, May, October, November and December.

Distribution and habitat. Occurs in Brazil (Mato Grosso) and Paraguay (Figure 11). Inhabits remnants of dry deciduous forests, Chaco forests, sandy dunes, and the Paraguayan savanna known as “Espartillar”.

***Discussion*.** *Tarenaya eosina* resembles *T. diffusa*, differing by the discreetly armed petioles, smaller and narrower leaflets 1.5–3 × 0.8–1.5 cm (vs. 1.3–9 × 2.3–3.2 cm), oblong-elliptic petals (vs. oblanceolate to spathulate) and filaments 4.5–6 mm long (vs. 4.5–11 mm long). It also can be confused with *T. tucumanensis*, from which it is distinguished by its herbaceous habit (vs. subshrubby), pedicels 6–15 mm long (vs. 15–25 mm long), narrower petals 1.5 mm width (vs. 3–4 mm width) and fruits on a shorter gynophore 3–5 mm long (vs. gynophore 30–40 mm long).

***Specimens Selected*.** BRAZIL. **Mato Grosso do Sul:** Corumbá, Feb 1911, *F.C. Hoehne 3447* (R, WIS); Ladário, Fazenda Uruba, 1ª lage, 19°04'17"S 57°29'16"W, 9 Nov 1996, *V.J. Pott et al. 3258* (PEUFR). **PARAGUAY. Alto Paraguay:** Parque Nacional Defensores del Chaco, 20°27'32"S 59°47'25"W, 15 Feb 1999, *E.M. Zardini & J. Godoy 50427* (MO). **Amambay:** cerca del Parque Nacional Cerro Corá, 9 Feb 1982, *J.F. Casas & J. Molero 6124* (MO, NY). **Boquerón:** Exp. Isla Poí, 30 km SE de Loma Plata, 22°30'S 60°W, 25 Feb 1991, *R. Vanni et al. 2274* (MO); Filadelfia, 22°20'S 60°05'W, 26 Nov 1982, *W. Hahn 790* (MO, NY, WIS); Km 412, Ruta IX Carlos A. Lopez, 2 km del Cruce Loma Plata, 12 Jan 1990, *T.F. Peña et al. 649* (MO); Proposed National Park Medanos del Chaco, 20°54'08"S 61°50'34"W, 13 Dec 1998, *E.M. Zardini & N. Duarte 49842* (MO, NY, WIS); Ruta Transchaco, 25 km SE de Nueva Asunción, 13 May 1994, *A. Krapovickas et al. 45373* (WIS). **Chaco:** Cerro León, 20°26'S 60°15'W, 3 Oct 1979, *A. Schinini & E. Bordas 17834* (WIS); Parque Nacional Defensores del Chaco, a 30 km de Aguarrica em dirección a Lagerenza, 21 Oct 1980, *J.F. Casas & J. Molero 4390* (MO, NY). **Presidente Hayes:** Between Cruce to Loma Plata and Estancia Montiel, 22°40'S 59°45'W, 26 May 1994, *E.M. Zardini & L. Guerrero 39366* (MO); Estancia Zalazar, Laguna, 22°58'50"S 59°07'05"W, 13 Dec 1996, *E.M. Zardini & J. Fernandez 45990* (MO, WIS); Isla Poí, 24 km N de la ruta Trans-Chaco, Km 415, 11 Dec 1992, *A. Krapovickas & C.L. Cristóbal 44348* (WIS).

15. **Tarenaya guaranitica** (Chodat & Hassl.) Soares Neto & Roalson, Acta Bot. Bras. 32: 542. 2018. *Cleome rosea* Vahl ex DC. var. *guaranitica* Chodat & Hassl., Bull. Herb. Boissier. ser.2, 3: 797. 1903. TYPE: PARAGUAY. Chololo: ad marginem silvae, in valle fluminis Y-aca, December 1900, *E. Hassler 6707* (holotype: G001064449 [image!]; isotypes: B 10 0242716 [image!], BM000537896 [image!], G00106446 [image!], G00106447 [image!], G00106448 [image!], K000220457 [image!], NY 00215161!, P00076111 [image!], S-R-7343 [image!], WIS0259073!, WIS0259074!). *Cleome guaranitica* Briq., Annuaire Conserv. Jard. Bot. Genève 17: 371. 1914.

Cleome rosea Vahl ex DC. var. *armata* Chodat & Hassl., Bull. Herb. Boissier. ser. 2, 3: 797. 1903. TYPE: PARAGUAY. Tobaty: ad marginem silvae, September 1900, *E. Hassler 6423* (lectotype, designated here: G00106444 [image!]; isolectotypes: G00106441 [image!], G00106442 [image!], G00106443 [image!], G00106445).

Subshrub 1–1.5 m tall; branches glandular-puberulent. Stipular spines 1–1.5 × 1 mm, straight. Leaves 3-foliolate; petioles 3–3.7 cm long, glandular-puberulent, armed with slender prickles; leaflets ovate to elliptic, basally cuneate, apically acute, margin entire, ciliate; surfaces with short eglandular hairs on both sides; midrib and secondary veins puberulent, without prickles; the central leaflet 2.7–4.3 × 1–1.7 cm, the other 2–3.5 × 0.7–1.5 cm; petiolules 1–2 mm long, puberulent, unarmed. Corymbiform racemes terminal, 20 cm long. Floral bracts 16–26 × 6–10 mm, ovate, basally obtuse, apically acute, with short eglandular hairs on both sides, margin ciliate; petioles 2–8 mm long, puberulent, with a pair of prickles at base. Pedicels 18–20 mm long, puberulent. Sepals 5–6 × 1 mm, lanceolate, apically acute, margin ciliate, puberulent abaxially. Petals 8–9 × 3–4 mm, oblong-elliptic, apically obtuse, glabrous, white. Nectary conic, inconspicuous fleshy, obsolete in fruit. Filaments 27–43 mm long, purple; anthers 3–3.5 mm long. Ovary 4 mm long, cylindric, glabrous; style not elongated; stigma sessile, discoid. Capsules 63–67 mm long, cylindric, glabrous; gynophore 40–48 mm long, glabrous. Seeds 2–2.2 × 1, suborbicular, slightly flattened dorsally, longitudinally striate, with few transversed ridges; cleft covered by small oil cells, without a membrane.

Phenophase. The collections cited here have been collected with flowers and fruits in March, September and December.

Distribution and habitat. Species endemic to Paraguay (Figure 11), known from only a few collections. Found in gallery forests.

Nomenclatural notes. G holds five specimens of *E. Hassler 6423*. G00106443 and G00106444 are labeled from Chodat and Hassler herbaria, respectively. However, all the specimens are annotated as new species. G00106443 is being designated as the lectotype because it is a more complete specimen, bearing both flowers and fruits.

Discussion. *Tarenaya guaranitica* is a 3-foliolate species positioned in the Hemiscola clade, related to *T. aculeata* and *T. cordobensis* (Chapter 1). It was treated by Iltis (1952) as a subspecies of *Cleome aculeata*. It can be distinguished by the larger sepals 5–6 mm long (*vs.* 2.5–3 mm in *T. aculeata* and 3–4 mm in *T. cordobensis*), larger petals 8–9 × 3–4 mm (*vs.* 3.5–5 × 2–2.5 mm and 5–7 × 1.5–3 mm), filaments 27–43 mm long (*vs.* 3.5–7 mm and 13–15 mm),

capsules 63–67 mm long and a long gynophore 40–48 mm long (*vs*. 22–69 mm long, sessile or on a gynophore 1–10 mm long in *T. aculeata,* and 25–40 mm long on a gynophore 12–15(–25) mm long in *T. cordobensis*).

Specimens Selected. PARAGUAY: **Paraguari.** National Park Ybicuí, 26°01'S 56°46'W, 12 Mar 1992, *E.M. Zardini & T. Tilleria 31084* (MO, NY, WIS).

16. **Tarenaya hassleriana** (Chodat) Iltis, Novon 17(4): 450. 2007. *Cleome hassleriana* Chodat, Bull. Herb. Boissier 6, App. 1: 12. 1898. TYPE: PARAGUAY. Ad ripam fluminis pr. Apa, fl. Maj., *E. Hassler 162* (lectotype, designated here: G00106464 [image!], isolectotype: G00106525 [image!]).

Herb to shrub 0.7–1.8 m tall; branches pubescent to glandular-pilose throughout. Stipular spines 3–4 × 2 mm, straight. Leaves 5–7-foliolate; petioles 3.5–9 cm long, pubescent, usually armed with slender to stout straight prickles, rarely unarmed; leaflets elliptic to oblanceolate, basally cuneate to attenuate, apically acute to acuminate, margin minutely serrulate-ciliate; surface pubescent on both sides; midrib and secondary veins pubescent, with prickles; the central leaflet 4.7–8.5(–12) × 1.5–2.5(–4) cm, the other 3.8–6.5(–9.5) × 1.8–2(–3) cm; petiolules 1–3 mm long, densely pubescent, unarmed. Corymbiform racemes terminal, 27–40 cm long. Floral bracts 10–22 × 5–8 mm, ovate or cordate, basally obtuse to cordate, apically acute, glabrescent, margin ciliate; petioles 2–4 mm long, pubescent, without prickles at base. Pedicels 20–50 mm long, pubescent. Sepals 5–7 × 1 mm, linear-triangular to narrowly lanceolate, apically acuminate to long acuminate, margin ciliate, pubescent abaxially. Petals 18–20 × 7–8 mm, oblong to oblanceolate, apically obtuse, glabrous, white or purplish. Nectary conic, inconspicuous fleshy, obsolete in fruit. Filaments 50–70 mm long, wine; anthers 8–11 mm long. Ovary 4–8 mm long, cyindric, glabrous; style not elongated; stigma sessile, discoid. Capsules 50–100 mm long, cylindric, glabrous; gynophore 40–80 mm long, glabrous. Seeds 2–2.5 × 1.5–2 mm, suborbicular, longitudinally striate, transversed ridged; cleft covered by a shiny membrane. Figure 12A–E.

***Phenophase*.** Flowering and fruiting all the year.

Distribution and habitat. Native to South America, occurs from Bahia to Rio Grande do Sul, in Brazil, and in Argentina and Paraguay (Figure 13). It can be found along riversides, in gallery forests, in flooded areas, along the borders of semideciduous forests, in wet forests, and along roadsides and in disturbed areas.

***Uses*.** Cultivated as ornamental around the world.

Vernacular name. "feijão-de-venda" (*D.A. Folli 2554*); "sete-marias", "mussambê"; "mussambê-de-espinho", "beijo-fedorento" (Costa-e-Silva, 2000).

Nomenclatural notes. There are two specimens of *Hassler 162* deposited in G. Both specimens are good representatives for *Tarenaya hassleriana* bearing diagnostic features to recognize the species. However, G00106464 is being designated as lectotype because there is a Chodat's handwriting labeled "spec. nov." and it is supposed to be a material used by Chodat to describe the species.

Discussion. *Tarenaya hassleriana* has been wrongly identified as *T. spinosa* in many herbaria. Both species have the same subshrub habit, armed petioles, 5–7-foliolated leaves and very similar floral features which overlap when compared. Nevertheless, *T. hassleriana* is native to South America while *T. spinosa* occurs from Mexico to Venezuela and Colombia, and in the West Indies. Furthermore, *T. hassleriana* has larger petals (18–20 × 7–8 mm *vs*. 7–15 × 3–5 mm), filaments 50–70 mm long (*vs*. 21–33 mm), anthers 8–11 mm long (*vs*. 6–9 mm), and a gynophore 40–80 mm long (*vs*. 15–30(–35) mm).

Specimens Selected. ARGENTINA. **Buenos Aires:** San Pedro, 28 Nov 1943, *E. Luora 3435* (WIS). **Corrientes:** Bella Vista, Ruta 27, 10 km S de Bella Vista, 13 Oct 1974, *A. Schinini & C.L. Cristóbal 9842* (WIS); Capital, Jan 1944, *T. Meyer 6614* (WIS); Empedrado, Estancia "Las Tres Marias", 15 Dec 1971, *T.M. Pederson 10045* (MBM, NY); Esquina, Ruta 27, 3 km N de Esquina, 1 Dec 1974, *A. Krapovickas et al. 26968* (WIS); Ituzaingó, Isla Apipé Grande, Puerto Mora, 11 Dec 1973, *A. Krapovickas et al. 24266* (MBM, WIS); Paso de La Patria, Camino Pto. González, 17 Oct 1977, *R. Vanni 22* (WIS); San Cosme, Rio Paraná, 20 Jun 1973, *A. Krapovickas et al. 23644* (MBM, WIS). **Entre Rios:** Delta Paraná, Arroyo Brazo Largo, 26 Mar 1937, *A. Burkart 8302* (WIS); Gualeguaychu, 14 Apr 1963, *A. Burkart & N. Trancoso 24177* (WIS). **Guairá:** Colonia Independencia, 25°45'S 56°13'W, 25 Dec 1996, *A. Schinini & E. Bordas 25251* (WIS). **Missiones:** Candelaria, Puerto de Sta. Ana, 27°20'S 55°35'W, 10 Oct 1996, *O. Morrone et al. 1161* (MO); General Belgrano, 26°23'S 53°48'W, 1 Mar 1995, *F.O. Zuloaga et al. 5122* (MO); Eldorado, 5 km W de intersección de rutas 17 y 20, 2 Jul 1986, *S. Ferrucci et al. 553* (MBM); Iguazú, Parque Nacional Iguazú, Cataratas, 23 Oct 1991, *J.H. Hunziker & J.C. Gamerro 11885* (MO). BRAZIL. **Bahia:** Abaíra, Catolés, Serra do Barbado, 26 Feb 1994, *P.T. Sano et al. CFCR 14572* (MO, PEUFR); Campo Alegre, Estrada para Pitomba-Salvador, sem local determinado, 1951, *I. de Menezes s.n.* (ESAL); Ipiaú, Jitauna, 25 Aug 1964, *C.M. Magalhães 226* (CEPEC); Ubatã, Barra do Rocha, 8 Mar 1996, *R. Pinheiro 76* (CEPEC). **Distrito Federal:** Brasília, Grounds of University of Brasília, 10 Sep 1964, *G.T.*

Prance & N.T. Silva s.n. (RB, WIS). **Espiríto Santo:** Santa Teresa, arredores de Santa Teresa, 26 Nov 1953, *A.P. Duarte 3942* (RB); Venda Nova do Imigrante, Sítio Guaçuvirá, ICEB, 2 Feb 2004, *D.A. Folli 2554* (CVRD, RB, WIS); Vitória, Ad aerodromum in dumetosis, 13 Jan 1940, *B. Rambo s.n*. (PACA). **Mato Grosso:** Alto Araguaia, BR 364, 15 Nov 1973, *G. Hatschbach & C. Koczicki 33252* (MBM, WIS). **Mato Grosso do Sul:** Aquidauana, Pirizal, 10 Jun 1985, *D.S. Pinto s.n*. (PEUFR); Jateí, Parque Estadual do Rio Ivinhema, lagoa Peroba, 22°54'30"S 53°38'24"W, 17 Oct 2007, *S.R. Slusarski et al*. *60* (UFRN); Taquarassu, Rio Baía, Fazenda Unida, 28 Sep 1993, *M. Curti & M.C. Souza-Stevaux 3* (UFRN). **Minas Gerais:** Campo Alegre, sine data, *A.J. Sampaio 25082* (R, WIS); Coronel Pacheco, E.E.A.L., 4 Jan 1963, *S.V. Monteiro 2591* (RB); Itinga, Itinga para Pedra Azul, 23 Nov 1964, *A.P. Duarte s.n*. (PEUFR); Jaíba, APA Sabonetal, fazenda Agropeva, 20 Oct 2007, *R.M. Castro et al*. *21* (ESAL); Juiz de Fora, In weedy clay dump and waste place along rio Paraibuna at bridge of Rua Carlos Otto, 18 Oct 1970, *M. Nee 3443* (RB, WIS); Lavras, Departamento de Agricultra-Floricultua, UFLA, Oct 2001, *V.F. Gomes s.n*. (ESAL); Madre de Deus de Minas, Área de deposição do rio, 17 Nov 1990, *S.C. Pereira et al. s.n.* (ESAL); Monte Belo, Fazenda Lagoa, 1991, *M.C.W. Vieira 1824* (RB); Ouro Fino, sem local determinado, 30 Oct 2010, *G.T.P. Barbosa 15* (ESAL); Ouro Preto, 5 Jan 1951, *A. Macedo 2848* (WIS); Paraisópolis, Brejo do Rio Sapucahy, 23 Apr 1927, *F.C. Hoehne s.n*. (PEUFR); Paraopeba, 10 Jun 1959, *E.P. Heringer 31844* (WIS); Riacho dos Machados, 21 Sep 1963, *R.S. Santos & A. Castellanos 24314* (WIS); Rio Preto, às margens do Rio do Funil, 2 Nov 1967, *J.P. Carauta 489* (RB, WIS); São João del-Rei, sem local determinado, 2 Oct 2005, *C.A. Atala s.n.* (ESAL); Sete Lagoas, Estação Experimental, 13 Sep 1950, *A.P. Duarte 3259* (RB). **Paraná:** Campo Magro, Caverna de Sumidouro, 14 Oct 1997, *G. Tiepolo & A.C. Svolenski 707* (MBM); Céu Azul, trilha para a Cachoeira Jacutinga, 10 Oct 2009, *L.G. Temponi et al. 591* (MBM); Curitiba, Parque Barigui, 29 Nov 1996, *C. Kozera & V.A.O. Dittrich 93* (MBM); Foz do Iguaçu, Avenida da Ponte, 2 Oct 1979, *Buttura 255* (MBM); Gauira, Córrego da Onça, 9 Dec 1982, *G. Hatschbach 45829* (MBM, WIS); Londrina, Lago Igapó, 14 May 1986, *H.H. Suguimoto s.n*. (PEUFR); Mandirituba, Rio da Várzea, 27 Dec 1966, *J. Lindeman & H. Haas 3698* (MBM); Marechal Candido Rondon, Porto Britonha, 18 Sep 1981, *G. Hatschbach 44004* (MBM, WIS); Morretes, 25 Oct 2006, *R.T.A. Santos s.n*. (MBM); Pinhão, Rio Iguaçu, próximo à barra do Rio Divisa, 11 Mar 1991, *G. Hatschbach & J. Saldanha 55254* (MBM); Santa Helena, Porto Verde, 9 Dec 1977, *G. Hatschbach 40558* (MBM, WIS); São José dos Pinhais, Rio Miringuava, 31 Jul 1986, *J.M. Silva & J. Cordeiro 148* (MBM, WIS); São Mateus do Sul, Fazenda do Durgo, 28 Nov 1986, *S.M. Silva et al. 944* (MBM); Tijucas do Sul, Represa de Vossoroca, 8 Feb 1975, *R. Kummrow 867* (MBM, WIS). **Rio de Janeiro:**

Cambuci, Funil (RJ 194), 25 Aug 1981, *J.P. Carauta et al. 3821* (WIS); Campos dos Goytagazes, 9 Dec 1953, *S. Vianna et al. 1190* (R, WIS); Caxias, Reserva da Petrobras, trilha ao redor da represa, 26 Aug 1997, *J.A. Lira Neto et al. 637* (RB); Duque de Caixias, Reserva da Petrobras, 22°31'S 43°16'W, 26 Aug 1997, *J.A. Lira Neto et al. 637* (RB, WIS); Nova Friburgo, 26 Sep 1964, *E. Santos et al. 2037* (PEUFR); Paraíba do Sul, na margem do Rio Paraíba do Sul, 25 Jul 1984, *J.P. Carauta 4794* (WIS); Petrópolis, Correas, Oct 1944, *O.C. Goés & D. Constantino 661* (RB); Santa Maria Madalena, margem do Rio Grande, 29 Sep 1979, *Moutinho & Ventura 37* (PEUFR); Resende, Porto Real, 21 Oct 1981, *J.P. Carauta & M.R.V. Barbosa 3867* (WIS); Volta Redonda, Floresta da Cicuta, 12 Oct 1985, *J.P. Carauta et al. 5086* (WIS). **Rio Grande do Sul:** Caxias do Sul, Fazenda Souza, 1 Apr 2000, *A. Kegler 951* (NY); Nova Bassano, 25 Oct 1986, *G. Grazziotin & N. Peruffo s.n.* (MBM); São Francisco de Paula, Canela, 23 Feb 1953, *K. Emrich s.n.* (MBM). **Santa Catarina:** Itapiranga, Fallow field near ferry landing, 27°10'S 53°43'W, 17 Oct 1964, *L.B. Smith & P.R. Reitz 12620* (NY, R); Lontras, Salto do Pilão, 19 Oct 1958, *Reitz & Klein 4073* (WIS); Rodeio, Rua Barão do Rio Branco, 26°55'27"S 49°22'15"W, 29 May 2012, *L.A. Funez 556* (RB). **São Paulo:** Barretos, às margens do Rio Preto, Nov 1917, *A. Frazão 56* (RB); Campinas, 1950, *Dr. Dedeca s.n.* (RB); Campos do Jordão, Jan 1944, *E. Friedrichs s.n.* (PACA); Lorena, Beira Parahyba, Nov 1921, *J.G. Belforge 3* (RB); Mogi-Guaçu, Distrito de Martinho-Prado, 4 Dec 1976, *H.F. Leitão & P. Gibbs 4040* (RB); Pinheiros, próximo ao Shopping Eldorado, 15 Oct 1996, *M.B. Costa-e-Silva 1286* (IPA); Piracicaba, Mata da Bica, 22°45'15"S–47°51'47"W, 23 Aug 1994, *K.D. Barreto et al. 2996* (PEUFR); Santo Amaro, 10 Nov 1956, *O. Scavone s.n.* (RB); Santo André, 3.1 km east of Campo Grande RR Station, 28 Oct 1965, *G. Eiten 6388* (NY, WIS); São Paulo, Jardim na Saúde, 30 Oct 1995, *E.D. Cestaré s.n.* (ESAL); São Roque, 28 Nov 1981, *M. Kerichi 1728* (NY); Tapiraí, Fazenda Água Doce, 24°01'40"S 47°33'03"W, 20 Oct 1994, *K.D. Barreto et al. 3107* (PEUFR). PARAGUAY. **Caaguazú:** cerca de Carayaó, 13 Oct 1980, *J.F. Casas & J. Molero 4247* (NY, MO). **Itapúa:** Orilla del Río Paraná cerca del Puerto San Rafael, 27°21'S 54°55'W, 6 Nov 1985, *D.R. Brunner 1322* (MO). **Paraguay:** 35 km N of Caapucu, 26°10'S 57°10'W, 4 Aug 1984, *W. Hahn 2723* (MO). **Presidente Hayes:** Concepción, Pozo Coloroado, 23°32'S, 58°08'W, 19 Nov 1993, *E.M. Zardini & L. Guerrero 37540* (MO, WIS). **San Pedro:** Santa Rosa-Santa Barbara, 23°50'26"S 56°23'47"W, 11 Mar 1998, *E.M. Zardini & M. Vera 48120* (MO, NY, WIS).

17. **Tarenaya horrida** (Mart. ex Schult. & Schult. f.) Roalson & Soares Neto, Acta Bot. Bras. 32: 543. 2018. *Cleome horrida* Mart. ex Schult. & Schult. f., Syst. Veg., ed. 15 bis [Roemer

& Schultes] 7(1): 32. 1829. TYPE: BRAZIL. Espírito Santo, Itapemirim, *Prinz Max. von Neuwied s.n.* (lectotype: BR 698551 [image!], designated by Soares Neto & al., Acta Botanica Brasilica 32: 543. 2018; isolectotypes: BR 698580 [image!]; WIS 0258937 [image!]). *Cleome spinosa* L. f. *horrida* (Mart. ex Schult. & Schult. f.) Eichler, Fl. Bras. 13(1): 253. 1865. ≡ *Cleome spinosa* Jacq. var. *horrida* (Mart. ex Schult. & Schult. f.) Fawc. & Rendle, Fl. Jamaica 3: 226. 1914.

Cleome richii A. Gray, U.S. Expl. Exped., Phan. 15: 67. 1854. TYPE: BRAZIL. Rio de Janeiro, *Wilkes s.n.* (holotype: US 00100494 [image!]).

Cleome scabrella Eichler, Vidensk. Meddel. Naturhist. Foren. Kjøbenhavn 188. 1870. TYPE: BRAZIL. Rio de Janeiro, Teresópolis, *A. Glaziou 1595* (lectotype, designated here: BR 698617[image!]; isolectotypes: BR 698552[image!], C, F (frag. + neg.) V0053150F[image!], P00141281[image!], R000007496!, WIS0259075!).

Herb to subshrub 0.7–1.4 m tall; branches glandular-pubescent throughout. Stipular spines 4–5 × 2–2.5 mm, curved. Leaves 5–7-foliolate; petioles 5–11 cm long, pubescent-glandular, armed with slender or stout curved prickles; leaflets elliptic, basally attenuate, apically acuminate to long acuminate, margin serrulate-ciliate; surface with scattered short eglandular hairs on both sides; midrib and secondary veins densely pubescent, with prickles; the central leaflet 4–7 × 1–2 cm, the other 3–6 × 0.8–1.7 cm; petiolules 1–2 mm long, densely glandular-pubescent, armed. Corymbiform racemes terminal, 23–35 cm long. Floral bracts 10–15 × 6–8 mm, ovate, basally rounded or cordate, apically acute, with scattered short eglandular hairs on both sides, margin ciliate; petioles 1–3 mm long, pubescent-glandular, with a pair of prickles at the base. Pedicels 32–40 mm long, puberulent to glabrescent. Sepals 5–6 × 1–1.5 mm, lanceolate, apically acuminate, margin ciliate, puberulent abaxially. Petals 14–20 × 5–8 mm, oblong-elliptic, apically obtuse, glabrous, white. Nectary conic, inconspicuous fleshy, obsolete in fruit. Filaments 50–60 mm long, purple; anthers 7–9 mm long. Ovary 12–15 mm long, cylindric, pubescent; style not elongated; stigma sessile, capitate. Capsules 92–145 mm long, cylindric, glabrescent to glabrous; gynophore 50–60 mm long, glabrous. Seeds 1.5–2 × 1–1.3 mm, suborbicular to orbicular, verrucose; cleft covered by a smooth membrane.

Phenophase. Collected with flowers and fruits in February, March, April, June, September and November.

Distribution and habitat. Species endemics to Brazil (Espírito Santo, Minas Gerais, Rio de Janeiro e São Paulo states), Figure 13. It occurs in swamps, along riversides, and in gallery forests, from sea level to 1400 m elevation.

Nomenclatural notes. Several herbaria hold duplicates of *Glaziou 1595*. BR 698617 has Eichler's handwrite notation as "species original!", so this specimen is being designated as the lectotype of *Cleome scabrella* because it is supposed to be used to describe the species.

***Discussion*.** *Tarenaya horrida* is commonly confused with *T. hassleriana* and *T. longicarpa* because of similar floral features. It can be distinguished from both by the presence of curved stipular spines and prickles, the latter abundant on petioles and abaxially on the midrib and secondary veins.

***Specimens Selected*.** BRAZIL. **Espírito Santo:** Vitória, Praia da Costa, 21 Mar 1962, *E. Santos 1174* (PEUFR). **Minas Gerais:** Baependi, Usina Hidrelétrica Congonhal, Rio Jacu, 13 Nov 2000, *A. Salino & L.C.N. Melo 5869* (BHCB); Cristina, PCH Cristina, Apr 2000, *L.V. Costa s.n.* (BHCB); Lavras, 8 Sep 1982, *M.L. Gavilanes 3151* (ESAL); Passagem Mariana, Margem do Canal, 18 Jun 1942, *Black 2351-B* (ESAL); Pavão, 21 Apr 2012, *W.C. Cardoso & A.M. Tedesco 117* (VIES). **Rio de Janeiro:** Parque Nacional das Serras dos Órgãos, Fazenda Dr. Portugal, 28 Nov 1948, *A.C. Brade 19474* (PEUFR, RB); Parque Boca da Mata: dentro de uma chácara, atrás de uma escola, 30 Sep 1995, *J.M. de Rezende 145* (PEUFR 28147). **São Paulo:** Arujá, 6 Nov 1990, *N.T. Tamada s.n.* (ESAL); Bananal, Itaguassu, 31 Oct 1901, *A. Hammar s.n.* (PEUFR); São Paulo, Cidade Jardim, 28 Feb 1932, *W. Hoehne s.n.* (PEUFR).

18. **Tarenaya houstonii** (R. Br.) Soares Neto & Roalson, Acta Bot. Bras. 32: 543. 2018. *Cleome houstonii* R. Br., Hort. Kew., ed. 2 [W.T. Aiton] 4: 131. 1812. TYPE: (lectotype: t. 45, in Martyn, Hist. Plant. Rar. v. 5. 1736, designated by Soares Neto & al. 2018, Acta Botanica Brasilica 32: 543. 2018).

Cleome cubensis A. Rich., Hist. Phys. Cuba, Pl. Vasc. 1: 74. 1845. TYPE: [CUBA]. Crescit in cultis circa Havanam, *sine data*, *R. de la Sagra s.n.* (lectotype: P00076121[image!], designated by Rodríguez, Flora de La República de Cuba, 10(2): 10. 2005).

Herb to subshrub 1 m tall; branches pubescent or glandular-pubescent to glabrescent. Stipular spines 1–3 × 1–1.5 mm, straight. Leaves 3–5-foliolate; petioles 3.2–7.5 cm long, pubescent, usually unarmed, rarely with few slender straight prickles; leaflets elliptic to lanceolate-elliptic, basally attenuate to cuneate, apically acuminate, margin serrulate-ciliate; surface with scattered short eglandular hairs throughout or glabrous; midrib and secondary veins pubescent, with prickles; the central leaflet 4.5–7.3 × 1.3–2.2 cm, the other 3–4 × 1–1.6 cm; petiolules 1–2 mm long, pubescent, unarmed. Corymbiform racemes terminal, 20–40 cm long. Floral bracts 3.5–11 × 2–6 mm, ovate, basally cordate, apically acute, glabrescent, margin

ciliate; petioles 1 mm long, glabrescent, with a pair of prickles at the base. Pedicels 17–22 mm long, glabrescent. Sepals 5–6 × 1 mm, linear-triangular, apically acuminate, margin ciliate, pubescent abaxially. Petals 4.5–5 × 2.5 mm, obovate, apically rounded, glabrescent to glabrous, red. Nectary disciform, inconspicuous fleshy, obsolete in fruit. Filaments 8–10 mm long, purple; anthers 2–3 mm long. Ovary 5 mm long, cylindric, puberulent; style 1–2 mm long; stigma capitate. Capsules 61–80 mm long, cylindric, glabrous; gynophore 2–7 mm long, glabrous. Seeds 1.2–1.5 × 1 mm, suborbicular to orbicular, longitudinally striate, with subequal claws, with or without few transverse slightly conic excrescence; cleft small covered by a thin, inconspicous membrane. Figure 15.

Phenophase. Collected with flowers and fruits in February, March, April, May and August.

Distribution and habitat. Species endemic to Cuba (Figure 17), occurs on river banks, in vacant lots, and along borders of salt marshes, from sea level up to 50 m elevation.

Discussion. *Tarenaya houstonii* is known from few collections. In flower, it is easily recognized by its unique red petals. Among the other species occurring in Cuba, *T. houstonii* can be distinguished from *T. spinosa* by its 3–5-foliolate leaves (vs. 5–7-foliolate), petals 4.5–5 × 2.5 mm (vs. 7–15 × 3–5 mm), disciform nectary (vs. conic), shorter filaments 8–10 mm long (vs. 21–33 mm) and anthers 2–3 mm long (vs. 6–9 mm), and fruits on a 2–7 mm long gynophore (vs. 15–35 mm).

Specimens Selected. CUBA. **Havana:** border of salt marsh, La Playa de Marianao, 1 May 1905, *A.H. Curtiss 740* (MO, NY). **Matanzas:** vicinity of Matanzas, Valley of the Cannimar, 16 Mar 1903, *N.L. Britton et al. 381* (NY); Yumury, 1849, *F. Rugel 278* (MO, NY). **Pinar del Río:** Finca San Antonio, Bahía Honda, 19 Mar 1951, *B. Alain 1784* (MO); *sine loco*, 25 Apr 1903, *J.A. Shafer 398* (NY); vicinity of Pinar del Río, Mar 1911, *E.G. Britton 10035* (NY). **Santa Clara:** District of Cienfuegos, Abreus, Río Damuji, 20 Aug 1895, *R. Combs 632* (MO, NY); Jibacoa, NW of Cienfuegos, 11 Apr 1930, *B. León 14310* (NY).

19.**Tarenaya inermis** (Malme) Soares Neto & Roalson, Acta Bot. Bras. 32: 543. 2018. *Cleome inermis* Malme, Ark. Bot. 22A(7): 5. 1928. TYPE: BRAZIL. Rio Grande do Sul: Cachoeira, in silvula clara, 10 January 1902, *G. Malme II 1041* (lectotype: S-R-7321 [image!], designated by Soares Neto & al. 2018, Acta Botanica Brasilica 32: 543. 2018; isolectotypes B 10 0242693 [image!], S10-16936 [image!], WIS0258939!, WIS0258940!).

Herb 0.5 m tall; branches pubescent to hirsute throughout. Stipular spines absent. Leaves 5-foliolate; petioles 3.5–5 cm long, densely pubescent, unarmed; leaflets elliptic, basally

cuneate to attenuate, apicaly acute to acuminate, margin serrulate-ciliate; surface glabrescent adaxially, glabrous abaxially; midrib and secondary veins densely pubescent on both sides, without prickles; the central leaflet 5–5.7 × 1.2–1.5 cm, the other 4.2–5 × 1–1.2 cm; sessile. Corymbiform racemes terminal, 11–17 cm long. Floral bracts 5–10 × 3–5 mm, ovate, basally rounded, apically acute, pubescent on both sides, margin ciliate; petioles 1 mm long, pubescent, without prickles at base. Pedicels 18–22 mm long, pubescent to puberulent. Sepals 4.5–5 × 1 mm, lanceolate, apically long acuminate, margin ciliate, densely puberulent abaxially. Petals 8–10 × 2–2.5 mm, elliptic to oblanceolate, apically obtuse, glabrous, pink. Nectary conic, inconspicuous fleshy, obsolete in fruit. Filaments 20–30 mm long, purple; anthers 3.5–4 mm long. Ovary 2–10 mm long, cylindric, puberulent; style not elongated; stigma sessile, not expanded. Capsules 45–55 mm long, cylindric, puberulent; gynophore 20 mm long, glabrous. Seeds 1.5 × 1 mm, suborbicular, longitudinally striate, sparsely transversed ridged, the ridges very conspicous; cleft covered by an opaque membrane, attaching the claws. Figure 14B.
Phenophase. Collected with flowers and fruits in July and November.

Distribution and habitat. Species endemic to southern Brazil, in the state of Rio Grande do Sul (Figure 13). Occurs on rocks and along borders of woods.

Discussion. *Cleome inermis*, basyonym of *Tarenaya inermis* was frequentely identified as *C. rosea* s.l. (=*T. rosea*) and was considered as a one of its subspecies: *C. rosea* subsp. *inermis* Iltis [unpublished]. However, *T. inermis* is restricted to inner Rio Grande do Sul, while *T. rosea* is distributed along the Brazilian coast from Rio de Janeiro to Santa Catarina. *T. inermis* is a pubescent to hirsute herb (vs. glabrous in *T. rosea*) without stipular spines (vs. presence of straight stipular spines), with long acuminate sepals 4.5–5 ×1 mm (vs. acuminate 2.5–3(–3.5) × 0.5–1 mm), and cylindric capsules 45–55 mm long (vs. (35–)50–87 mm).

Specimens Selected. BRAZIL. **Rio Grande do Sul:** Bagé, Casa de Pedra, 3 Nov 1989, *I. Fernandes 690* (PACA); Montenegro, Pareci Velho, 50 km N of Porto Alegre, Jul 1938, *B. Rambo s.n.* (PACA).

20. **Tarenaya latifolia** (Vahl ex DC.) Soares Neto & Roalson, Acta Bot. Bras. 32: 543. 2018. *Cleome latifolia* Vahl ex DC., Prodr. 1: 239. 1824. TYPE: [GUIANA] In Guiana, v.s. in h. Vahl (neotype: French Guiana, 1858, *P.A. Sagot 1170*, P00076114[image!], designated by Soares Neto & al., Acta Botanica Brasilica 32: 543 2018; isoneotypes: GOET [photo at WIS], P000745091 [image!], P00076129 [image!]).

Cleome hostmanni Miq., Linnea 22: 470. 1849. TYPE: SURINAME. *Hostmann 118* (lectotype, designated here: K000220445 [image!]; isolectotypes: BM000629068 [image!], FI003964 [image!], G00226212 [image!], G00226213 [image!], P00141280 [image!], U 0000963 [image], WIS v0258938!).

Herb 0.7 m tall; branches puberulent. Stipular spines 1.5 × 1 mm, straight. Leaves 3-foliolate; petioles 2–6 cm long, puberulent, discreetly armed with few prickles; leaflets lanceolate to elliptic or oblanceolate-elliptic, basally cuneate to attenuate, apically acuminate, margin entire, slightly sinuose; surface scattered with short eglandular hairs adaxially, glabrous abaxially; midrib and secondary veins puberulent, without prickles; the central leaflet 6.5–10 × 2.5–4 cm, the other 3.2–5.5 × 1.5–3 cm; petiolules 1 mm long, puberulent, unarmed. Corymbiform racemes terminal, more than 40 cm long. Floral bracts 10–15 × 5–10 mm, ovate or orbicular, basally obtuse or cordate, apically acute or obtuse, glabrous adaxially, puberulent abaxially, margin sinuose-ciliate; sessile. Pedicels 15–20 mm long, puberulent. Sepals 2.5–3 × 0.5–1 mm, lanceolate, apically acute, margin ciliate, puberulent to glabrescent abaxially. Petals 5–6 × 2–3 mm, oblong-elliptic, apically obtuse, glabrous, white. Nectary conic, inconspicuous fleshy, obsolete in fruit. Filaments 10–15 mm long, purple; anthers 3 mm long. Ovary 2 mm long, cylindric, puberulent; style not elongated; stigma sessile, strongly capitate. Capsules 40–70(–95) mm long, cylindric, puberulent; gynophore 15–23 mm long, glabrous. Seeds 1.5–2 × 1 mm, suborbicular, longitudinally striate, transverse-rugolose, undulate; without cleft membrane. Figure 22A.

Phenophase. Probably flowering and fruiting throughout the year. It has not been collected only in September.

Distribution and habitat. From Venezuela, Guiana, French Guiana, Suriname, and Brazil (Amazonas, Maranhão and Pará states), Figure 18, along river banks, *várzea* forests, *terra firme* forests, *igapó* forests, on and roadsides.

Vernacular names. "wild mustard" (Iltis 1952).

Nomenclatural notes. *Hostmann 118* has many duplicates distributed among different herbaria but there was not a clear known holotype. U 0000963 has unreadable handwriting after the author's name, so it is unclear if this specimen was used by Miquel to describe the species. K000220445 is being chosen as lectotype because it is in good condition, bearing flowers and mature capsules, good diagnostic features to recognize the species.

Discussion. *Tarenaya latifolia* may be confused with *T. aculeta* because both species have 3-foliolated leaves and cylindric capsules of very similar length (22–69 mm long vs. 40–70 mm long). It can be distinguished by the discreetly armed petioles (vs. unarmed), oblong-elliptic petals (vs. spathulate), conic nectaries (vs. disciform), filaments 10–15 mm long (vs. 3.5–7 mm) and gynophores 15–23 mm long (vs. not elongated or 1–10 mm long).

Specimens Selected. BRAZIL. **Amazonas:** Borba, rio Abacaxis, 4°22'S 58°40'W, 5 Jul 1983, *C.A.C. Ferreira 4070* (NY, WIS); Humaitá, east bank of Rio Madeira, 1 km N of Humaitá, 2 Dec 1966, *G.T. Prance et al. 3540* (NY, WIS); Paraná do Urariá, 16 Mar 1924, *J.G. Kuhlman 1630* (RB, WIS). **Maranhão:** 1960, *O. de Carvalho 6* (RB); Viana, 23 Jul 1960, *O. de Carvalho 18* (photo at WIS). **Pará:** Almeirim, Monte Dourado, 27 Feb 1986, *M.J. Pires et al. 794* (WIS); Altamira, Picada da Topografia no largo do murici, à margem esquerda subindo o rio, 18 Oct 1986, *S.A.M. Souza et al. 360* (MO); Cuantã do Anajás, Rio Anajás between Anajás and Vista Alegre, 0°57'S 49°48'W, 5 Nov 1987, *H.T. Beck et al. 315* (NY, WIS); Jari, estrada de Caracurú, 5 Aug 1969, *N.T. Silva 2596* (NY, WIS); margem do rio Jari entre Monte Dourado e Matadouro, 18 May 1969, *N.T. Silva 1991* (NY, WIS); Oriximiná, rio Trombetas, margem esquerda em frente à Mineração Sta. Patrícia, 7 Jul 1980, *C.A.C. Ferreira et al. 1342A* (NY, WIS). **Rondônia:** Rio dos Pacaás Novos, between the first and second cachoeiras, 18 Mar 1978, *W.R. Anderson 12173* (NY, WIS). **Tocantins:** Rio Vermelho, ao longo do rio, 2 May 1951, *R.L. Fróes 27041* (WIS). FRENCH GUIANA. Saut Stephanie, Bassin du Sinnamary, 4°27'N 52°54'W, 9 Jan 1992, *M. Hoff 7282* (MO, NY). GUYANA. Akyma**,** Demerara River above Wismar, Jan 1920, *A.S. Hitchcock 17440* (NY); **Berbice Oriental-Corentyne:** Baba Grant Sawmill, along Corentyne river, 5°00'N 57°42'W, 19 Apr 1990, *T. McDowell & D. Gopaul 2363* (NY); **Upper Takutu-Upper Essequibo:** E of bank Essequibo, South of Parika, 24 Jan 1962, *W.H.A. Hekking 1242* (WIS); Kanuku Mts., Rupununi R., Puwib R., near "the farm" of the Captain of Sandcreek, 3°07'N 59°26'W, 14 Feb 1985, *M.J. Jansen-Jacobs et al. 195* (NY, WIS). SURINAME. Bank of Tanji Mamma R. (trib. Coppename R.), 18 Nov 1954, *A.M.W. Mennega 461* (NY). **Saramacca:** Along Saramacca river between Doorsenee and Peprekampoe, 1 Feb 1951, *J. Florschütz & P.A. Florschütz 254* (NY); *sine loco*, 1903, *A. Pulle 144* (NY). VENEZUELA. **Bolivar:** Reserva Florestal "La Paragua", márgenes del río Asa, Jun 1970, *C. Blanco 785* (MO).

21. **Tarenaya lilloi** (S.A.Gómez) Arana & Oggero, Phytotaxa 267(2): 163. 2016. *Cleome lilloi* S.A.Gómez, Lilloa 26: 311. 1953. TYPE: ARGENTINA. Formosa, Dpto. Pilagá, Estancia

Yacaré, 26 November 1944, *S.A. Pierotti 12* (holotype: LIL 111370, two sheets: A and B, [image!]; isotype: A00042334 [image!]).

Subshrub 1.5 m tall; branches glandular-pubescent. Stipular spines 1.5–5 × 2–2.5 mm, slightly curved at apex. Leaves 5–7-foliolate; petioles 3–8.5 cm long, glandular-pubescent, armed with slender to stout straight prickles; leaflets obovate to oblanceolate, basally cuneate, apically obtuse-apiculate, margin ciliate; surface with scattered short eglandular hairs on both sides; midrib and secondary veins densely pubescent, without prickles; the central leaflet 3.3–5 × 1.6–2.2 cm, the other 2.8–4 × 1.2–2 cm; petiolules 1–3 mm long, pubescent, armed. Corymbiform racemes terminal, 15 cm long. Floral bracts 11–17 × 6–14 mm, ovate, basally rounded, apically obtuse, with scattered short eglandular hairs on both sides, margin ciliate; petioles 2–5 mm long, pubescent, with a pair of prickles at the base. Pedicels 20–30 mm long, pubescent. Sepals 8–9 × 1–2 mm, lanceolate, apically acuminate, margin ciliate, pubescent abaxially. Petals 30–33 × 8–12 mm, oblong-elliptic, apically obtuse, glabrous, white. Nectary conic, inconspicuous fleshy, obsolete in fruit. Filaments 95–110 mm long, purple; anthers 12–13 mm long. Ovary 7–10 mm long, cylindric, puberulent; style not elongated; stigma sessile, truncate. Capsules 75–95 mm long, cylindric, glabrous; gynophore 75–95 mm long, glabrous. Seeds 1.8–2 × 1.5 mm, suborbicular, longitudinally striate, transversed ridged; cleft covered by a smooth membrane, without inflated cells. Figure 14B.

Phenophase. Flowering and fruiting from October to December.

Distribution and habitat. Known from few collections from Argentina, Bolivia and Paraguay (Figure 18). Found on roadsides, border of rivers and flooded places.

Discussion. *Tarenaya lilloi* can be distinguished from other species of *Tarenaya* by the obovate to oblanceolate leaflets with an obtuse-apiculate apex; large sepals (8–9 mm long) and petals (30–33 × 8–12 mm); filaments 95–110 mm long; anthers 12–13 mm long and the cylindric capsules on a long gynophore 75–95 mm long.

Specimens Selected. ARGENTINA. **Chaco:** Dep. Tapenaga, Charadai, 28 Dec 1942, *A.G. Schulz 3763* (WIS); Dep. Mayor Luis Jorge Fontana, Enrique Urien, 24 Dec 1970, *A.G. Schulz 17769* (WIS); Santa Elisa, Dec 1903, *E. Hassler 2678* (MO, NY, WIS); *sine loco*, 27 Nov 1994, *A. Krapovickas et al. 46321* (MBM). BOLIVIA. **Formosa:** Dep. Patiño, Ruta 81, 3.5 km W de Ibarreta, 27 Nov 1994, *A. Krapovickas & C.L. Cristóbal 46421* (WIS); Estancia El Ombu, 26°9’22”S 58°47’4”, 21 Nov 2004, *H. Maturo & D. Prado 186* (MO). PARAGUAY. Colonia

Risso, 3 Dec 1986, *J.D. Anistis 2478* (WIS). **Santa Cruz:** San Ignazio, s.d., *Steinbach 3537* (WIS).

22. ***Tarenaya longicarpa*** Soares Neto & Roalson, [in review.]. TYPE: BRAZIL. Ceará: [Aquiraz] Waste places on banks of Rio Pacoty, 6 km S of Aquiraz, 15 October 1935, *F. Drouet 2615* (holotype: MO-247740!; isotypes: F V0053152F [image!], GH 00042343 [image!], IPA!, US, WIS!).

Herb to subshrub 0.5 to 2.5 m tall; branches glandular-puberulent to glabrescent. Stipular spines 1.5–2 × 1–1.5 mm, straight. Leaves 5–7-foliolate; petioles 3.5–8 cm long, glandular-puberulent to glabrescent, unarmed; leaflets lanceolate or narrowly elliptic to elliptic, basally long attenuate, apically acute to acuminate, margin minutely serrulate-ciliate; surface with scattered short pointed eglandular or glandular hairs on both sides; midrib and secondary veins puberulent-glandular, without prickles; the central leaflet 6.7–7.8 × 1.8–2 cm, the other 2–5.5 × 0.8–1.7 cm; petiolules 3–8 mm long, densely puberulent, unarmed. Corymbiform racemes terminal, up to 1 m long. Bracts subtending the lower flowers leaf-like, with 3–5-leaflets, becoming 1-foliolate, the other 4–17 × 2–10 mm, ovate or cordate, basally rounded or cordate, apically acute, puberulent-glandular, margin serrulate-ciliate; petioles 1–5 mm long, glabrous, without prickles at base. Pedicels 25–35 mm long, glandular-puberulent to glabrescent. Sepals 8–10 × 0.5–1 mm, lanceolate, apically acuminate, margin ciliate, puberulent to glabrescent abaxially. Petals 9–20 × 4–8 mm, oblong, apically obtuse, glabrous, essentially white, purple, or white at base becoming purple at apex. Nectary conic, inconspicuous fleshy, obsolete in fruit. Filaments 35–50 mm long, purplish; anthers 8–12 mm long. Ovary 10–15 mm long, cylindric, glabrous; style not elongated; stigma sessile, capitate. Capsules 110–195 mm long, cylindric, glabrous, rarely glandular-puberulent to glabrescent; gynophore 45–70 mm long, glabrous. Seeds 1–1.2 × 1 mm, orbicular, finely longitudinally striate, pronouncedly transverse ridged; cleft narrow, covered by a porous membrane. Figure 2G–H.

Phenophase. Flowers and fruits throughout the year.

Distribution and habitat. *Tarenaya longicarpa* is distributed throughout Brazil and Bolivia (Figure 18). In Brazil it has been collected in the dry deciduous thorn-scrub known as *caatinga*, semideciduous forests, riparian forests, along riversides, roadsides, and in *igapó* forests in the Amazon. It can be found cultivated or escaped in urban centers, disturbed areas, waste disposal areas, around lakes or along the water line of sewage treatment channels.

Vernacular names. In Brazil is known as “catinga de negro”, “mussambê de espinhos”, and “sete-Marias”, “estaladeira”, “murrambi”, “muçambê”, “mussambê” and “mussambê branco” (Soares Neto et al. submit.).

***Uses*.** Used as ornamental and medicinal for treating asthma, bronchitis, coughs and ear aches (Soares Neto et al. submit.).

Discussion. *Tarenaya longicarpa* is frequently wrongly identified as *T. spinosa*. It is an herb or subshrub, glandular-puberulent, with flowers white, purple, or white becoming purple petals at the apex, and longer capsules, with a ratio fruit/gynophore two to three times longer. The size of the capsules is the main difference between *T. longicarpa* (110–195 mm long) and *T.* spinosa (50–120 mm long), together with the petals (9–20 × 4–8 mm vs. 7–15 × 3–5 mm), filaments 35–50 mm long (vs. 21–33 mm) and anthers length 8–12 mm long (vs. 6–9 mm).

Specimens Selected. BOLIVIA. **Pando:** Nicolas Suarez, Cobija, 16 Oct 1988, *St. G. Beck 17030* (MO, WIS). BRAZIL**. Acre:** Brasiléia, Reserva Extrativista Chico Mendes, 10˚51’S 68˚48’W, 28 Oct 1991, *L. Ferreira & L.C. Ming 99* (NY); Cruzeiro do Sul, Estrada do aeroporto da cidade, fl., 19 Oct 1984, *C.A.C. Ferreira et al. 5164* (MO, NY, WIS); Rio Branco, INPA, Rio Branco building, old airport terminal, 5 Oct 1980, *S.R. Lowrie 399* (MO, NY, RB, WIS); Sena Madureira, BR 364 trecho da Estrada entre Sena Madureira e Manoel Urbano, 29 Sep 1980, *C.A.C. Ferreira & B.W. Nelson 2609* (MO, NY, WIS). **Alagoas:** Maceió, Bairro do Barro Duro, 8 Nov 2006, *N. Larissa s.n.* (RB); Pão de Açucar, Riacho Grande, 9°43’24”S 37°30’13”W, 23 Jun 2002, *R.P. Lyra-Lemos et al. 6920* (HUEFS); União dos Palmares, Fazenda Santo Antônio, 5 Jan 1964, *I.B. Pontual 54-64* (PEUFR). **Amazonas:** Benjamin Constant, Alto Solimões, 7 Sep 1962, *A.P. Duarte 6872* (PEUFR, RB); Boca do Acre, Rio Purus, beach on Rio Purus, 25 Sep 1966, *G.T. Prance et al. 2545* (NY, WIS); Humaitá, Madeira, 3 Sep 1923, *J.G. Kuhlmann 327* (RB); Manacapuru, 2 Feb 1963, *Lanna & Castellanos 494* (WIS). **Bahia:** 26 km along road N of Urandi towards Guanambi, 22 Jan 1981, *R.M. King & L.E. Bishop 8589* (MO); Abaíra, Tijuquiho, subida do Garimpo da Mata, 13°16’S 41°54’W, 14 Nov 1992, *W. Ganev 1447* (HUEFS, NY); Abaré, 8°44’26”S, 39°4’44”W, 1 Nov 2009, *E. Melo et al. 7035* (HUEFS); Andorinha, Sítio do Açude, 10°12’54”S 39°56’47”W, 18 Feb 2006, *F. França et al. 5476* (HUEFS); Anguera, Lagoa 6, Km 23, BA 052, 12˚10’S 39˚12’W, 8 Dec 1996, *F. França et al. 2026* (HUEFS, MBM); Barreiras, às margens do Rio de Ondas, 26 Oct 1965, *A.P. Duarte 9510* (RB, WIS); Bendengó, 2 km da cidade na direção a Uauá, 9°57’30”S 39°11’19”W, 23 Feb 2000, *A.M. Giulietti & R.M. Harley 1771* (HUEFS); Cachoeira, Vale dos Rios Paraguaçu e Jacuípe, 12˚32’S 39˚05’W, Oct 1980, *Grupo Pedra do Cavalo 830* (ALCB,

EAC, HUEFS, RB); Campo Alegre de Lourdes, 9˚30’13”S 43˚2’40”W, 30 Sep 2005, *D. Cardoso et al. 851* (HUEFS); Canudos, Estação Ecológica de Canudos, 10°1’S 39°9’W, 20 Jun 2003, *F.H.M. Silva et al. 412* (HUEFS); Casa Nova, Fazenda Santárem, 9˚32’20”S 41˚21’31”W, 5 Oct 2003, *K.R.B. Leite et al. 408* (HUEFS, IPA); Conde, Sítio Conde, 25 Apr 1996, *E.C. Medeiros Neto s.n.* (EAC); Curaçá, beira da estrada para a Serra da Natividade, 9°8’6”S 39°40’16”W, 12 Mar 2011, *E. Melo et al. 9342* (HUEFS); Entre Rios, 12°10’S 37°58’W, 6 Feb 2013, *A.V. Popovkin & J.C. Mendes 1349* (HUEFS); Feira de Santana, Rodovia Feira-Rio de Janeiro, Km 8, 19 Feb 1981, *A.M. de Carvalho 600* (ALCB, CEPEC, MBM, WIS); Iaçu, Rio Paraguaçu, 17 Jul 1982, *G. Hatschbach & O. Guimarães 45118* (MBM, MO, WIS); Itaberaba, margem do Rio Paraguaçu, 4 Jun 1995, *F. França et al. 1220* (HUEFS, MBM); Itiuba, margem do açude Jacurici, 10°43’S 39°51’W, 23 Oct 2001, *J.G. Nascimento & C. Correia 30* (HUEFS); Jaguarari, BR-407 entre Senhor do Bonfim e Juazeiro, 10˚6’11”S 40˚13’50”W, 19 Feb 2006, *E.B. Souza et al. 1512* (HUEFS); Jequié, Rod. BR 116 (Rio-Bahia), 19 Nov 1978, *S.A. Mori et al. 11228* (CEPEC, NY, WIS); Juazeiro, distrito de Massaroca, 9°50’53”S 40°18’5”W, 12 Jun 2009, *E. Melo et al. 6342* (HUEFS); Lagoa da Eugenia southern end and near Camaleão, 10°40’S 39°43’W, 20 Feb 1974, *R.M. Harley 16245* (EAC, IPA, MO); Malhada, Rod. BR-030, próximo ao trevo para Iuiú, 30 Oct 2004, *G. Hatschbach & E. Barbosa 78734* (ASE, MBM); Miguel Calmon, arredores da cidade, 11°25’S 40°36’W, 16 Jul 1985 *L.R. Noblick 3901* (HUEFS); Monte Santo, arredores da cidade, 18 Apr 2000, *R.P. Oliveira et al. 429* (HUEFS); Morpará, beira do Rio Paramirim, 11°33’S 43°16”W, 17 Dec 2007, *A.A. Conceição et al. 2731* (HUEFS); Mucugê, Parque Municipal de Mucugê, 24 Nov 2001, *E. Gallindo et al. 2* (HUEFS); Parnamirim, barragem de Zabumbão, 13°26’06”S 42°12’39”W, 6 Feb 1997, *B. Stannard et al. 5148* (ALCB, HUEFS); Paulo Afonso, Bairro of Vila Nobre, 6 Jun 1981, *S.A. Mori & B.M. Boom 14201* (CEPEC, NY, WIS); Pilão Arcado, caminho para Brejo do Zacarias, 10°0’9”S 42°30’35”W, 10 Nov 2005, *A.A. Conceição et al. 1576* (HUEFS); Remanso, estrada Remanso-Pilão Arcado, 9˚36’S 42˚6’W, 1 Dec 2003, *E.R. Souza & E. Gross 416* (HUEFS); Rodelas, ca. 4,5 km cidade, 8°52’53”S 38°55’24”W, 30 Oct 2009, *E. Melo et al. 6994* (HUEFS); Santa Terezinha, Serra do Jiboia, 12˚45’S 39˚32’W, 15 May 1999, *A.M. Giulietti & R.M. Harley 2537* (HUEFS); Serra do Ramalho, ca. 18 km da entrada da cidade, 13˚30’38”S 43˚45’8”W, 14 Apr 2001, *J.G. Jardim et al. 3465* (CEPEC, HUEFS, NY); Sobradinho, estrada para Santo Sé, 9˚32’40”S 40˚0’22”W, 22 Sep 2009, *E. Melo 6503* (ALCB, HUEFS); Tucano, Distrito de Caldas do Jorro, 1 Mar 1992, *A.M. Carvalho & D.J.N. Hind 3848* (CEPEC, MBML, MO, WIS); Uauá, caminho para distrito de Pilar, 9˚51’49”S 40˚5’42”W, 29 Mar 2000, *N.G. Jesus et al. 905* (ALCB, HUEFS, UESC); Valley of the Rio das Ondas, 5 Mar

1971, *H.S. Irwin et al. 31536* (MO, NY); Xique-Xique, Lagoa da Itaparica, 11°06'44"S 42°44'18"W, 19 Mar 1996, *E. Woodgyer et al. PCD 2549* (ALCB, HUEFS). **Ceará:** Km 443 of BR-116, 16 km N of Barro, just S of Paraíba boundary, 7°S 38°50'W, 13 Feb 1985, *Al Gentry et al. 50091* (EAC, MO, WIS); Sine loco, 24 Aug 1948, *A.P. Duarte 1469* (RB); Aiuaba, Estação Ecológica de Aiuaba, 6˚37'23"S 40˚11'56"W, 8 Oct 2013, *M.I.B. Loiola & F.A.L. Magalhães 2160* (EAC); Amontada, distrito Nascente, estrada Amontada-Morrinhos, 7 Sep 2013, *M.I.B. Loiola et al. 2093* (EAC); Aurora, açude Cachoeira, 9 Dec 2013, *A.J. Rangel 15* (EAC); Canindé, 24 Feb 1985, *F.S. Cavalcanti s.n.* (EAC); Caridade, Fazenda Feijão Caridade, 19 Nov 1989, *B. Freitas s.n.* (EAC); Caucaia, Parque Botânico do Ceará, 24 Sep 1997, *A. Fernandes & E. Nunes s.n.* (EAC); Cratéus, Próximo a BR 226, 7 Mar 2010, *A.M.M. Carvalho s.n.* (EAC); Crato, Açude Umari, 7˚06'04"S 39˚29'09"W, *A.C. Albuquerque et al. 50* (EAC); Fortaleza, Rio Siqueira, 31 Jan 2002, *E. Nunes s.n.* (EAC); Guaramiranga, 24 Sep 1981, *F.S. Cavalcanti & F. Bruno s.n.* (EAC); Iguatu, Sítio Sobreiro, 10 Jul 2010, *L.R.O. Normando et al. 511* (EAC); Independência, estrada para Quiterianópolis, 10 Apr 1998, *E.B. Souza s.n.* (EAC); Ipaumirim, Sítio Bananeiras, 15 Feb 1958, *J.G. Oliveira s.n.* (EAC); Ipu, Rio Acaraú, 25 Nov 2010, *J.R.A. Paiva & L.Q. Matias 13* (EAC); Irauçuba, Fazenda Cacimba Salgada, 5 May 2001, *A. Carvalho s.n.* (EAC); Itaiçaba, Morro do Ereré 10 Apr 1982, *E. Nunes* (EAC); Itapipoca, Lagoa das Pedras, 31 May 2008, *H. Santos s.n.* (EAC); Juazeiro do Norte, lagoa próximo ao Açude dos Carneiros, 7˚09'32"S 39˚19'53"W, 13 Jun 2015, *A.C. Albuquerque et al. 82* (EAC); Lavras da Mangabeira, açude Rosário, 7 Nov 2012, *A.S. Dias s.n.* (EAC); Milagres, 20 Jan 2010, *J.R. Andrade et al. 293* (PEUFR); Missão Velha, 23 Mar 2008, *L.K.P. Dutra 3761* (EAC, HCDAL); Morada Nova, Fazenda Lagoa do Meio, 9 Mar 2009, *A.S. Silva 60* (HUEFS); Pacujá, 19 Dec 2007, *P.M. Teixeira 48* (HUEFS); Parambu, Fazenda Pau Preto, 23 May 1982, *E. Nunes s.n.* (EAC); Pedra Branca, BR 020, 27 Apr 1981, *P. Martins* (EAC 101222); Quixadá, Horto de plantas medicinais do IFCE, 5 Dec 2013, *J.M. Negreiro 15* (EAC); Reriutaba, no sangradouro do açude Araras, 13 Apr 1979, *A.J. Castro s.n.* (EAC); Santa Quitéria, CE 032, Km 165 Sobral-Canindé, 15 Jun 1979, *J. Coradin et al. 1965* (PEUFR); São Gonçalo do Amarante, Dunas do Pecém, 13 Mar 2004, *A.V. Vieira & M.F. Lima s.n.* (EAC); Sobral, Fazenda Experimental da UVA, 3˚37'01"S 40˚18'22"W, 28 Nov 2014, *F.A.A. Nepomuceno & J.P.C. do Vale 46* (EAC); Várzea Alegre, Lagoa Azul, 6˚47'27"S 39˚19'59"W, 10 Jun 2015, *A.C. Albuquerque et al. 18* (EAC); Tauá, Fazenda Boa Esperança, 10 Apr 1985, *M.A. Figueiredo et al. 58* (EAC). **Distrito Federal:** Sobradinho, Área alterada próximo à parada de ônibus na quadra 2, 10 Nov 1986, *E. Curado et al. s.n.* (WIS). **Espírito Santo:** Baixo Guandu, 26 May 1985, *W. Boone 469* (MBML, PEUFR); Governador Lindemberg, Mata da Prefeitura,

19˚14’50”S 40˚27’19”W, 14 Nov 2006, *V. Demuner et al. 3073* (MBML). **Goiás:** Flores de Goiás, Rod. GO-020, Rio dos Macacos, *G. Hatschbach 44076* (MBM, MO). **Maranhão:** BR 222, Bubase, 1979, *E. Nunes & A.J. Castro* (EAC 6389); Barra do Corda, villgae of Copaiba, 26 km east of village of Alto Alegre, 5°28’S 45°34’W, 12 Jan 1970, *G. Eiten & L.T. Eiten 10301* (NY, WIS); Maracassumé River Region, 18 Jul 1932, *R. Froes 1794* (MO, NY); Mineirinho, Rio Pindaré, 3˚40’S 45˚50’W, 14 Mar 1978, *J. Jangoux & R.P. Bahia 505* (NY, RB); Monção, BR 316, Km 159, São Comando, próximo a um ponto da PF, 17 Feb 1979, *A. Fernandes et al. s.n.* (EAC). **Mato Grosso:** Água Boa, 47 km north of Chavantina, 10 Oct 1964, *G.T. Prance & N.T. Silva 59360* (NY, WIS); Barão de Melgaço, Vila São Pedro de Joselândia, Sep 2003, *G.B.S. Pinto et al. s.n.* (MBM, UPCB); Barra do Sangradourozinho, BR 070, Km 638, 3 Dec 1984, *J.G. da Silva & J.A.F. da Costa 5635* (R); Xavantina, 14˚40’S 52˚20’W, 27 Sep 1964, *H.S. Irwin & T.R. Soderstrom 6390* (NY, WIS). **Minas Gerais:** Barreiras a margem do Rio de Ondas, 26 Oct 1965, *A.P. Duarte 9510* (PEUFR, RB); Norte de Minas ao longo da BR-4, 25 Nov 1964, *A.P. Duarte 8645* (RB, WIS); Itaobim, Passado, 17 Jul 1988, *G. Hatschbach et al. 52200* (FLOR, MBM); Itinga para Pedra Azul, 23 Nov 1964, *A.P. Duarte 8565* (PEUFR, RB); Paraopeba, 10 Jun 1995, *E.P. Heringer 31844* (PEUFR); South Bank of Rio Verde Pequeno along road between Monte Azul and Guanambi, 22 Jan 1981, *R.M. King & L.E. Bishop 8587* (MO). **Pará:** Campo de sementes de fumo de Tracatema, 25 Oct 1938, *H. Barradas* (RB 37651); Itupiranga, along Rio Tocantins, 21 Oct 1977, *C.C. Berg & A.J. Henderson 665* (NY, RB, WIS); Peixe-Boi, 11 Dec 1974, *R.R. Santos 14964* (RB); Remansão, Rio Tocantins, 15 Sep 1948, *R.L. Fróes 23463* (WIS); Rio Caraipé, approx. 60km from Tucurui, 4°04’S 49°5’W, 8 Nov 1981, *D.C. Daly et al. 1263* (MO, NY, WIS); Santarém, Puerto, 15 Jan 1981, *A. Krapovickas & C.L. Cristóbal 37134* (MO, WIS). **Paraíba:** Alagoa Nova, Fazenda Sr. José Roberto, 7°4’43”S 35°45’35”W, 8 Mar 2012, *E. Melo et al. 11063* (HUEFS); Barra de Santa Rosa, Fazenda Quandu, 30 Jan 1970, *J.E. Souto 52* (RB); Caaporã, margem da estrada, 9 Dec 1997, *M.B. Costa-e-Silva & M.R. Sales de Melo 1470* (PEUFR); Cabaceiras, Sítio Bravo, 4 Feb 1992, *V.L. Nascimento & C.F. Martins 7* (JPB); Itaporanga, Sítio Recanto, 4 Mar 1993, *M .F. Agra & M.G. Silva 1610* (NY); João Pessoa, Jardim Botânico, 7˚00’S 34˚00’W, 30 Nov 2011, *P.C. Gadelha Neto 3077* (JPB, NY, RB); Lucena, Praia de Lucena, 2 Dec 1997, *M.B. Costa-e-Silva 1445* (PEUFR, WIS); Maturéia, Pico do Jabre, 7°11’10”S 37°25’53”W, Nov 1997, *M.F. Agra & P.C. da Silva 4481* (MO); Monteiro, 14 Sep 1954, *J.I.A. Falcão et al. 1079* (RB); Patos, Estaca Zero, 23 Jun 1955, *G.R. Gonçalves s.n.* (RB); Pitimbu, Assentamento Nova Vida, 22 Jan 2013, *M.F.M. de Brito 270* (JPB); Pocinhos, Sítio Caeana, 7 Oct 2007, *L.E.T. Mendonça 10* (JPB); Pombal, próximo a estação rodoviária,

12 May 1982, *C.A.B. Miranda & O.T. Moura 77* (JPB); Remígio, 17 Mar 1975, *V.P. Barbosa 222* (PEUFR, RB); São João do Cariri, Rio Taperoá, 25 Feb 2003, *A.V. Lacerda & F.M. Barbosa 7* (JPB); São José dos Cordeiros, sertão do Cariri, Feb 1987, *E. Braz 53039* (EAC, IPA); Solânea, 24 May 2001, *T. Grisi 205* (JPB); Soledade, 13 Mar 1986, *M. Sales et al. s.n.* (PEUFR); Sousa, Vale dos Dinossauros, 6 Sep 2002, *P.C. Gadelha Neto 749* (JPB); Taperoá, 28 Jul 1986, *M.F. Agra 541* (JPB). **Paraná:** Santa Fé, Rio Bandeirantes, 1 Sep 1989, *J.M. Silva & G. Hatschbach 649* (MBM, MO). **Pernambuco:** Altinho, Comunidade Carão, 8°35'13"S 36°5'34"W, 24 Mar 2007, *V.T. Nascimento & J.G. Melo 41* (PEUFR); Araripina, waste grond in front of highway maintainance station, 7 Mar 1970, *G. Eiten & L.T. Eiten 10855A* (WIS); Arcoverde, Serra das Varas, 21 Feb 2006, *R. Pereira et al. 2602* (HUEFS, IPA); Bezerros, BR 232, 10 Jun 1998, *M.B. Costa-e-Silva 1484* (PEUFR); Brejo da Madre de Deus, Sítio Conceição, 11 Jan 1996, *M.B. Costa-e-Silva 1487* (PEUFR, WIS); Carpina, Jun 1991, *R. Bedi 139* (EAC, IPA); Caruaru, Brejo Santo, 19 Apr 1996, *M.B. Costa-e-Silva 1210* (PEUFR); Correntes, Fazenda do Ministério da Agricultura, 4 Dec 1985, *V.C. Lima 46* (EAC, IPA); Custódia, arredores da cidade, 15 May 1996, *M.B. Costa-e-Silva & R. Fuks 341* (IPA, PEUFR, WIS); Fernando de Noronha, , vicinity of Vila dos Remédios, 16 Nov 1979, *G.T. Prance 26342* (NY); Garanhuns, Fazenda Monteiro, 18 Aug 1998, *M.F.A. Lucena et al. 647* (PEUFR); Goiana, Usina Maravilha, 9 Jul 1997, *M.B. Costa-e-Silva & M.R. Sales de Melo 1472* (PEUFR); Ibimirim, 24 Nov 1986, *L. Gouveia et al. 52* (PEUFR); Itaíba, Sítio Capim, 12 Aug 2000, *A. Bocage 382* (IPA, JPB); Jatobá, Bananeiras, próximo a divisa com Alagoas, 29 May 1997, *M.B. Costa-e-Silva 1245* (PEUFR); Maraial, 28 Feb 1966, *E.P. Guedes 54* (PEUFR); Mirandiba, área urbana, 17 Jul 1996, *M.F.A. Lucena et al. 575* (PEUFR, WIS); Olinda, 28 Mar 1946, *R. Burle-Marx s.n.* (RB); Ouricuri, 7˚54'S 40˚3'W, 16 Jul 1962, *G. Eiten & L.T. Eiten 4925* (NY, PEUFR, WIS); Paulista, 4 Feb 1997, *A. Silva 21* (IPA, MBM); Pesqueira, BR 232, 8°21'10"S 36°41'10"W, 30 Aug 1998, *M.B. Costa-e-Silva et al. 1503* (PEUFR, WIS); Petrolândia, a 2 km da entrada da cidade, 29 May 1997, *M.B. Costa-e-Silva 1252* (PEUFR); Petrolina, entre 8-10 km antes do IFET, 30 Jun 2012, *J.T.L. Santos 4630* (HUEFS); Poção, periferia da cidade, 8°11'08"S 36°42'06"W, 30 Aug 1996, *M.B. Costa-e-Silva et al. 1501* (PEUFR, WIS); Recife, Cidade Universitária, 25 Oct 1999, *M.B. Costa-e-Silva 1526* (IPA, PEUFR, WIS); Salgueiro, entrada de acesso à cidade, 17 Jul 1996, *M.F.A. Lucena et al. 579* (IPA, PEUFR, WIS); Sanharó, BR 232, 8°22'03"S 36°34'01"W, 30 Jul 1998, *M.B. Costa-e-Silva et al. 1498* (PEUFR, WIS); São José da Coroa Grande, 27 Aug 1954, *J.I.A. Falcão et al. 831* (PEUFR, RB); São Lourenço da Mata, Barragem Tapacurá, 25 Oct 1999, *M.B. Costa-e-Silva 1528* (IPA, PEUFR, WIS); Serra Talhada, próximo aos experimentos de manejo de caatinga, Nov 1985, *M. Ataíde et al. 669*

(EAC, IPA); Surubim, de Surubim para Vertentes, na saída da cidade, 18 May 1996, *M.B. Costa-e-Silva 1200* (PEUFR, WIS); Triunfo, Lagoa Nova, 18 Jun 1999, *A.M. Miranda & V. Silva 3527* (HST, HUEFS); Verdejante, na estrada em direção a Salgueiro, 15 Aug 1994, *M.B. Costa-e-Silva & R. Fuks 230* (PEUFR, IPA, WIS); Vicência, matas do Engenho Sambaquim, 27 Nov 1964, *G. Teixeira 2571* (PEUFR). **Piauí:** Campo Maior, açude da cidade, 4 Jul 1997, *M. Luceño et al. s.n.* (TEPB); Caracol, na entrada da cidade vindo da estrada do Parque Nacional da Serra das Confusões, 9˚13'15"S 43˚29'28"W, 26 Nov 2005, *E.A. Rocha et al. 1427* (JPB); Floriano, 6˚46'S 43˚1'W, 11 Jul 1962, *G. Eiten & L.T. Eiten 4901* (NY, WIS); Nazaré do Piauí, margem direita do Rio Piauí, 10 Jun 2000, *A.S. Lopes s.n.* (TEPB); Oeiras, Buriti-do-Rei, 28 Apr 2007, *F.C.S. Oliveira 147* (TEPB); Parnaíba, 24 Sep 1983, *A. Fernandes & Matos s.n.* (EAC, PEUFR); Picos, 19 Jan 1976, *J.P. Carauta 1857* (RB); São José do Piauí, Morro do Baixio, 22 Jan 2000, *M.R.A. Mendes et al. 233* (TEPB); São Miguel do Tapuio, entre Castelo e São Miguel do Tapuio, 27 Oct 1981, *F. Pires s.n.* (TEPB); São Raimundo Nonato, Fundação Ruralista, 9˚S, 42˚W, 21 Jan 1982, *G.P. Lewis & H.P.N Pearson 1140* (RB); Teresina, Horta Comunitária Vila Sinhá Borges, 6 Aug 2003, *A. Carvalho 330* (TEPB). **Rio de Janeiro:** Rio de Janeiro, Correas, 11 Nov 1964, *A.P. Duarte 8467* (RB, WIS). **Rio Grande do Norte:** Acari, Sítio Talhado, 6˚20'39"S 36˚36'42"W, *J.L. Costa-Lima et al. 408* (HUEFS, UFRN); Açu, açude Pataxós, 12 Oct 1983, *G.C.P. Pinto 83* (EAC, IPA); Almino Afonso, Sítio Grossos, 26 Feb 2003, *M.A.G. Paiva et al. 13* (EAC); Caicó, 6°32'49"S 37°15'24"W, 20 Feb 2010, *E. Melo et al.* (7744); Mossoró, Rio Mossoró, 11 Jan 2008, *A.S. Silva & A.R. Ribeiro 31* (ASE, EAC); Parnamirim, próximo ao horto municipal, 4 Jan 2005, *A. Ribeiro 82* (JPB, UFRN). **Rondônia:** Porto Velho, 28 Sep 1962, *A.P. Duarte 7065* (PEUFR, RB). **Roraima:** Caracaraí, Rio Branco, 0˚19'21"N 61˚44'29"W, 19 Mar 2012, *R.C. Forzza et al. 6835* (RB); Rorainópolis, Rio Branco, 0˚28'10"N 61˚42'30"W, 27 Mar 2012, *G. Martinelli et al. 17660* (RB). **Sergipe:** Carmopólis, Próximo à estação Oiterinho, *A.P. Prata et al. 3477* (ASE); Gararu, Margem do Rio São Francisco, 14 Dec 1981, *G. Viana 314* (ASE); Japaratuba, Próximo à estação Jericó, 7 Mar 2013, *P. Barbosa & E. Santos 8* (ASE). **Tocantins:** Paranã, Rio Paranã, Balsa para Palmeirópolis, 11 Nov 1991, *G. Hatschbach et al. 56082* (MBM); SítioNovo do Tocantins, Trilha da Sumaúma, 8 Jun 2000, *J. Ribeiro 155* (HUEFS).

23. **Tarenaya longipes** (Lamb. ex DC.) Iltis, Novon 23: 57. 2014. *Cleome longipes* Lamb. ex DC., Prodr. 1: 239. 1824. TYPE: [ECUADOR. Guayas] In Huyaquil, s.d., *Anon. s.n.* (holotype: G00207155 [image!]).

Scandent shrub or treelet 1–2.5 m tall; branches densely pubescent to puberulent, glabrescent to glabrous. Stipular spines 2–3.5 × 1–2.5 mm, curved. Leaves 3–5-foliolate; petioles 3.5–12 cm long, pubescent to glabrescent, sometimes with eglandular or glandular hairs throughout, usually armed with curved prickles, rarely unarmed; leaflets ovate, elliptic, oblanceolate, basally cuneate to attenuate, apically acuminate to long acuminate, margin ciliar or not; surface scattered with short pointed hairs on both sides; midrib and secondary veins glabrescent, with prickles; the central leaflet 5.8–9.5 × 3–4.5 cm, the other 3.5–7(–9) × 1.8–3.8(–4.5) cm; petiolules 1–5 mm long, glabrous, unarmed. Corymbiform racemes or panicles of racemes terminal and/or axillary, 7–15 cm long. Floral bracts 1 mm long, filiform, caducous; sessile. Pedicels 10–15 mm long, puberulent to glabrous. Sepals 1.5 × 0.5 mm, lanceolate, apically acuminate, margin slightly ciliate, glabrescent abaxially. Petals 4–5 × 1.5–2 mm, oblanceolate-elliptic, apically obtuse, glabrous, yellow or yellow-greenish. Nectary disciform, conspicuous fleshy, persistent in fruit. Filaments 8.5–20 mm long, green; anthers 2–2.5 mm long. Ovary 5–8 mm long, cylindric, glabrous; style not elongated; stigma sessile, strongly capitate. Capsules 150–300 mm long, cylindric, slightly moniliform; gynophore 130–300 mm long, scattered with short pointed hairs throughout. Seeds 1.5–2 × 0.5–1 mm, orbicular, smooth, glabrous; cleft covered by an opaque membrane. Figure 14D.

Phenophase. Flowering and fruiting throughout the year.

Distribution and habitat. Distributed in Costa Rica, Panamá, Equador and Peru (Figure 19), in tropical rain forests, along riversides and sandy river banks, in flooded forest, thickets, and along roadsides, up to 375 m elevation (up to 800 m in Juan Jul, Peru).

Vernacular names. In Peru it is called “jagki” (*V. Huashikat 794*), “janki” (*A. Kujikat 100*), “namaka nakari” (*V. Huashikat 1818*) and “tripa de gato” (*J. Schunke 7985*).

Discussion. Easily recognized by the scandent shrub or treelet habit, curved stipular spines and curved prickles on the petioles, terminal and/or axillary corymbiform racemes or panicles of racemes, conspicuous fleshy disciform nectary, persistent on the fruit and long capsules 150–300 mm long, and gynophores 130–300 mm long.

Specimens Selected. COSTA RICA. **Heredia:** Estacion Biologica La Selva Reserve of of the Organization for Tropical Studies, 27 Feb 1986, *F. Almeida & B. Anderson 5129* (WIS). **Limón:** Bananito, 9°51’N 83°02’W, 10 Mar 1928, *H.E. Stork 1195* (MO); Cantón de Pococí, Cuenca Tortuguero-Sierpe, 10°32’40”N 83°32’50”W, 21 Jan 1997, *B. Hammel 20722* (MO); Hacienda Tapezco-Hda, La Suerte, 10°30’N 83°47’W, 26 Aug 1979, *C. Davidson & J.*

Donahue 8881 (WIS); Talamanca, Cuenca del Sixaola, Finca de la Associación campesina, 9°33'36"N 82°38'12"W, 5 Mar 1999, *A. Rodríguez & L.D. Vargas 4584* (MO, NY); Tortuguero, Parque Nacional Tortuguero, Estácion Agua Fría, 10°27'N 83°34'W, 2 Feb 1988, *R. Robles 1591* (MO, WIS). ECUADOR. **Esmeraldas:** Río Onzolé, upstream San Francisco de Onzolé, 0°52'N 79°3'W, 3 Sept 1980, *L. Holm-Nielsen et al. 25755* (MO, NY). **Guayas:** Coastal plain, in the vicinity of Naranjito, Jun 1945, *W.H. Camp 3592* (NY, WIS). **Los Rios:** Canton Vinces, Km 70 Quevedo-Palenque via Mocachi, 26 Mar 1980, *C.H. Dodson & A. Gentry 9925* (MO); Juaneche, km 70 Quevedo-Palenque via Mocachi, 26 Mar 1980, *C.H. Dodson & Al Gentry 9925* (MO). **Napo:** Orellana Cantón, Parque Nacional Yasuní, 0°35S 76°29'W, 8 Jun 1994, *M. Aulestia 2369* (MO). **Santiago Zamora:** Between Tres Ranchos and Chontal, 15 Dec 1944, *W.H. Camp 1550* (NY, WIS). PANAMA. **Bocas del Toro:** Nievecita, Aug 1940, *R.E. Woodson Jr. & R.W. Schery 1025* (MO, NY). **Darien:** Distrito Chepijana, 5 Mar 1940, *M.E. Terry & T.R.A. Terry 1399* (MO); Marraganti and vicinity, Apr 1908, *R.S. Williams 639* (NY); Vicinity of Cana, 24 Jun 1959, *W.L. Stern et al. 702* (MO). PERU. **Amazonas:** Condorcanqui, Valle del Rio Santiago, approx. 65 km N de Pinglo, Quebrada Caterpiza, 2–3 km atrás de la comunidad de Caterpiza, 16 Jan 1980, *V. Huashikat 1818* (MO); Monte Orilla de Huampami, Rio Cenepa, 18 Jan 1973, *R. Kayap 165* (NY); Río Cenepa, vicinity of Huampami, 4°30'S 78°30'W, 3 Aug 1978, *E. Ancuash 100* (MO). **Junin:** Puerto Bermudez, July 1929, *E.P. Killip & A.C. Smith 26681* (NY, RB). **Loreto:** Above Pongo de Manseriche, mouth of Río Santiago, 23 Nov 1931, *Y. Mexia 6150* (MO); Boqueron Padre Abad, 16 Aug 1946, *F. Woytkowski 34374* (MO); Iquitos, Rio Itaya, Nueva Esperanza, 19 Dec 1974, *S. McDaniel 19496* (MO); San José de Parinari, Rio Maranon, 4°32'S 74°30'W, 10 Aug 1981, *R. Vásquez et al. 2293* (MO); San Juan de Muniches, Río Itaya, 3°50'S 73°20'W, 11 Apr 1980, *R. Vásquez et al. 122* (MO, NY); Yurimaguas, lower rio Huallaga, Aug-Sep 1929, *E.P. Killip & A.C. Smith 27653* (NY). **Perseverança:** Marrom, 5 Feb 1924, *J.G. Kuhlman 1342* (RB). **San Martin:** Juan Jui, Alto Rio Huallaga, Jun 1936, *G. Klug 4397* (MO, NY); Mariscal Cáceres, Distrito Tocache Nuevo, 8°09'S 76°27'W, 14 Dec 1981, *T. Plowman 11386* (MO, NY); Uchiza, Caserío Santa Cruz, al este de la carretera marginal, 2 Aug 1974, *J. Schunke 7985* (MO).

24. **Tarenaya microcarpa** (Ule) Soares Neto & Roalson, Acta Bot. Bras. 32: 543. 2018. *Cleome microcarpa* Ule, Engl., Bot. Jarhb. Syst. 42: 201. 1908, non *Cleome microcarpa* Hassl. 1913. TYPE: BRAZIL. [Piauí] Piauhy: Catinga der Serra Branca, January 1907, *E. Ule 7428* (lectotype: HBG-522391 [image!], designated by Soares Neto & al., Acta Botanica

Brasilica 32: 543. 2018; isolectotypes: B 10 0242701 [image!], K000220462 [image!], F neg 5766 [image!]).

Cleome gardneri Briq., Ann. Conserv. Jard. Bot. Genève. 17: 381. 1914. TYPE: BRAZIL. [Piauí] Piauhy, 1840, *G. Gardner 2035* (lectotype, designated here: G00226203 [image!]; isolectotypes: B 10 0242702 [image!], BM000573884 [image!], CGE, F 869195 [image!], G00226204 [image!], GH 00042331 [image!], NY 00387678!, NY 00215155!, P00745098 [image!], P00076107 [image!]).

Herb to subshrub 0.3–1 m tall; branches glandular-puberulent to glabrescent. Stipular spines less than 1 × 1 mm, straight, sometimes lacking. Leaves 3–5-foliolate; petioles 1.3–5.5 cm long, puberulent, unarmed; leaflets elliptic, lanceolate to oblanceolate, basally attenuate, apically acute, margin entire, ciliate; surface glandular-puberulent on both sides; midrib and secondary veins glandular-puberulent, without prickles; the central leaflet 1.3–5.8 × 0.5–2 cm, the other 1.5–4 × 0.5–1.2 cm; petiolules less than 1 mm long, unarmed or sessile. Corymbiform racemes terminal and/or axillary, 13–25 cm long. Floral bracts 3–9 × 2–7 mm, ovate or cordate, basally obtuse or cordate, apically acute, puberulent abaxially, margin ciliate; subsessile. Pedicels 10–18 mm long, puberulent. Sepals 1.5–2 × 1–1.5 mm, ovate-lanceolate, apically acute, margin ciliate, puberulent abaxially. Petals 1.5–2 × 1–1.5 mm, spathulate, apically obtuse, puberulent abaxially, purple. Nectary disciform, inconspicuous fleshy, obsolete in fruit. Filaments 2–5 mm long, purple; anthers 1–1.5 mm long. Ovary 1.5–3 mm long, ellipsoid to fusiform, densely glandular-puberulent; style 2 mm long, persistent in fruit; stigma capitate. Capsules 13–30 mm long, ellipsoid to fusiform, glandular-puberulent; gynophore 1–5 mm long, glabrous. Seeds 1–3 × 1 mm, suborbicular, longitudinally striate, with transverse ridges, puberulent; cleft wide covered by a thin membrane attached to a conspicuous aril connecting the claws, with an aril attached to the membrane. Figure 2I–J.

Phenophase. Flowers and fruits throughout the year.

Distribution and habitat. Species restricted to northeastern Brazil, known only from the states of Bahia, Ceará, Pernambuco and Piauí (Figure 19), in the *caatinga*, *campo rupestre*, *carrasco*, *cerrado*, and on rocky outcrops, from 400 to 1450 m elevation.

Nomenclatural notes. There are two collections of *Gardner 2035* at G, but G00226203 is being designated as lectotype because it has a label with Briquet's handwriting identifying the species. Furthermore, it is in good conditions bearing flowers and fruits, features useful to recognize the species.

Discussion. *Tarenaya microcarpa* has glandular-puberulent indumentum and is very sticky when fresh. Although it has similarities with *T. diffusa* as the number of leaflets and morphology of the fruit, it can be distinguished by the smaller petals (1.5–2 × 1–1.5 mm vs. 2–6 × 2.5–4 mm), purplish (vs. white) and filaments 2–5 mm long (vs. 4.5–11 mm), styles elongated, 2 mm long, and persistent in fruit (vs. style not elongated), and the glandular-puberulent (vs. glabrous) capsules.

Specimens Selected. BRAZIL. **Bahia:** Abaíra, Catolés, estrada Catolés-Inúbia, Vila de Barra ca. 10,4 km de Catolés, 13°13’56”S 41°53’26”W, 30 Dec 2013, *R.M. Harley et al. 56911* (HUEFS); Água Quente, Pico das Almas, Vale ao noroeste do Pico, 13°30’S 41°59’W, 13 Dec 1988, *R.M. Harley 27228* (CEPEC); Andaraí, estrada nova entre Andaraí e Mucugê, a 5 km ao SE de Andaraí, 4 Mar 1980, *S.A. Mori & R. Funch 13419* (CEPEC); Caetité, Caminho para Brejinho de Ametista, 14°08’48”S 42°32’29”W, 11 Feb 1997, *B. Stannard-PCD 5436* (CEPEC, HUEFS); Campo Alegre de Lourdes, Morro da Carlota, ca. 7,6 km NW de Campo Alegre de Lourdes, 9°29’03”S 43°05’33”W, 21 May 2000, *L.P. de Queiroz et al. 6235* (HUEFS, IPA); Casa Nova, ca. 5 km N de Pau-a-Pique na estrada para a BR (Casa Nova-Remanso), 9°34’55”S 41°38’09”W, 9 Feb 2004, *L.P. de Queiroz et al. 9129* (HUEFS, IPA); Delfino, Serra do Curral Frio, estrada velha Delfino-Mimoso de Minas, 32 km de Delfino, 10°29’54”S 41°18’23”W, 9 Mar 1997, *E.N. Lughadha-PCD 6164* (CEPEC, HUEFS, IPA); Gentio do Ouro, estrada Santo Inácio-Gameleira do Acuruá Km 20, 11°16’S 40°24’W, 30 Jun 1983, *L. Coradin et al. 6305* (PEUFR); Itaeté, Chapadinha, 12°33’01”S 41°23’33”W, 21 Feb 2004, *R. Funch 137* (HUEFS); Jacobina, Serra do Cruzeiro, 11°12’24”S 40°28’55”W, 7 Apr 2001, *N.G. Jesus et al. 1302* (HUEFS); Juazeiro, Serra do Mulato, 9°44’48”S 40°41’03”W, 28 Mar 2000, *M.R. Fonseca et al. 1352* (HUEFS); Lençóis, Morro da Chapadinha, 12°27’35”S 41°26’25”W, 27 Oct 1994, *A.M. de Carvalho-PCD 1131* (HUEFS); Morporá, Caminho para Fazenda Ema, ca. 3 km, 11°33’S 43°16’W, 22 Jan 2001, *M.L. Guedes 7811* (HUEFS); Morro do Chapéu, Fazenda Agreste, entrada da fazenda, 17 Aug 2015, *R.L. Soares Neto & A.F.P. Pires 127* (JPB); Mucugê, ca. 11 km S de João Correia, 2 km E de Brejo de Cima, na estrada Abaíra-Mucugê, 13°19’01”S 41°33’27”W, 14 Feb 1992, *L.P. de Queiroz et al. 2636* (HUEFS, IPA); Palmeiras, Grotão do Pai Inácio, 12°34’S 41°23’W, 21 May 2006, *A.A. Conceição et al. 1755* (HUEFS); Paramirim, Barragem do Zabumbão, 13°26’06”S 42°12’39”W, 6 Feb 1997, *R.M. Harley-PCD 5175* (CEPEC, HUEFS); Pilão Arcado, Torre da Telemar, 9°57’59”S 42°23’29”W, 29 Feb 2000, *A. Nascimento et al. 251* (HUEFS); Uibaí, Serra Azul, 11°20’10”S 42°08’29”W, 17 Mar 1996, *A.A. Conceição-PCD 2471* (HUEFS, IPA); Umburanas, Serra do Curral Feio (localmente

referida como Serra da Empreitada), entrando para W a cerca de 20 km S de Delfino na estrada para Umburanas, 10°22'S 41°19'W, 9 Apr 1999, *L.P. de Queiroz et al. 5157* (HUEFS, IPA). **Ceará:** Crateús, Serra das Almas, 10 May 2003, *R.C. Costa 204 Probio* (EAC); Novo Oriente, Planalto da Ibiapaba, Baixa Fria, 4 May 1991, *F.S. Araújo 425* (EAC, IPA). **Pernambuco:** Betânia, Serra dos Arrombados, 24 May 1971, *Academia Brasileira de Ciências 882* (IPA); Bonito, Terreno ao lado da cachoeira, 15 Mar 2000, *M.B. Costa-e-Silva 1612* (IPA); Buíque, Vale do Catimbau, Alcoçaba; na trilha em direção à Barra do Pico, 8°33'13"S 37°11'26"W, 1 Apr 2008, *O. Cano et al. 807* (HUEFS, IPA). **Piauí:** Caracol, estrada para Dolinas, 8°59'10"S 43°26'45"W, 25 Feb 2011, *E. Melo et al. 9200* (HUEFS); Cristino Castro, PARNA Serra das Confusões, próximo a guarita perto dos afloramentos rochosos, 28 Mar 2007, *R. Barros et al. 2940* (HUEFS, TEPB); São Raimundo Nonato, Tapuio, 17 Feb 1986, *L. Emperaire s.n.* (TEPB).

25. **Tarenaya parviflora** (Kunth) Iltis, Novon 23: 57. 2014. *Cleome parviflora* Kunth, Nov. Gen. Sp. 5: 83. 1821. TYPE: [COLOMBIA?] "Crescit in calidis Novae Granatae?" s.d., *F.W.H.A. Humboldt & A. Bonpland s.n.* (holotype: P-679903 [image!], photo at F). ≡ *Cleome humboldtii* DC., Prodr. 1: 241. 1824. syn. hom.

Cleome brasiliensis Weinm., Syll. Pl. Nov. 1: 122. 1824. TYPE: BRAZIL. August, *Weinmann s.n.* (neotype, designated here: BRAZIL. Santa Catarina, Sombrio, Araranguá, 5 February 1946, *B. Rambo s.n.*, PACA 31576!; isoneotype: WIS!).

Cleome micrantha Ham., Prodr. Pl. Ind. Occid. [Hamilton] 48. 1825. TYPE: GUYANA, *Collector unknown* (holotype: P00745102 [image]!).

Cleome villosa Gardner, London J. Bot. 1: 166. 1842. TYPE: BRAZIL. Rio de Janeiro, In valle dicta Tarangueiras, 1840, *G. Gardner 6* (lectotype, designated here: BM000573982 [image!]; isolectotypes: BM000573981[image!], CGE, E00326209 [image!], E00326210 [image!], F, G00226196 [image!], GH 00042344 [image!], K000220451 [image!], K000220452 [image!], K000220453 [image!], NY00215147!, NY00215148!, P00076113 [image!], S, US 00100499 [image!]).

Cleome palustris Salzm. ex Turcz., Bull. Soc. Imp. Naturalistes Moscou 27(2): 317. 1854. TYPE: BRAZIL. Bahia, In paludosis, *P. Salzmann s.n.* (types: E00326208 [image!], photo at F, G00226194 [image!], G00226200 [image!], HAL0117687 [image!], HAL0117688 [image!], K000220460 [image!], K000220461 [image!], LE 00001895 [image!], MO-2196325!, P00141283 [image!], P00745099 [image!]).

Cleome gaudichaudii Briq., Annuaire Conserv. Jard. Bot. Genève 17: 373. 1914. TYPE: BRAZIL. Rio de Janeiro, [1833], *M. Gaudichaud 1011* (lectotype, designated here: G00226198 [image!]; isolectotypes: B 10 0242697 [image!], F, G00226197 [image!], G00226199 [image!], P00141284 [image!]).

Cleome brachypoda Briq., Annuaire Conserv. Jard. Bot. Genève 17: 378. 1914. TYPE: BRAZIL. Amazonas, Rio Juruá, October 1901, *E. Ule 5902* (holotype: G00226195 [image!]; isotypes: B 10 0242696 [image!], MG 005799 [image!]).

Cleome panamensis Standl., J. Wash. Acad. Sci. 17: 252. 1927. TYPE: PANAMA. Maragantí, 5 April 1908, *R.S. Williams 993* (holotype: US 00100489 [image!]; isotype: NY00387672!).

Herb to shrub 1 m tall; branches glandular-pubescent, pubescent to glabrescent. Stipular spines 2–3 × 1.5 mm, slightly curved at apex. Leaves 3–7-foliolate; petioles 3.5–13 cm long, pubescent to glabrescent, armed with slender to stout straight short prickles; leaflets elliptic to widely elliptic, elliptic-lanceolate, basally attenuate to cuneate, apically acuminate to long acuminate, margin sinuose-ciliate to serrulate-ciliate; surface essentially glabrous or rarely with scattered short pointed eglandular hairs on both sides; midrib and secondary veins glabrous, with prickles; the central leaflet 5.2–14.5 × 2.5–5.7 cm, the other 5.5–10 × 2.3–3.8 cm; petiolules 4–7 mm long, pubescent, armed. Corymbiform racemes terminal, up to 30 cm long. Floral bracts 12–30 × 5–17 mm, ovate, basally rounded, apically acuminate, glabrous, margin serrulate-ciliate; petioles 2–8 mm long, puberulent, without prickles at base. Pedicels 10–20 mm long, glabrescent. Sepals 1.5–2 × 0.5–1 mm, linear-triangular to lanceolate, apically acute to acuminate, margin ciliate, glabrescent abaxially. Petals 3–4 × 1.5 mm, oblanceolate, apically obtuse, glabrescent to glabrous, white to deep pink. Nectary disciform, conspicuous fleshy, persistent in fruit. Filaments 10–16 mm long, purple; anthers 2–3 mm long. Ovary 3–5 mm long, cylindric, puberulent; style short elongated, 1 mm long; stigma subsessile, strongly capitate. Capsules 47–80 mm long, cylindric, slightly moniliform, pubescent to glabrous; gynophore 5–15 mm long, glabrescent to glabrous. Seeds 1.5–2.2 × 1 mm, suborbicular, seemingly smooth, longitudinally striate and finely transversely ridged; cleft covered by a thin and opaque membrane. Figure 20A–C.

Phenophase. Flowers and fruits throughout the year.

Distribution and habitat. Species widespread in the Neotropical region, from Mexico and Central America (in Costa Rica, Honduras, Nicaragua, Panama) to South America (in Colombia, Venezuela, Suriname, Ecuador, Paraguay, Peru, Bolivia, Brazil and Argentina),

Figure 19. It occurs in swamps or flooded areas, along riversides and riverbanks, *terra firme* and *várzea* forests, border of woods, in banana and cocoa plantations, open fields, on rocks and on roadsides, in elevations between 20–700 m.

Vernacular names. In Brazil it is known as "musambér" (*B.W. Nelson 777*), "mussambê" (*G. Pedrelli & S.T. Meyer s.n.*-BHCB 15298). In Colombia, "platanito" (*W.A. Córdoba 418*). In Costa Rica "espuela del caballero" (*R.W. Holm & H.H. Iltis 636*). In Peru "uña de gato" (*C.H. Dodson 2824*).

Uses. The tea made with the roots is used for convulsive cough and that made with the flowers is used to heal diseases in chickens (*B.W. Nelson 777*).

Nomenclatural notes. We could not to locate any type material used by Weinmann to describe *Cleome brasiliensis*, which is supposed to be at LE. PACA 31576 is being here designated as the neotype because it was used by Iltis to describe *Cleome parviflora* subsp. *brasiliensis* [unpublished] and it is in good condition enabling us to recognize the species.

Gardner 6 has duplicates distributed among several herbaria. BM000573982 is being designated as the lectotype of *Cleome villosa* because it is from Gardner's herbarium and bears flowers and mature fruits.

G holds three specimens of *Gaudichaud 1011*, but G00226198 is being designated as lectotype because it is labeled with Briquet's handwriting.

Discussion. *Tarenaya parviflora* can be recognized by its glandular-pubescent or pubescent to glabrescent indumentum, 3 to 7-foliolated leaves; armed petioles, midrib and secondary veins; leaflets with sinuose-ciliate to serrulate-ciliate margins; sepals 1.5–2 mm long, white to deep pink oblanceolate petals, fleshy disciform nectary persistent in the fruit, filaments 10–16 mm long and capsules cylindrical-linear, slightly moniliform on a short gynophore 5–15 mm long.

T. parviflora is commonly confused with *T. longipes* since both species have similar floral features and floral measures, and a fleshy disciform nectary persistent in fruit. However, *T. parviflora* is an erect herb or shrub (vs. scandent shrub or treelet), with ovate floral bracts (vs. filiform) and shorter capsules 47–80 cm long and gynophores 5–15 mm long (vs. longer capsules 150–300 mm long and gynophores 130–300 cm long).

Specimens Selected. ARGENTINA. **Corrientes:** Ituzaingó, Isla Apipé Grande, Puerto San Antonio, 8 Dec 1973, *A. Krapovickas et al. 23976* (WIS); Montes Caseros, 10 Feb 1945, *L. Pujol 12* (NY); San Martín, boca rios Cuay Grande y Uruguay, 15 Dec 1944, *T. Ibarrola 1703*

(NY). **Misiones:** Guaraní, Reserva Antropólogica y Cultural Papel Misionero, 6 May 2001, *H. Keller 814* (WIS). BOLIVIA. **Beni:** Ballivian, Estancia El Porvenir, 14°49'S 66°25'W, 17 Nov 1985, *J.C. Solomon 14760* (MO); Moxos, colectas a orillas del río Chirizi, 130 km S de San Ignacio U. de Princeton, 12 Oct 1991, *M.D. Aguila & R.E. Gullison 144* (MO). **Chuquisaca:** Luis Calvo, Centro El Salavador-CIMBOC, 20°37'S 63°10'W, *C.S. Toledo et al. 11805* (MBM). **Cochabamba:** Ayopaya, Rios Altamachi y Malpaso, 16°33'32"S 66°08'29"W, 14 Aug 2001, *I.G. Vargas 6590* (MO); Chapare, Todos Santo, 3 Oct 1966, *R.F. Steinbach 378* (NY). **La Paz:** Iturralde, Puerto Heath along the rio Madre de Díos at Peruvian border, 12°30'S 68°38'W, 26 Aug 1985, *M. Nee 31573* (NY). **Pando:** Madre de Díos, along Rio Madre de Deus, Nueva Etea, 11°20'S 66°59'W, 4 Sep 1985, *M. Nee 31769* (MO, NY). **Santa Cruz:** Ichilo, Reserva Florestal el Chore, 16°46'54"S 64°13'53"W, 17 Jul 2005, *A. Molina 36* (MO). BRAZIL. **Acre:** Bujari, basin of Rio Purus, 9°39'S 68°02'W, 26 Mar 1995, *D.C. Daly et al. 8525* (NY, WIS); Capixaba, Projeto de Assentamento Extrativista (PAE) São Luís do Remanso, 10°29'34"S 67°54'3"W, 30 Sep 2003, *D.C. Daly et al.12049* (NY, RB); Mâncio Lima, Parque Nacional da Serra do Divisor, Nov 2007, *F. Obermuller et al. 392* (RB); Quixadá, 30 Km abaixo do Rio Branco ao longo do Rio Acre, ca. 10°S 67°50'W, 22 Oct 1980, *B.W. Nelson 777* (MO, NY, RB). **Amapá:** Macapá, Vizinhanças da Praia Araxá, SE de Macapá, 18 Nov 1979, *D.F. Austin et al. 7434* (RB). **Bahia:** Ilhéus, Área do CEPEC, km 22 da Rodovia Ilhéus/Itabuna (BR 415), Quadra H, 20 May 1981, *J.H. Lage & H.S. Brito 701* (CEPEC); Itabuna, às margens do rio Cachoeira, próximo ao bairro da Bananeira, 17 Aug 1997, *J.L. da Paixão 1* (CEPEC, RB); Mucuri, Próximo à ponte sobre o rio Mucuri na Rod. BR 101, 15 Sep 1978, *S.A. Mori et al 10546* (CEPEC, RB, WIS); Porto Seguro, 19 Jun 1962, *A.P. Duarte 6749* (RB). **Goiás:** Rialma, Rio das Almas, 22 Nov 1975, *G. Hatschbach 37796* (MBM, MO, WIS). **Espírito Santo:** Iconha, M. Rio Novo, 13 Jul 1956, *J.G.F.S. 9* (RB); Linhares, margem da Lagoa Juparanã, 13 May 1977, *G. Martinelli et al. 2029* (RB); Santa Teresa, Valsugana Velha, Estação Biológica de Santa Lúcia, 10 Jul 2001, *L. Kollmann et al. 4123* (JPB, MBML). **Mato Grosso do Sul:** Corumbá, margem do Rio Vermelho, 17 Oct 1991, *C.A. Conceição 2795* (PEUFR). **Minas Gerais:** Marliéria, Parque Estadual do Rio Doce, 17 Jul 1996, *J.A. Lombardi 1307* (BHCB, PEUFR); Uberlândia, Rio Araguari, 28 Oct 1986, *G. Pedrelli & S.T. Meyer s.n.* (BHCB). **Pará:** Belém, beira do Guamá, 27 Nov 1947, *G.A. Black 840* (WIS); Vicinity of Igarapé Kazuo, Km 1223, 19 Nov 1977, *G.T. Prance et al. 25573* (MO, NY, RB, WIS); Óbidos, Sep 1928, *A.J. de Sampaio 4237A* (R). **Paraná:** Alvorada do Sul, Rio Paranapanema, Posto Alvorada, 10 Jul 1969, *G. Hatschbach & O. Guimarães 21726* (MBM, NY, UPCB); Cerro Azul, 17 Jul 1951, *G. Hatschbach 2303* (MBM, WIS); Chopinzinho, Rio Iguaçu, Salto Santiago, 11 Apr 1975, *G.*

Hatschbach 36640 (MBM, MO, WIS); Cruzeiro do Oeste, Douradina, 31 Oct 1959, *R. Braga 72* (UPCB); Guaratuba, São João, 17 Dec 1963, *G.Hatschbach 10778* (MBM, PEUFR, WIS); Jataizinho, Rio Tibagi, 2 Nov 1946, *G. Hatschbach 506* (MBM, PACA); Morretes, 28 Mar 1912, *P. Dusén 14034* (NY). **Rio de Janeiro:** Cabo Frio, Campos, *C. Goland 6671* (RB); Cantagalo, s.d., *N. Armond 61* (R, WIS); Silva Jardim, Reserva Biológica de Poço das Antas, 29 Oct 1997, *J.M.A. Braga et al. 4385* (RB). **Rio Grande do Sul:** Torres, Lagoa Itapeva, 15 Sep 1978, *G. Hatschbach 41129* (MBM, WIS). **Rondônia:** Island in Rio Madeira opposite Jaciparaná, 27 Jun 1968, *G.T. Prance et al. 5260* (NY, WIS). **São Paulo:** Iporanga, beira da estrada, 8 Mar 1986, *M.C. Dias et al. 19* (PEUFR); Mogi Guaçu, Estação Experimental, 20 Oct 1977, *P.E. Gibbs & H.F. Leitão Filho s.n.* (BHCB). **Santa Catarina:** Araranguá, Sombrio, 5 Feb 1946, *B. Rambo s.n.* (PACA); Brusque, Azambuja, 27°06'S 48°54'W, 4 Mar 1952, *C.B. Smith & P.R. Reitz 6034* (WIS); Chapecó, Mato Branco, 24 km east of Rio Uruguai junction, s.d., *L.B. Smith & P.R. Reitz s.n.* (WIS); Itajaí, Barragens do rio, s.d., *Fr. Muller 104* (R); Lontras, Rio Sul, 19 Oct 1958, *P.R. Reitz & R. Klein 7362* (NY, WIS). COLOMBIA. **Amazonas:** Leticia, Sep 1946, *R.E. Schultes 8224* (NY). **Antioquia:** Támesis, Corregimento Palermo, 5°43'N 75°42'W, 28 Sep 1989, *F.J. Roldán et al. 1303* (MO). **Caquetá:** Araracuara, 22 Nov 1991, *D. Restrepo & A. Matapi 568* (NY). **Chocó:** Hoya del Rio San Juan, Alrededores de Palestina, 4°10'N 77°'10'W, 26 Mar 1979, *E. Forero et al. 4020* (MBM, MO); Quibdó, corregimiento de Bebará, sector La Calle em el río Bebará, 12 Apr 1984, *W.A. Córdoba 418* (MO); Riosucio, Zona de Urabá, 18 May 1988, *D. Cárdenas 1921* (MO). **Joaquin Antonio Uribe:** Turbo, Carretera Tapón del Darién, 15 Jan 1985, *J. Brand et al. 1306* (MO). **Santander:** Puerto Wilches and vicinity, 1926, *E.P. Killip & A.C. Smith 14906* (NY). **Valle del Cauca:** Bajo Calima, Concesión Pulpapel/Buenaventura, 3°55'N 77°0'W, *M. Monsalve 1602* (MO); Buenaventura, San Francisco, Río Raporo, 25 Oct 1979, *H. Cuadros 888* (MO); Cartago, Santa Ana de los Caballeros, 19 Nov 1946, *J. Cuatrecasas 23048* (MO). COSTA RICA. **Alajuela:** San Carlos, Vicinity of Los Chiles, Rio Frio, 11°02'N 84°44'W, 1 Aug 1949, *R.W. Holm & H.H. Iltis 636* (MO). ECUADOR. **Guayas:** Naranjal, Reserva Ecológica Manglares, 2°27'S 79°3'W, 3 Jan 1992, *C.E. Cerón 18022* (MO). **Los Rios:** Babahoyo, 28 Oct 1933, *H.J.F. Schimpff 339* (MO); Hacienda Clementina on Rio Pita, 13 Mar 1939, *E. Asplund 5272* (MBM, RB); Jauneche, en la carretera Mocachi-Palenque, 15 km Este de la via Empaime-Balzar, 25 Jul 1984, *C.H. Dodson et al. 14462* (MO). GUYANA. **Upper Taktu-Upper Essequibo:** To Buro-Buro River, by road from village to woods, 04°08'N 59°04'W, 20 Feb 1990, *T. McDowell et al. 1911* (NY). HONDURAS. **Cortés:** Aldea de Corinto y alrededores frontera con Guatemala, 55 km al O de Puerto Cortés, 9 Aug 1975, *C. Nelson et al. 2872* (MO); Lago de

Yojoa, Isla del Venado, 4 Sep 1991, *M. Chorley 79* (MO). MEXICO. **Oaxaca:** 63.2 mi N of Mateos Romero near Hwy. 147 branch toward Tuxtepec, 8 Sep 1979, *S. Trott et al. 268* (MO). **Tabasco:** 28 miles E of Villahermosa along MEX 186, 20 Jul 1971, *D. Spellman et al. 144* (MO). **Vera Cruz:** Santa Lucrecia, isthmus of Tehauntepec, Apr 1895, *C.L. Smith 1014* (MO). NICARAGUA. **Estelí:** Condega, Comunidad Venecia, 13°24'60"N 86°14'25"W, 20 Dec 2007, *C.M.O. Matey 88* (MO). **Río San Juan:** Entre Río Bartola y Río Sábalos, 11°02'N 84°38'W, 14 July 1994, *R. Rueda et al.* 2005 (MO); Muelle de San Carlos, 11°08'N 84°47'W, 16 Dec 1981, *J.C. Sandino 1766* (MO). **Zelaya:** at Río Kukalaya on road from Puerto Cabezas to Rosita, 14°04'N 84°05'W, 3 May 1978, *W.D. Stevens 8717* (MO). PANAMA. **Barro Colorado Islands:** Canal Zone, Miller Point, 8 Jul 1934, *Shaltuck 993* (MO). **Canal Zone:** Edge of lake near Madden Dam, 18 Sep 1974, *S. Mori & J. Kallunki 1992* (MO). **Coclé:** Boca del Toabré at confluence of Río Toabré and Río Coclé del Norte, 11 Apr 1969, *W.H. Lewis et al. 5541* (MO). **Darien:** Ensenada del Guayabo, 16–19 km SE of Jaqué, 29 Apr 1980, *N.C. Garwood 1002* (MO); Village of Mannene, 30 Apr 1968, *J.H. Kirkbride et al. 1633* (MO, NY). **Panama:** Forest bordering grasslands on Cerro Campana, 9 Sep 1966, *J.A. Duke 8689* (MO); Vicinity of La Jagua, wet savanna area east of Panama City, 4 Jul 1940, *H.H. Bartlett & T. Lasser 16376* (MO). PARAGUAY. **Caazapá:** Tavai, Rio Tebicuary, 15 Mar 1989, *N. Soria 3285* (MO, NY). **Capital:** Pto. Itá Enramada, 6 Apr 1976, *A. Schinini & E. Bordas 13315* (MO). **Central:** Tavarory, Border with Acosta ñu, 25°27'S 57°33'W, 12 Aug 1993, *E.M. Zardini & L. Guerrero 36842* (MO). **Itapua:** Yacyreta dam island reserve, 27°29'20"S 56°45'17"W, 5 Dec 2002, *E.M. Zardini & R. Gamarra 59144* (MO). PERU. Cañe Iricahua, abajo de Jenaro Herrera, margem isquierda del rio Ucayali, 19 Nov 1981, *Spichiger & Encarnación 1092* (MBM). **Loreto:** En la Circular (cerca al cementerio de Iquitos), 18 Sep 1964, *C.H. Dodson 2824* (MO); Indiana, Río Amazonas, Quebrada de Yanayacu hasta el caserio de "Falcon", 17 Apr 1996, *M. Rimachi 11617* (NY); Iquitos, Rio Nanay, Bellavista, 19 Dec 1974, *S. McDaniel & M. Rimachi 19465* (MO); Nauta, Paraiso, Rio Amazonas, 4°15'S 73°18"W, 24 Aug 1973, *S. McDaniel & M. Rimachi 17981* (MO); Punchana, Rio Momón, em orilla inundable, 20 Aug 1993, *M. Rimachi 10685* (MBM, RB); Requena, Cañe Iricahua, abajo de Jenare Herrera, margen izquierda del rio Ucayali, 19 Nov 1981, *R. Spichiger & F. Encarnación 1092* (MO). **Madre de Dios:** Tambopata, Dist. Las Piedras, Quebrada Gamitana, 12°30'31"S 68°59'45"W, *J. Farfán et al.* 651 (MO). **Ucayali:** Quebrada Shesha, tributary of Río Abujao, 8°02'S 73°55'W, 18 Jun 1987, *Al Gentry & C. Diaz 58417* (MO). SURINAME. Ad flum. Paloemeu et Tapanahoni confl., 3°20'N 55°27'W, 13 Apr 1963, *J.G. Wessels Boer 1259* (NY); Paramaribo, 21 Jan 1918, *B.W. 3568* (NY); *Sine loco*, 1841, *M. Berthould-Coulon 444* (MO); 2 km below confluence of Oost

Rivier, 12 Sep 1963, *H.S. Irwin et al. 55674* (NY); Vrendenburg Weg, 5 Dec 1934, *W.A. Archer 2872* (NY). VENEZUELA. **Apure:** Reserva Forestal San Camilo, 28 Mar 1968, *J.A. Steyermark et al. s.n.* (MO). **Bolivar:** Pedro Chien, Reserva Florestal de Imataca, 8°14'18"N 62°10'45"W, May 2003, *W. Diaz 6081* (NY). **Delta Amacuro:** Caño Winiquina Comunidad Indígena Barranquilla, 9 Feb 1996, *G. Colonnello 2119* (MO); near the border (=Rio Grande o Toro) between Estado Bolivar and Territorio Delta Amacuro, 8°4'N 61°44'W, 12 Apr 1964, *F.J. Breteler 3793* (MO). **Zulia:** 6 km West of main road and 2 km south of Río Catatumbo, 9°6'N 72°42'W, 29 Mar 1982, *R. Liesner & A. González 13371* (MO, NY); Miranda, alrededores de El Consejo de Ciruma, en El Parque El Cardón, 4 Sep 1982, *G.S. Bunting 11695* (NY).

26. **Tarenaya pernambucensis** Iltis & Costa-e-Silva ex Soares Neto & Roalson, Phytotaxa 334: 32. 2018. TYPE: BRAZIL. Pernambuco, São Lourenço da Mata, Tapera, São Bento, Upon a rock, 25 June 1932, *B. Pickel 3045* (holotype: IPA-3812!; isotypes: BH, F v0053149F [image!], GH00042342 [image!], LCU, MASS 00319664 [image!], MICH, MO-1551128!, RM0005356 [image!], UC, WIS v0324960WIS!).

Herb 0.1–0.8 m tall; branches puberulent throughout. Stipular spines 1–1.5 × 1 mm, straight. Leaves 3–7-foliolate; petioles 2.5–9 cm long, puberulent, armed with slender prickles; leaflets elliptic to oblanceolate, basally attenuate, apically acute, margin entire, ciliate; surface puberulent adaxially, glabrous abaxially; midrib and secondary veins glabrous, with discrete prickles; the central leaflet 2–5.5 × 0.8–2 cm, the other 1.5–4 × 0.5–1.5 cm; petiolules ca. 2 mm long, puberulent, armed. Racemes terminal and/or axillary, 9–23 cm long. Floral bracts 3–6 × 2–4 mm, cordate or ovate, basally cordate or obtuse, apically acute or obtuse, puberulent on both sides, margin ciliate; petioles 0.5–1 mm, puberulent, without prickles at base. Pedicels (5–)8–15 mm long, puberulent. Sepals 2–2.5 × 0.5–1 mm, ovate to lanceolate, apically acuminate, margin ciliate, densely puberulent to glabrescent abaxially. Petals 1.5–2.5 × 0.5–1 mm, spathulate, apically obtuse, glabrous, white to purple. Nectary disciform, conspicuous fleshy, obsolete in fruit. Filaments 2.5–3.5 mm long, purple; anthers 1.5–2.5 mm long. Ovary 1.5–2.5 mm long, cylindric, densely puberulent; style not elongated; stigma sessile, capitate. Capsules 20–30 mm long, cylindric, puberulent; gynophore 1–2 mm long, glabrous. Seeds 1–1.5 × 1 mm, cochleate, with densely transverse ridges, glabrous; cleft narrow, covered by a thin and small membrane connecting the claws.

Phenophase. Collected with flowers in February, April, May, September, November and December and with fruits in April, May, July, September, November and December.

Distribution and habitat. Endemic to Northeastearn Brazil (Alagoas, Bahia, Paraíba and Pernambuco states), Figure 19, it is found at the border of semidecidual forests, upon rocks and in gallery forests, between 245–450 m elevation.

Vernacular names. Known as "canela-do-mato" (*A.M. Miranda et al. 2243*).

Discussion. This species is related to *T. curvispina*, differing by the straight stipular spines (vs. curved), filaments relatively longer 2.5–3.5 mm long (vs. 1–2 mm long) and capsules cylindric (vs. oblongoid to oblanceoloid).

Specimens Selected. BRAZIL. **Alagoas:** São José da Laje, Usina Serra Grande, 21 Feb 2002, *M. Oliveira & A.A. Grillo 793* (HUEFS, IPA, UFP, UFRN). **Bahia:** Cachoeira, Vale dos rios Paraguaçu e Jacuípe, 12°38'S 39°05'W, Sep 1980, *Grupo Pedra do Cavalo 712* (CEPEC, HUEFS); Feira de Santana, Fazenda Boa Vista, Serra de São José, 12°15'S 38°58'W, 10 May 1984, *L.R. Noblick 3191* (CEPEC, HUEFS, PEUFR); Iaçu, Rod. BA–046, 17 Jul 1982, *G. Hatschbach & O. Guimarães 45081* (CEPEC, MBM); Itaberaba, ARIE Serra do Orobó, Fazenda Bom Jardim, 12°19'55"S 40°27'00"W, 14 Jul 2006, *L.P. de Queiroz & D. Cardoso 12220* (HUEFS). **Paraíba:** Maturéia, Pico do Jabre, 28 May 2005, *P.C. Gadelha Neto et al. 1406* (JPB); Pocinhos, 8 Jul 1994, *L.P. Félix & A.M. Miranda 6553* (PEUFR). **Pernambuco:** Arcoverde, Estação Experimental, 21 Jul 1971, *D. Andrade-Lima 6340* (EAC, IPA); Bezerros, Serra Negra, 16 Sep 1998, *M.I.B. Loiola et al. 519* (PEUFR); Bonito, Reserva Municipal de Bonito, 8°29'40"S 35°41'45"W, 21 May 1996, *E.M.O. Villarouco et al. 189* (PEUFR); Chã de Alegria, Estrada que dá acesso ao engenho Aratangi, 20 Dec 1996, *M.F.A. Lucena & A. Laurênio 688* (PEUFR); Pesqueira, Serra do Ororubá, 2 Aug 1979, *Andrade-Lima et al. 9582* (EAC, IPA); Primavera, Cachoeira do Urubu, 8 Sep 1996, *M.F.A. Lucena et al. 651* (PEUFR); Quipapá, Água Branca, Fazenda Pelada, 12 Sep 1950, *D. Andrade-Lima 601* (IPA); São Lourenço da Mata, Estação Ecológica do Tapacurá, Mata do Alto da Buchada, 1 Jul 1997, *A. Laurênio & M.I.B. Loiola 542* (PEUFR); Triunfo, Lagoa Nova, 7 Jun 1997, *A.M. Miranda et al. 2697* (HST, PEUFR); Vitória de Santo Antão, Engenho Pombal, primeira vereda após a ponte, em direção ao rio Tapacurá, 26 Sep 1998, *A. Laurênio & M.I.B. Loiola 1379* (PEUFR).

27. **Tarenaya psoraleofolia** (DC.) Soares Neto & Roalson, Acta Bot. Bras. 32: 543. 2018. *Cleome psoraleifolia* DC., Prodr. 1: 239. 1824. TYPE: BRAZIL. *Ferreira s.n.* (holotype: P001412296 [image]!).

Cleome nummularia DC., Prodr. 1: 239. 1824. TYPE: BRAZIL. *Ferreira s.n.* (holotype: P001412295 [image]!).

Herb to shrub 1 m tall; branches glandular-pubescent, pubescent to glabrescent. Stipular spines 2–3 × 1.5 mm, slightly curved at apex. Leaves 3–7-foliolate; petioles 6–8.5 cm long, pubescent to glabrescent, armed with slender to stout straight short prickles; leaflets elliptic to widely elliptic, elliptic-lanceolate, basally attenuate to cuneate, apically acuminate to long acuminate, margin sinuose-ciliate to serrulate-ciliate; surfaces glabrous or rarely with scattered short pointed eglandular hairs on both sides; midrib and secondary veins glabrous, with prickles; the central leaflet 6.2 × 2 cm, the other 3.3–4.7 × 1–1.3 cm; petiolules 2–3 mm long, pubescent, armed. Corymbiform racemes terminal, up to 30 cm long. Floral bracts 11–16 × 5–10 mm, ovate to elliptic, basally cuneate to rounded, apically acute, puberulent on both sides, margin serrulate-ciliate; petioles 3–5 mm long, puberulent, without prickles at base. Pedicels 17–19 mm long, glabrescent. Sepals 2.5–3 × 1 mm, linear-triangular to lanceolate, apically acute, margin ciliate, glabrescent abaxially. Petals 5–6 × 2.5–3 mm, obovate, apically obtuse, glabrous, white. Nectary conic, conspicuous fleshy, persistent in fruit. Filaments 20–23 mm long, purple; anthers 2.5–3 mm long. Ovary 4–5 mm long, cylindric, glabrous; style short elongated 1–2 mm long, persistent in fruit; stigma strongly capitate. Capsules 60–90 mm long, cylindric, slightly moniliform, pubescent to glabrous; gynophore 21–25 mm long, glabrous. Seeds 2–2.5 × 1–1.5 mm, suborbicular, seeming smooth, longitudinally striate and finely transversely ridged; cleft covered by a thin and opaque membrane.

Phenophase. Flowering and fruiting throughout the year.

Distribution and habit. Occurs in South America, in Ecuador, Peru, Bolivia, Brazil, Paraguay and Argentina (Figure 21). Found at wet, *terra firme* and *varzea* forests, border of woods, along river banks and riversides, pampas and on roadsides, in elevations between 200–1350 m.

Discussion. *Tarenaya psoraleifolia* resembles *T. parviflora*, being very difficult to distinguish them by vegetative features. However, *T. psoraleifolia* has bigger petals 5–6 × 2.5—3 mm (3–4 × 1.5 mm); conic nectary (vs. disciform); filaments 20–23 mm long (vs. 10–16 mm) and capsules on gynophores 21–25 mm long (vs. 5–15 mm).

Specimens Selected. ARGENTINA. **Entre Rios:** Concordia, Balneario La Tortuga Alegre, N de Concordia, 28 Feb 1993, *N. Bacigalupo et al. 1617* (NY). **Salta:** San Martín, de Coronel Cornejo hacia Altos de San Antonio, 8 km de Cornejo, 12 Dec 1986, *F. Zuloaga et al. 2743* (NY). BOLIVIA. **Beni:** Cercado, Casarabe, 51 km E of Trinindad on road to Ascencíon de Guarayos, 14°50'S 63°40'W, 14 Dec 1988, *M. Nee 37166* (NY, WIS); Rurrenbaque, 30 Oct 1921, *H.H. Rusby 1300* (NY); VacaDiez, Puerto Oro Blanco, río Beni, 13 Sep 1985, *M.Moraes 566* (WIS). **Santa Cruz:** Ichilo, Estancia San Rafael de Amboro, 17°35'S 63°37'W, 29 Jul

1988, *M. Nee et al. 35440* (NY, WIS); Ñuflo de Chavez, San Javier a 50 km al noroeste del pueblo Cabañas Selváticas Motacú, 15°56’55”S 62°22’45”, 23 Sep 1995, *S. Ortiz 191* (WIS); Velasco, San Ignacio, 5 Mar 1986, *R. Seidel 132* (NY, WIS). BRAZIL. **Acre:** Tarauacá, Rio Muru, 12 km above confluence with Rio Taruacá, 16 Sep 1968, *G.T. Prance et al. 7292* (NY). **Pará:** Santarém, arredores de Aramanaí, 5 Dec 1978, *U.N. Maciel & M.R. Cordeiro 144* (NY). **Rondônia:** along the Rio dos Pacaás Novos, 18 Mar 1978, *W.R. Anderson 12173* (NY). ECUADOR. **Los Rios:** Rio Palenque Biological Station, km 56 Quevedo-Santo Domingo, 18 Dec 1972, *C.H. Dodson 5224* (WIS). **Santo Domingos de los Colorados:** Sto. Domingo-Quevedo road km 37, 22 Oct 1981, *L. Werling & S. Lete-Nissen 534* (NY). PARAGUAY. **San Pedro:** Primavera, 8 Dec 1956, *A.L. Woolston 1147* (NY). PERU. **San Martín:** Mariscal Caceres, Tocache Nuevo, 19 Aug 1969, *J. Schunke 3356* (NY).

28. **Tarenaya regnellii** (Eichler) Soares Neto & Roalson, Acta Bot. Bras. 32: 543. 2018. *Cleome regnellii* Eichler, Vidensk. Meddel. Naturhist. Foren. Kjøbenhavn 190: 1870. TYPE: BRAZIL. Ad Caldas in prov. Minas Geraës [Minas Gerais], *A.F. Regnell III 147* (lectotype: BR 698554 [image!], designated by Soares Neto & al., Acta Botanica Brasilica 32: 543. 2018; isolectotypes: B 10 0242684 [image!], BR 698555 [image!], K000220449 [image!], LD 1314574 [image!], LE 00001896 [image!], S10-16964 [image!], S-R-7342 [image!], WIS0259069!, WIS0259070!).

Herb 0.2–0.3 m tall; branches pubescent throughout. Stipular spines 1 × 1, straight, sometimes inconspicuous. Leaves 3–7-foliolate; petioles 5.5–9 cm long, pubescent, unarmed; leaflets elliptic-lanceolate, basally attenuate, apically acute, apiculate, margin entire, ciliate; surface glabrous adaxially, pubescent abaxially; midrib and secondary veins pubescent, without prickles; the central leaflet 2.3 × 0.7 cm, the other 1.7 × 0.5 cm; petiolules 1–2 mm long, pubescent, unarmed. Corymbiform racemes terminal, 11–20 cm long. Floral bracts 3–5 × 2–3 mm, ovate to large-ovate, basally obtuse, apically acute, puberulent-glandular on both sides, margin ciliate; petioles 1 mm long, puberulent, without prickles at base. Pedicels 12–15 mm long, puberulent. Sepals 1.5–3 × 0.5–1 mm, lanceolate, apically acute, margin ciliate, densely puberulent to glabrescent abaxially. Petals 2.5–4 × 1.5–2 mm, elliptic, apically obtuse, glabrous, white. Nectary conic, inconspicuous fleshy, obsolete in fruit. Filaments 6–10 mm long, purple; anthers 1.5–2 mm long. Ovary 4–5 mm long, cylindric, puberulent; style short elongated, 1 mm long; stigma capitate. Capsules 25–30 mm long, cylindric, puberulent; gynophore 6–8 mm long, glabrous. Seeds 1–1.5 × 0.5 mm, suborbicular, longitudinally striate, with sparse transverse ridges protuberant, glabrous; cleft membrane inconspicuous. Figure 22B.

Phenophase. Collected with flowers and fruits in April.

Distribution and habitat. Species endemic to Brazil (Figure 21), with only a few records from the State of Minas Gerais, on limestone and rocky outcrops, between 150–650 m elevation.

Discussion. *Tarenaya regnellii* is a pubescent herb with diminutive stipular spines 1 × 1 mm long, sometimes inconspicuous; ovate to large-ovate floral bracts; short filaments 6–10 mm long and cylindric puberulent capsules 25–30 mm long on a short gynophore 6–8 mm long. It resembles *T. pernambucensis*, differing by the pubescent indumentum (vs. puberulent), unarmed petioles (vs. armed) and relatively longer gynophore 6–8 mm long (vs. short gynophore 1–2 mm long).

Specimens Selected. BRAZIL. **Minas Gerais:** Caldas, ReBio Serra da Pedra Branca, s.d., *C.D.M. Ferreira et al. 34* (RB); Januária, 15 km by road W of Januária on road to Serra das Araras, 20 Apr 1973, *W.R. Anderson 9216* (NY, RB).

29. **Tarenaya rosea** (Vahl ex DC.) Soares Neto & Roalson, Acta Bot. Bras. 32: 544. 2018. *Cleome rosea* Vahl ex DC., Prodr. 1: 239. 1824. TYPE: [BRAZIL, Rio de Janeiro] Ad Rio-Janeiro Brasiliae. v.s. in h. Juss., *P. Commerson 255* (holotype: P00671649 [image!]).

Cleome pentaphylla Vell., Fl. Flumin. 272. 1829 [“1825”]. TYPE: Lectotype, designated here: T. 111. in Fl. Flum. Icon. 6. 1831[“1829”]. **syn. nov.**

Herb to subshrub 0.5–1.5 m tall; branches glabrous. Stipular spines 1.5 × 1.5 mm, straight, sometimes lacking. Leaves 5-foliolate; petioles up to 13 cm long, glabrous, unarmed; leaflets elliptic to widely elliptic, elliptic-lanceolate, basally attenuate, apically acuminate to long acuminate, margin entire or serrulate to serrulate-ciliate; surfaces with scattered short hairs adaxially, glabrous abaxially; midribs and secondary veins glabrous, without prickles; the central leaflet 5–10 × 1–3.5 cm, the other 4–8 × 1–2.4 cm; petiolules 1–2 mm long, glabrous, unarmed. Corymbiform racemes terminal, 15–30 cm long. Floral bracts 10–20 × 6–10 mm, cordate, basally cordate, apically acute, glabrous, margin entire; petioles 1–2 mm long, glabrous, without prickles at base. Pedicels (15–)18–25 mm long, glabrescent to glabrous. Sepals 2.5–3(–3.5) × 0.5–1 mm, ovate-lanceolate, apically acuminate, margin ciliate, puberulent abaxially. Petals 8–10 × 2–4 mm, oblong-elliptic to obovate, apically obtuse, glabrous, white to pink or white at base becoming pink at apex. Nectary conic, inconspicuous fleshy, obsolete in fruit. Filaments (15–)19–25 mm long, purple; anthers (2.5–)3–4 mm long. Ovary 2–10 mm long, cylindric, puberulent; style not elongated; stigma sessile, capitate. Capsules (35–)50–87 mm long, cylindric, glabrescent to glabrous; gynophore (13–)15–25 mm

long, glabrous. Seeds 1.5–2 × 1 mm, suborbicular, longitudinally striate, conspicuously transversed ridged; cleft covered by an opaque membrane. Figure 20D–E.

Phenophase. Flowering and fruiting throughout the year.

Distribution and habitat. Species endemic to Brazil, ranging from Espírito Santo to Santa Catarina, along the Brazilian coast (Figure 21), in the *restinga* vegetation, at sea level.

Nomenclatural notes. Although the description of *Cleome pentaphylla* is quite simple, without present clear diagnostic features to identify the species, it is being here considered as a new synonym of *Tarenaya rosea*. Analyzing the plate and based on the leaves 5-foliolated, the spines or prickles lacking, and the appearance of inflorescence combined with the geographic distribution, *C. pentaphylla* resembles *T. rosea*. As there are not specimens from Vellozo's collection for Flora Fluminensis placed in any herbarium and based on the arguments presented above the plate related to the name *Cleome pentaphylla* is being designated here as its lectotype.

Discussion. *T. rosea*, under its basyonym *Cleome rosea*, was misapplied to *C. bicolor* (= *Tarenaya bicolor*) and *C. inermis* (= *T. inermis*). It can be distinguished from *T. inermis* by being glabrous (vs. pubescent to hirsute); by having stipular spines (vs. stipular spines absent); shorter filaments (15–)19–25 mm long (vs. 20–30 mm) and glabrescent to glabrous capsules 50–87 mm long (vs. puberulent, 45–55 mm). *T. rosea* does not reach Rio Grande do Sul, where *T. inermis* is found. For relationship with *T. bicolor*, see the comments in the description of the last.

Specimens Selected. BRAZIL. **Espírito Santo:** Vila Velha, Ilha das Garças, 6 Jul 1996, *J.M.L. Gomes 2132* (PEUFR). **Paraná:** Antonina, Rio Cotia, 29 Nov 1965, *G. Hatschbach 13170* (MBM); Guaratuba, arredores, 2 Apr 1983, *Y.S. Kuniyoshi 4650* (MBM); Ilha do Mel, Baía de Paranaguá, Jan 1929, *G. Tessmann 1954* (MBM); Matinhos, Caioba, Ilha do Farol, 5 Jul 1976, *G. Hatschbach 38835* (MBM); Morretes, Grota Funda, 28 Nov 1973, *G. Hatschbach 33393* (MBM); Paranaguá, Ilha da Galheta, 26 May 1984, *R. Kummrow 2469* (MBM); São José dos Pinhais, 27 Feb 1985, *G. Htaschbach 48951* (MBM). **Rio de Janeiro:** Campo Grande, Serra do Mendanha e Rio de Prata, 6 Jul 1997, *H.C. de Lima 6* (PEUFR, RB); Mangaratiba, Reserva Ecológica do Rio das Pedras, trilha do Cumbucá, Oct 1996, *M.G. Bovini et al. 1081* (RB); Niterói, Engenho do Mato, Parque Estadual da Serra da Tiririca, início da Trilha da Jararaca, 22°58'38"S 43°02'53"W, 26 Mar 2013, *D.N.S. Machado et al. 247* (RB); Rio de Janeiro, Jacarepaguá, terreno do aeroporto de Jacarepaguá, 9 Aug 1986, *T. Wendt 16* (PEUFR, RB). **Santa Catarina:** Estrada Dona Francisca, 4 Oct 1957, *Reitz & Klein 4994* (MBM). **São Paulo:** Cunha, 28 Feb 1939, *J. Kiehl s.n.* (PEUFR); Peruíbe, Estação Ecológica da Jureia, Barra do

Una, 1 Apr 1989, *V.C. Souza & A. Eterovic 533* (PEUFR); Praia Grande, Fortaleza de Itaipu, 10 Oct 1992, *U.M. Ruanda et al. 746* (PEUFR).

30. **Tarenaya siliculifera** (Eichler) Soares Neto & Roalson, Acta Bot. Bras. 32: 544. 2018. *Cleome siliculifera* Eichler, Fl. Bras. 13(1): 260. 1865. TYPE: [BRAZIL. Minas Gerais] Prov. Minarum: Habitat prope Cocaes et in Serra dos Pinheiros, [1839], *J. Pohl s.n.* (lectotype: BR 698586 [image!], designated by Soares Neto & al. 2018, Acta Botanica Brasilica 32: 544. 2018; isolectotypes: F (frag. + neg.) [image!], G00226314 [image!], M-0010385 [image!], LE, W [image!], WIS0259077!).

Herb 0.5 m tall; branches glandular-puberulent. Stipular spines absent. Leaves 3–5-foliolate; petioles 1–2.2 cm long, glandular-puberulent, unarmed; leaflets oblong-elliptic to oblanceolate, basally attenuate, apically obtuse, emarginate or acuminate, margin ciliate; surface glandular-puberulent on both sides; midrib and secondary veins puberulent, without prickles; the central leaflet 1–1.5 × 0.2–0.25 cm, the other 0.6–1 × 0.15–0.2 cm; sessile. Racemes terminal, 24–36 cm long. Floral bracts 2.5–5 × 2–3.5 mm, suborbicular to cordate, basally cordate, apically rounded, glandular-puberulent on both sides, margin ciliate; petioles 0.5–1 mm, glabrous, without prickles at base. Pedicels 10–15 mm long, glabrous. Sepals 1–1.5 × 0.5 mm, oblong to oblanceolate, apically acute, margin ciliate, glandular-puberulent abaxially. Petals 3–5 × 1–1.5 mm, orbicular, apically rounded, glabrous, white. Nectary disciform, conspicuous fleshy, persistent on fruit. Filaments 6–9 mm long, purple; anthers 1 mm long. Ovary 1.5 mm long, suborbicular to ovoid, glabrous; style 1 mm long, persistent in fruit; stigma not expanded. Capsules 2–2.5 mm long, ellipsoid to obovoid, inflated, glabrous; gynophore 7–10 mm long, glabrous. Seeds 1.5 × 1–1.5 mm, suborbicular, inconspicuously longitudinally striate and transversed ridged; cleft covered by a smooth and shiny membrane.
Phenophase. Collected with flowers in January, April, and from October to December, and with fruits from January to July, and from October to December.

Distribution and habitat. Species endemic to Brazil, occurring only at Chapada Diamantina, in the States of Bahia and Minas Gerais (Figure 21), on rocky outcrops and upon rocks, at ca. 1.250 m elevation.

***Discussion*.** *Tarenaya siliculifera* is well characterized by not bearing stipular spines, oblong-elliptic to oblanceolate leaflets, small flowers, disciform fleshy nectary persistent on fruit, ellipsoid to obovoid capsules, 2–2.5 mm long.

Specimens Selected. BRAZIL. **Bahia:** Rio de Contas, Pico das Almas, Vertente Leste, 13°32'S 41°54'W, 11 Dec 1988, *R.M. Harley & B. Stannard 27089* (CEPEC). **Minas Gerais:** Diamantina, Água Fria, 2 Apr 1957, *E. Pereira & Pabst 2803* (PEUFR, RB); Grão-Mogol, Estrada Grão-Mogol-Cristália, c. 2 km do entrocamento com a estrada Boqueirão-Grão-Mogol, 16°35'30"S 42°43'30"W, 14 Feb 2003, *F. França et al. 4352* (HUEFS); Mato Verde, ca. 14 km para Norte, Monte Azul, vindo de Montezuma, 15°23'24"S 42°47'21"W, 11 Jan 2006, *A.K.A. Santos et al. 626* (HUEFS); Rio Vermelho, Pedra Menina, Fazenda Vargem do Anjo, 13 Oct 1984, *R. Mello-Silva et al. CFCR 5388* (CEPEC, PEUFR).

31. **Tarenaya spinosa** (Jacq.) Raf., Sylva Tellur. 111. 1838. *Cleome spinosa* Jacq., Enum. Syst. Pl. 26. 1760. *Neocleome spinosa* (L.) Small, Man. S.E. Fl. 577. 1933. TYPE: JAMAICA. *N. Jacquin s.n.* (neotype: BM, designated by Al-Shehbaz, in R.A. Howard (ed.): Fl. Lesser Antilles 4: 305. 1988).

Cleome heptaphylla L., Sp. Pl. 2. 2: 987. 1763. TYPE: Habitat the Indiis. (lectotype, designated here: JAMAICA, 1730, *W. Houston s.n.*, BM000629051 [image!]). ≡ *Cleome erucago* Mill., Gard. Dict., ed. 8. n. 6. 1768.

Cleome pungens Willd., Hort. Berol. 1804. TYPE: Habitat in America calidiore. (lectotype, designated here: t. XVIII, in Hort. Berol. 1804.). *Cleome pungens* Willd. var. *pungens* Griseb., Fl. Brit. W. I. 16. 1864.

Cleome pubescens Sims, Bot. Mag. 43: pl. 1857. 1816. TYPE: (lectotype, designated here: pl. 1857, In Bot. Mag. 43. 1816).

Cleome tonduzii Briq., Annuaire Conserv. Jard. Bot. Genève 17: 375. 1914. TYPE: COSTA RICA. Bords des Chemins a Nyesya, Mars [March] 1900, *A. Tonduz 13862* (lectotype, designated here: G00226164 [image!]; isolectotypes B 10 0242692 [image!], BM000629046 [image!], F V0053134F [image!], G00226165 [image!], G00226311 [image!], GH 00042312 [image!], K000220437 [image!], K000220438 [image!], P00076160 [image!], US 00100498 [image!]).

Herb or subshrub 0.4–1.7 m tall; branches pubescent to glandular-puberulent. Stipular spines 2–5 × 1–3.5 mm, straight or slightly curved at apex. Leaves 5–7-foliolate; petioles 2.5–9 cm long, glandular-puberulent, armed with sparsely few slender to stout prickles; leaflets elliptic to oblanceolate-elliptic, basally attenuate, apically acute to acuminate, margin serrulate-ciliate; surface scattered with short pointed eglandular hairs throughout on both sides or

glabrous; midrib and secondary veins pubescent, without prickles; the central leaflet 3.7–9 × 1–2.7 cm, the other 2.1–7 × 1–2.5 cm; petiolules 1–4 mm long, puberulent, unarmed. Corymbiform racemes terminal, 14–56 cm long. Floral bracts 6–22 × 4–13 mm, elliptic to oblong-elliptic, oblanceolate or ovate to large ovate, basally rounded or cuneate, apically acute, glandular-puberulent throughout, margin ciliate; petioles 1–10 mm long, puberulent, with a pair of prickles at base. Pedicels 15–30 mm long, glandular-puberulent. Sepals 5–8 × 1–2 mm, lanceolate, apically acuminate, margin ciliate, puberulent abaxially. Petals 7–15 × 3–5 mm, oblong-elliptic, apically obtuse, puberulent to glabrous abaxially, white. Nectary conic, inconspicuous fleshy, obsolete in fruit. Filaments 21–33 mm long, purple; anthers 6–9 mm long. Ovary 2–5 mm long, cylindric, puberulent; style not elongated; stigma sessile, capitate. Capsules 50–120 mm long, cylindric, slightly moniliform, puberulent; gynophore 15–30(–35) mm long, glabrous. Seeds 1.5–2 × 1–1.2 mm, suborbicular, longitudinally striate, longitudinally striate, sparsely transversely ridged; cleft covered by a thin translucent membrane.

Phenophase. Flowers and fruits throughout the year.

Distribution and habitat. Species ranging from Mexico to Colombia, Venezuela and in the West Indies (Figure 24). Found on roadsides, along railroads, riversides, river banks, in *restingas*, savannas, meadows, open fields, waste and disturbed areas, and border of woods, from sea level to up 1000 m elevation.

Vernacular names. In El Salvador "barbón" (*J.M. Rosales 2068*). Costa Rica "alelí" (*A. Molina & A.R. Molina 35155*), "espuela de caballero" (*A. Tonduz 13862*). Honduras "chilpate" (*R.R. Pineda 92*). Mexico "charamusco" (*M. Nee & K. Taylor 26526*). Venezuela "barbasco" or "garcita" (*G. Martino et al. 425*).

Uses. Used as abortifacient in different breed of cattle (*G. Martino et al. 425*).

Nomenclatural notes. Linnaeus described *C. heptaphylla* based on a plant inhabiting the West Indies. He also indicated as synonym *Cleome foliis hexandris* described in "*The gardeners dictionary*" by Phillip Miller and *Sinapistrum aegyptiacum heptaphyllum* described by Houston. In 1768 a new edition of "*The gardeners dictionary*" was released with the publication of *Cleome erucago* (probably the same *Cleome foliis hexandris*) and presenting *Sinapistrum aegyptiacum heptaphyllum* as synonym. Since no *Cleome heptaphylla* specimen was located in Linnaeus' collections, as well as no clear type was indicated for *Cleome erucago*, both species are being here considered as synonym *homonimus*. BM000629051 is being designated as the

lectotype because it is a Houston's collection supposed to be used to described *Sinapistrum aegyptiacum heptaphyllum*.

We could not locate at B, where Willdenow types collections' are usually located, any specimen from that time matching *Cleome pungens*. So, the illustration accompanying the original description of the species is being here designated as lectotype.

Cleome pubescens was described based on an individual raised from seeds of plants cultivated in Paris from an unknown original country. We are designating as lectotype the illustration that accompanies the original description because it depicts a diagnostic reproductive branch sufficient to recognize the species.

There are 11 duplicates of *Tonduz 13862* distributed among different herbaria. G holds three of these duplicates with G00226164 and G00226165 labeled with Briquet's handwrite notations. As no one of these specimens show notifications indicating "spec. nov", a lectotype is being designated here. Both specimens are good representatives for the species bearing flowers and fruits, but G00226165 is being designated as lectotype because bears mature capsules, a very diagnostic feature to recognize the species.

Discussion. *Tarenaya spinosa*, or its basyonym *Cleome spinosa*, is a name broadly misapplied to identify the *Cleome* species bearing a pair of spines at base of petioles. But, *T. spinosa* is frequently confused with the South American species *T. longicarpa* and *T. hassleriana*. It differs from *T. longicarpa* by the elliptic to oblanceolate-elliptic leaflets (vs. lanceolate or narrowly elliptic to elliptic), petals 7–15 × 3–5 mm (vs. 9–20 × 4–8 mm), and capsules 50–120 mm long on a gynophore 15–30(–35) mm long (vs. 110–195 mm and 45–70 mm). It is distinguished from *T. hassleriana* by glandular-puberulent pedicels 15–30 mm long (vs. pubescent, 20–50 mm); filaments 21–33 mm long and anthers 6–9 mm long (vs. 50–70 mm and 8–11 mm, respectively).

Specimens Selected. BELIZE. **Belize:** Belize City, 1.5 miles of city limits on Western Highway, 22 Jan 1974, *R. Liesner & J. Dwyer 1537* (MO, WIS). COLOMBIA. **Antioquia:** Magdalena River bridge, Puerto Berrio, 28 Mar 1971, *M. Nee & S. Mori 3817* (WIS). **Choco:** Río Atrato near Río Sucio, 17 Jan 1974, *A. Gentry 9287* (WIS). **Guajira:** Maicao, Corregimiento Albania, 11˚10'N 72˚35'W, 30 Apr 1988, *F.J. Roldán et al. 946* (WIS). **Magdalena:** 6 March 1972, *J. Daniels 310* (WIS); Santa Marta, 1898-1901, *H.H. Smith 1971* (MO, NY, WIS). **San Andres Islands:** 3 Aug 1967, *A. Gentry s.n.* (WIS). COSTA RICA. **Cartago:** Vicinity of Cartago, at turnoff from route 228 into Tobosi, on NW side of village,

near church, 9°52N 83°55'W, 9 Dec 1972, *W.S. Alverson 2009* (MO). **Guanacaste:** La Cruz, Cuenca del Sapoá, 11°10'35"N 85°36'09"W, 3 Apr 2001, *J.F. Morales 7916* (MO); Nandayure, 9°51'30"N 85°21'06"W, 14 Jul 1994, *A. Rodríguez & A. Estrada 84* (MO); Santa Cruz, Cuenca del Tempisque, 10°16'N 85°30'21"W, 13 May 2004, *L. González & A. Garita 3091* (MO). **Puntarenas:** Along West side of Río Grande de Tárcoles, ca. 0.5 km S of mouth of Río Turrubares, 9°50'N 84°34'W, 24 Apr 1985, *M. Graymun et al. 5214* (MO). CUBA. **Santa Clara:** District of Cienfuegos, Calicita, 31 May 1895, *R. Combs 98* (MO). DOMINICA. **Lesser Antilles:** St. Paul Parish, roadsides at Sag Toyota dealership, Canefield, southeast of airport, 30 Jul 1992, *S.R. Hill 24045* (MO). EL SALVADOR. **Ahuachapán:** A.P. Santa Rita, ruta 1, 13°48'N 90°4'W, 27 Jan 2004, *J.M. Rosales 2068* (MO, WIS). **Chalatenago:** Citalá, ribera del Río Lempa, 14°23'N 89°14'W, 4 Apr 1997, *M. Renderos et al. 133* (MO). **La Libertad:** Area Protegida San Juán Buenavista, 13°35'N 89°14'W, 6 Mar 2001, *R.A. Carballo et al. 4* (MO). **San Salvador:** Vicinity of San Salvador, *s.d., Standley 23198* (WIS). **Santa Ana:** Metapán, San Diego-La Barra, sector 12, Bosque La Barra, 14°18'N 89°32'W, 17 Jan 2011, *D. Rodríguez et al. 2237* (MO). **Sonsonate:** Caluco, Ctón. El Zapote, 13°42'33"N 89°37'W, 16 May 2012, *P. Galán & B.J. Peña 1420* (MO). GUADELOUPE. **Basse-Terre:** 2 km de Pointe Noire, vers Nahaut, 1 May 1974, *C. Sastre & F. Sastre 2774* (MO). GUATEMALA. **Amatitlan:** Mar 1947, *J.F. Brenckle 47-297* (MO). **Santa Rosa:** May 1892, *Heyde & Lux 2982* (MO). **Zacapa:** Gualán, 20 Jun 1909, *C.C. Deam 6385* (MO). HAITI. Plantes dans le rues á coté de la marché, Port-au-Prince, 26 May 1979, *W.G. D'Arcy 13365* (MO). HONDURAS. **Choluteca:** Marcovia, 20 km de Choluteca, 25 Mar 1984, *F. Argeñal 183* (MO). **Colón:** Trujillo, Howler site, Río Selen 7 km east Trujillo, 22 Apr 1980, *J. Saunders 190* (MO). **Cortés:** Comayagua, Alrededores del Lago Yojoa, 15 Jan 1984, *C.C. Dueñas 90* (Mo); La Lima, Alrededores de La Lima, 16 Apr 1983, *R.R. Guevara* 140 (MO). **Francisco Morazán:** Comayagüela, Colonia Alamo, 10 Feb 1983, *I. Montoya 107* (MO); Distrito Central, Campus of EAP El Zamorano, 16 Apr 2001, *A. Molina & A.R. Molina 35155* (MO); Tegucigalpa, Colonia Loarque, 6 Nov 1982, *R.G. Portillo 41* (MO). **Yoro:** Olanchito, San José, along the Rio Agalteca, 15°28'36"N 86°38'57"W, 2 Jul 1994, *G. Davidse et al. 35512* (MO, WIS). JAMAICA. **St. Andrew Parish:** In weedy fields on University of West Indies Campus, 5 Jun 1963, *M.R. Crosby et al. 63* (MO). **Parish:** St. Catherine, along the Río Cobre just south of Central Village, 14 May 1977, *G.R. Proctor 36863* (MO). MEXICO. **Chiapas:** 11 miles N Matías Romero, 16 Jun 1968, *C.D. Johnson 126-68* (MO). **Colisma:** Río El Salado, route 10, 19°21'N 103°45'W, 18 Jan 1982, *J.S. Miller et al. 242* (MO); Cintalapa, dry slopes with thorn forest 3–5 km north of Cintalapa, 22 Dec 1972, *D.E. Breedlove & R.F. Thorne 30480* (MO);

Ocozocoautla de Espinosa, steep-walled canyon at the head of the Río de la Venta at the Chorreadero near Derna, 16 Dec 1972, *D.E. Breedlove & R.F. Thorne 30337* (MO); Suchiapa, 3 km south of Suchiapa along road to Villa Flores, 26 Sep 1972, *D.E. Breedlove 28041* (MO). **Jalisco:** La Huerta, Rancho Cuixmala, along the Río Cuitzmala, 19°22'N 104°58'W, 16 Mar 1991, *A.C. Sanders et al. 10520* (MO). **Tabasco:** Cárdenas Fecha, Tamarindo, 8 Jul 1984, *F. Ventura 21101* (MO). **Vera Cruz:** Acayucan, Corral Nuevo, along Highway MEX.180, 8 km S of Juan Covarrubias, 18°07'N 95°07'W, 7 Apr 1983, *M. Nee & K. Taylor 26526* (MO); Cosamaloapan, Gabino Barreda Cosamaloapan, 12 Oct 1966, *G.M. Calderón 1101* (MO); La Antigua, Gulf Coast, Sep 1912, *C.A. Purus 6003* (MO); Río Vista, Río Coatzacoalcos, 1.5 km de Jesus Carranza, 17°27'N 94°531W, 9 Aug 1971, *L.I. Nevling & A. Gomez-Pompa 2575* (MO). NICARAGUA. **Atlántico Norte:** Island in Río Coco, ca. 1.5 km downstream from confluence of Río Waspuk, on Honduras border, 14°38'N 84°25'W, 3 Mar 1979, *W.D. Stevens et al. 13119* (MO). **Atlántico Sur:** Bluefields, on a rocky trail near stream, 11 Dec 1968, *J.T. Atwood et al. 354* (MO). **Boaco:** Quebrada Santa Cruz, along road from Puertas Viejas to Esquipulas, 9.9 km E of El Cacao, 12°37'28"N 85°50'13"W, 18 Feb 2008, *W.D. Stevens & O.M. Montiel 27146* (MO); San Francisco, NE of Pueblo along Tecolostote River, 22 Jul 1972, *F.C. Seymour & S.B. Robbins 6071* (MO). **Carazo:** Sobra la Quebrada de la finca Las Nilas, 11°38'N 86°11'W, 11 Jan 1983, *A. Grijalva et al. 2182* (MO). **Chinandega:** Cinco Pinos, Comunidad Las Pozas, 13°11'N 86°51'W, 4 May 2004, *I. Coronado & J. Soriano 608* (MO). **Chontales:** 5.8 km SSW of Juigalpa on road to Puerto Díaz, Río Potrero, 12°04'N 85°24'W, 5 Jun 1980, *W.D. Stevens & O.M. Montiel 17431* (MO); Juigalpa, sobre el camino entre Juigalpa y Puerto Díaz, 11 Jul 1980, *M. Guzmán et al. 380* (MO). **Estelí:** Condega, Comunidad El Bramadaro del Parque 200 m carretero al rodeo, 13°23'07"N 86°15'42"W, 19 Oct 2007, *J.G. Calderón 71* (MO). **Granada:** 7 km N de Intécna, 11°59'N 85°56'W, 24 Jun 1981, *J.C. Sandino 708* (MO); "La Calera", 7.5 km sobre la camino a Cutirre, 11°51'N 85°57'W, 11 May 1981, *P. Moreno & J. Henrich 8460* (MO); Nandaime, Comarca Aguas Agrias, finca Las Plazuelas, 11°45'N 85°56'W, 11 Apr 2011, *I. Coronado & P.A. Almanza 5938* (MO); N de ciudad Granada, camino entre Intecna y el Guayabo, 11°56'N 85°57'W, 19 Feb 1982, *J.C. Sandino 2247* (MO); Volcán Mombacho, 11°51'N 85°56'W, 24 May 1980, *P. Moreno 457* (MO). **Jinotega:** Rápido Piu, Río Coco, 14°15'N 85°15'W, 13 Mar 1980, *W.D. Stevens et al. 16802* (MO); Wiwilli, Comunidad Boca de Plis, 14°10'01"N 85°43'02"W, 7 Feb 2008, *E.M. Urbina 245* (MO). **Leon:** along Río Sinecapa at ford of road, 12°36'N 86°28'W, 15 Sep 1977, *W.D. Stevens 3890* (MO); carretera León-Poneloya, Puente Palermo, 12°23'18"N 86°59'22"W, 30 May 2012, *I. Coronado & J. Reyes 6597* (MO); slope and ridge immediately W of Quebrada

Las Ruedas and along stream, NW of El Transito, 12°05'N 86°43'W, 10 Dec 1977, *W.D. Stevens et al. 5440* (MO); Santa Rosa del Peñón, entrada a la presa Santa Bárbara, 11 Sep 1980, *P. Moreno 2478* (MO). **Madriz:** Cerro Quisuca, lower S and SW slopes, 13°30'N 86°31'W, 23 Nov 1979, *W.D. Stevens et al. 16173* (MO). **Managua:** Mateare, a orillas del Lago Xolotlán, 12°15'N 86°26'W, 20 May 1981, *P. Moreno 8578* (MO). **Masaya:** Laguna de Masaya, 11°59'N 86°08'W, 30 May 1981, *P. Moreno & J. Henrich 8938* (MO). **Matagalpa:** at ford of Río Grande de Matagalpa, 12°38'N 85°59'W, *W.D. Stevens et al. 9885* (MO); Laguna Tecomapa 10 km S of Ciudad Dario, 24 May 1977, *D. Neill 1945* (MO); Matguás, Hacienda "El Ojoche", 10 May 1980, *M. Guzmán & D. Castro 86* (MO). **Rivas:** Isla de Ometepe, 12°29'N 85°32'W, 25 Feb 1978, *W.D. Stevens et al. 6619* (MO); Hacienda La Flor, 18 km al sur de San Juan del Sur, 10 Feb 1980, *M. Araquistain & P. Moreno 1240* (MO); Quebrada Las Canas, near Río Escalante, 11°32'N 86°09'W, 3 Aug 1978, *W.D. Stevens et al. 9678* (MO). **San Carlos:** En La Isla Donald Guevara, archipelago de Solentiname, Lago Nicaragua, 18 Sep 1982, *E. Martínez 2257* (MO). **Zelaya:** Corn Island, N and W shore, Sandy Fly Point to Southwest Bay, and NW part of Island, along and and W of airstrip, 12°09'N 83°02'W, Apr 1981, *W.D. Douglas et al. 19871* (MO); Island of Río Coco, 14°38'N 84°25'W, 3 Mar 1979, *W.D. Stevens et al. 13119* (MO). PORTO RICO. **Cerro La Baderr:** 30 Mar 1964, *J.A. Duke 7341* (MO). REPUBLIC A DOMINICANA. **El Seibo:** Km 34 W of Higuey of highway to El Seibo, 18°45'N 69°01'W, 28 Apr 1981, *T. Zanoni et al. 13011* (MO). **Llanura Costera:** Distrito Nacional, Río Haina, 3 km al SO de Hato Nuevo, al SO de "UNO", 18°31'N 70°05'W, 14 Feb 1991, *T. Zanoni & B. Santana 44883* (MO). **San Pedro de Macoris:** town near Boca de Soco, on road from La Romana-San Pedro de Macoris, 18°27'N 69°13'W, s.d., *M. Mejía & T. Zanoni 8564* (MO).

32. **Tarenaya titubans** (Speg.) Soares Neto & Roalson, Acta Bot. Bras. 32: 544. 2018. *Cleome titubans* Speg., Anales Soc. Ci. Argent. 15: 97. 1883. TYPE: ARGENTINA. [Buenos Aires] Província Bonaërensi: Inter dumeta in paludosis secus, "el Rio de la Plata", loco dicto "las Conchas", Majo [May] 1881, *C.L. Spegazzini s.n.* (neotype: ARGENTINA. Buenos Aires, Quilmes, loc. Bernal, March 1973, *F.M. Rodríguez 191*, SI 066837 [image!], designated by Soares Neto & al., Acta Botanica Brasilica 32: 544. 2018; isoneotype: SI 066836 [image!]).

Cleome montevidense Arech., Anales Mus. Nac. Montevideo. 3: 54. 1901. TYPE: (syntypes: URUGUAY. Canelones: Bañados de Carrasco, *Arechavaleta s.n.*, Santa Lucia, *Arechavaleta s.n.*).

Subshrub 0.85 m tall; branches pubescent. Stipular spines 3–4 × 2–3 mm, straight. Leaves 3–5-foliolate; petioles 4–6 cm long, pubescent, armed with slender to stout prickles; leaflets elliptic to oblanceolate, basally cuneate to attenuate, apically acute; margin serrulate-ciliate; surface pubescent on both sides; midrib and secondary veins pubescent, with prickles; the central leaflets 3.5–5 × 1.5–2.3 cm, the other 3.5–4.5 × 1.7–2 cm; petiolules 1–2 mm long, pubescent, armed. Corymbiform racemes terminal, 20–36 cm long. Bracts subtending the lower flowers leaf-like, with 3–5-leaflets, becoming 1-foliolate, the other 15–25 × 5–15 mm, ovate, basally rounded, apically acuminate, with scattered short pointed hairs adaxially, glabrous abaxially, margin serrulate-ciliate; petioles 2–9 mm long, puberulent, with a pair of stout prickles at the base. Pedicels 10–16 mm long, puberulent. Sepals 4–6 × 0.5 mm, linear-triangular to narrowly lanceolate, apically acute, margin ciliate, pubescent abaxially. Petals 5–8 × 2–2.5 mm, elliptic, apically obtuse, glabrous, white to purple or white at becoming purple at apex. Nectary conic, inconspicuous fleshy, obsolete in fruit. Filaments 7–12 mm long, purple; anthers 8–10 mm long. Ovary 5–6 × 1–2 mm, fusiform, glabrous; style not elongated; stigma sessile, strongly capitate. Capsules 37–50 mm long, fusiform, slightly inflated, glabrous; gynophore 5–10 mm long, glabrous. Seeds 2–2.5 × 1–1.5 mm, suborbicular, seemingly smooth, discreetly longitudinally striate, with a few transversed ridges; cleft covered by a smooth membrane. Figure 23A.

Phenophase. Collected with flowers in December and with fruits in February, July and December.

Distribution and habitat. Distributed in Argentina, Brazil and Uruguay (Figure 24). It occurs in open, sandy, grassy fields and along riversides and border of woods, in elevations of ca. 200 m.

Discussion. *Tarenaya titubans* is a species from the south of South America, easily recognized by the presence of a pair of stout prickles at the base of the floral bracts petioles, petals white to purple or white becoming purplish at the apex and fusiform slightly inflated capsules.

Specimens Selected. ARGENTINA. **Buenos Aires:** Partido de La Plata, Punta Lara, 26 Feb 1946, *A. Krapovickas 2897* (MO); Punta Lara, 26 Feb 1946, *A. Krapovickas 2897* (MO, WIS). **Entre Ríos:** Gualeguaychu, arroyo Paranacito, 20 Apr 1965, *A. Burkart et al. 25733* (WIS). BRAZIL. **Rio Grande do Sul:** Pelotas, Praia do Laranjal, Pontal da Barra, 18 Dec 1998, *L.R. Soares & J.M. Schlee 3* (MBM); Santa Vitória do Palmar, Estacão Ecológica do Taim, margens da lagoa Mirim, 27 Feb 1978, *G. Martinelli 3987* (RB). URUGUAY. **Canelones:** Bañados de

Canelones, 25 Feb 1937, *D. Legrand 1033* (WIS). **São José:** São José, autódromo in paludosis, May 1932, *Herter 90580* (WIS).

33. **Tarenaya torticarpa** (Iltis & T. Ruiz Zapata) Soares Neto & Roalson, Acta Bot. Bras. 32: 544. 2018. *Cleome torticarpa* Iltis & T. Ruiz Zapata, Novon 7: 367. 1997. TYPE: VENEZUELA. Estado Falcón, Distrito Federación, Parque Nacional Cueva de la Quebrada el Toro, 10°50'N 69°07'W, em selva de galería, bajo sombra, 200m abajo de la "toma de agua" em la estácion del Parque, 600m, 29 October 1983, *Thirza Ruiz Zapata & Teo Ruiz 4138* (holotype: MY; isotypes: COL, F, K, MER, MEXU 01456934 [image!], MO-247739!, NY00387680!, NY00345549!, S08-1365 [image!], US 00589251 [image!], VEN 263848 [image!], WIS0259083!, WIS0259084!, WIS0259085!).

Herb 0.2–0.5 m tall; branches glabrescent to glabrous. Stipular spines less than 1 × 1 mm, straight or lacking. Leaves 3-foliolate; petioles 6.7–10 cm long, eglandular hairs throughout or glabrous, discreetly armed with slender prickles; leaflets lanceolate to elliptic, oblanceolate or ovate, basally cuneate at the central leaflet, asymetric at the other, apically acuminate to long acuminate, margin long-ciliate to serreate-ciliate; surface sparsely pilose, with scattered eglandular hair on both sides; midrib and secondary veins glabrous, without prickles; the central leaflet 7.3–11 × 2.4–3.4 cm, the other 6.5–8.8 × 2.3–3.2 cm; petiolules 2–4 mm long, pubescent, sometimes armed. Corymbiform racemes terminal, 15–30 cm long. Floral bracts 6–8 × 6–8 mm, ovate or suborbicular, basally rounded, apically acuminate, with scattered eglandular hairs on both sides, margin serreate-ciliate; petioles 1 mm long, glabrous, without prickles at base or sessile. Pedicels 13–15 mm long, glabrescent to glabrous. Sepals 4–5 × 0.5 mm, linear-triangular to lanceolate, apically long acuminate, margin ciliate, sparsely pilose abaxially. Petals 5–11 × 3–4 mm, oblong-elliptic, apically obtuse, glabrous, white. Nectary conic, inconspicuous fleshy, obsolete in fruit. Filaments 14–18 mm long, green; anthers 3–3.5 mm long. Ovary 1.5 mm long, fusiform, glabrous; style elongated, 1–2 mm long, persistent in fruit; stigma not expanded. Capsules 29–32 mm long, cylindric or fusiform, twisted 1-2 times, conspiscuously longitudinally striate, glabrous; gynophore 17–22 mm long, glabrous. Seeds 2.1–2.7 × 2.1–2.9 mm, suborbicular, thick, longitudinally striate, verrucose; cleft covered by a smooth membrane.

Phenophase. Collected with flowers and fruits in June, August, October and November.

Distribution and habitat. Species endemic to Venezuela, known only from one locality, in gallery forests, ca. 600 m elevation (Figure 24).

Discussion. *Tarenaya torticarpa* is a distinctive species bearing 3-foliolate leaves, the central leaflet cuneate basally and the other asymmetric. The main feature to recognize this species is the cylindric or fusiform twisted 1-2 times capsules.

Specimens Selected. VENEZUELA. **Falcón:** Distr. Federación, Parque Nacional Cueva de la Quebrada El Toro, 29 Oct 1983, *T. Ruíz & N. Mariño 4138* (MO); *loc. cit*., 21 Jun 1979, *R. Liesner et al. 7766* (MO); *loc. cit*., 21 Aug 1983, *T. Ruíz & T. Ruíz 4131* (MO, NY, WIS); *loc. cit*., 10°50'N 69°07'W, 23 Jun 1979, *R. Liesner et al. 7913* (MO); *loc. cit*., 22 Jun 1979, *R. Liesner et al. 7791* (NY, WIS); *loc. cit*., 23 Feb 1979, *Flora Falcón 404* (WIS); Entre Churuguara y Santa Cruz de Buracal, alrededores de Santa Cruz de Bucaral, 20 Nov 1982, *T. Ruíz & L. Gonzalez 4057* (NY).

34. **Tarenaya trachycarpa** (Klotzsch ex Eichler) Soares Neto & Roalson, Acta Bot. Bras. 32: 544. 2018**.** *Cleome trachycarpa* Klotzsch ex Eichler, Fl. Bras. 13(1): 252. 1865. TYPE: [BRAZIL] Habitat in Brasilia austro-orientali, *Sello* [*F. Sellow*] *2059* (holotype: B 10 0242688 [image]!). *Cleome psoraleifolia* DC. var. *trachycarpa* (Klotzsch ex Eichler) Kuntze, Revis. Gen. Pl. 3(3): 7. 1898.

Cleome selloana Klotzsch ex Eichler, Fl. Bras. 13(1): 252. 1865. TYPE: [BRAZIL] Habitat in Brasilia austro-orientalis, in Parana [Paraná], *Sello* [*F. Sello*] *2482–2592* (holotype: B 10 0242687 [image]!).

Subshrub 0.8–1 m tall; branches pubescent to glandular-pubescent, covered with many short slender to stout short prickles throughout. Stipular spines 2–2.5 × 1 mm, straight. Leaves 3–5-foliolate; petioles 6–15 cm long, densely pubescent, armed with slender prickles; leaflets elliptic to large-elliptic, basally cuneate to attenuate, apically acute to acuminate, margin entire, ciliate; surface slightly pubescent to glabrescent adaxially; midrib and secondary veins puberulent, with prickles; the central leaflet 6.5–10.5 × 2.5–5 cm, the other 5–8 × 2–4 cm; sessile. Corymbiform racemes terminal, 15–20 cm long. Floral bracts 10–35 × 7–15 mm, ovate, basally obtuse, apically acute, puberulent on both sides, margin ciliate; petioles 8–10 mm long, densely pubescent, with a pair of prickles at base. Pedicels 45–55 mm long, densely pubescent. Sepals 9–10 × 1 mm, linear-triangular, apically long acuminate, margin ciliate, pubescent abaxially. Petals 15–23 × 3–8 mm, oblong to oblanceolate, apically obtuse, slightly puberulent-glandular abaxially, purple. Nectary conic, inconspicuous fleshy, obsolete in fruit. Filaments 25–40 mm long, purple; anthers 6–7 mm long. Ovary 5–7 mm long, cylindric, densely puberulent-glandular; style not elongated; stigma sessile, discoid. Capsules 50–72 mm long,

cylindric, densely puberulent; gynophore 35–60 mm long, glabrous. Seeds 2.5–3 × 1 mm, suborbicular, finely longitudinally striate, not transversely ridged, glabrous; cleft covered by an opaque membrane.

Phenophase. Flowers and fruits from August to February.

Distribution and habitat. Distributed in northeastern Argentina, southern Brazil, Paraguay and Uruguay (Figure 24), on roadsides, border of woods, along riversides, sandy river banks and in flooded woods, between 100–600 m elevation.

Discussion. *Tarenaya trachycarpa* is a subshrub species, with densely pubescent to pubescent-glandular indumentum with many slender to stout short prickles throughout the branches. The indumentum is a diagnostic feature to recognize the species, that can be also recognized by the puberulent-glandular indumentum abaxially on petals and the densely puberulent cylindric capsules.

Specimens Selected. ARGENTINA. **Buenos Aires:** La Plata, Ensenada, s.d., *A.L. Cabrera 7460* (WIS). **Chaco:** Colonia Benitez, Jan 1931, *A.G. Schulz 180a* (WIS); Isla Antequeras, 12 Nov 1958, *A.G. Schulz 10236* (WIS). **Entre Rios:** Concepción del Uruguay, Banco Pelay, 1 Feb 1981, *N. Trancoso & N. Bacigalupo 3123* (NY); Rosario del Tala, 23 Feb 1963, *B.S. Sorarú 151* (WIS); Victoria, 18 Dec 1937, *A. Burkart 8725* (WIS). **Formosa:** Chaco Central, Oct 1918, *P. Jorgensen 3263* (MO). BRAZIL. **Paraná:** Mandirituba, Rio Maurício, 23 Feb 1978, *G. Hatschbach 41441* (MBM); São Mateus do Sul, Colônia Iguaçu, 17 Jan 2006, *J.M. Silva & O.S. Ribas 4625* (MBM). **Rio Grande do Sul:** Fazenda Sta Cecilia p. S. Gabriel (400 km W of P. Alegre, near the Uruguayan Republic), 6 Jan 1944, *B. Rambo s.n.* (PACA); Porto Alegre, ilha da Casa de Pólvora, 30°01'08"S 51°15'05"W, 5 May 1977, *Longhi et al. s.n.* (ICN); São Leopoldo, 12 Feb 1961, *A. Sehnem 7815* (PACA). PARAGUAY. **Conception:** 2 Sep 1901, *E. Hassler 7502* (MO). **Presidente Hayes:** Al costado de la ruta Transchaco, 18 Aug 1984, *L. Pérez 316* (MO). URUGUAY. **Canelones:** Rio Sta Lucía, Paso Cuello, Jan 1946, *B. Rosengurtt 5573* (MO, PACA, WIS). **Cerros Largos:** Palleros, Jan 1926, *G. Herter 18405* (WIS). **Florida:** La Palma, Apr 1938, *G. Herter 99361* (WIS). **Treinta y Tres:** Cebollati, Nov 1907, *G. Herter 11641* (WIS). **Rocha:** 10 km E de Rocha, 20 Feb 2005, *M. Dematteis & A. Schinini 1666* (WIS).

35. **Tarenaya tucumanensis** (Iltis) Arana & Oggero, Phytotaxa 267: 163. 2016. *Cleome tucumanensis* Iltis, Brittonia 12: 284. 1960. Replaced name: *Cleome flexuosa* Griseb., Abh. Königl. Ges. Wiss. Göttingen 19: 73. 1874, nom. illeg., non *C. flexuosa* F. Dietr., 1816. TYPE: ARGENTINA. Santiago del Estero: in ripa fl. Rio Dulce, Santiago gegenüber, 14 December 1871, *P.G. Lorentz 45* (holotype: GOET 009588 [image!]).

Subshrub 0.8–1 m tall; branches glandular-puberulent to glabrescent. Stipular spines 1–2 × 1 mm, straight, sometimes lacking. Leaves 3–5-foliolate; petioles 2.5–4 cm long, puberulent, unarmed; leaflets ovate to elliptic or oblanceolate, basally cuneate or obtuse, apically acute, apiculate, margin ciliate; surface glabrous on both sides; midrib and secondary veins glabrous, without prickles; the central leaflet 3–5 × 1.5–2 cm, the other 1.8–4 × 1–1.5 cm; petiolules 2–4 mm long, puberulent, unarmed. Corymbiform racemes terminal, 20–30 cm long. Floral bracts 15–23 × 5–7 mm, ovate to elliptic, basally obtuse or cuneate, apically acute, apiculate, puberulent on both sides, margin ciliate; petioles 2–3 mm long, puberulent, without prickles at base. Pedicels 15–25 mm long, densely puberulent. Sepals 4–5 × 1 mm, triangular to lanceolate, apically acuminate, margin ciliate, densely puberulent abaxially. Petals 6–8 × 3–4 mm, obovate to widely obovate, apically obtuse, glabrous, white. Nectary conic, inconspicuous fleshy, obsolete in fruit. Filaments 20–35 mm long, purplish; anthers 4–5 mm long. Ovary 2 mm long, ellipsoid, glabrous; style not elongated; stigma sessile, discoid. Capsules 30–35 mm long, ellipsoid or fusiform, glabrous; gynophore 30–40 mm long, glabrous. Seeds 2.5–3 × 3 mm, suborbicular, longitudinally striate with transverse acute ridges; cleft wide, covered by an opaque aril connecting the claws. Figure 23B.

Phenophase. Collected with flowers and fruits from January to June, and in October, November and December.

Distribution and habitat. It occurs in Argentina, Bolivia and Paraguay (Figure 24), in the chaco forests on the slopes of low hills, open or shaded weedy on sandy dunes, disturbed urban areas and roadsides, between 350–920 m elevation.

Vernacular names. In Argentina is known as “albaca del monte” (*S. Venturi 654*).

Discussion. *Tarenaya tucumanensis* is commonly confused with *T. cordobensis*, since both species are distributed in Argentina, Bolivia and Paraguay. It is distinguished from the last by the subshrubby habit 0.8–1 m tall (vs. herb 0.3 m tall); the 3–5-foliolated leaves (vs. 3-foliolate); unarmed petioles (vs. armed); long filaments 20–35 mm long and anthers 4–5 mm long (vs. 13–15 mm and 2.5–3 mm long, respectively), capsules on a gynophore 30–40 mm long (vs. 12–15(–25) mm long). Furthermore, *T. tucumanensis* occurs in lower elevations, between 350–920 m, while *T. cordobensis* is distributed in higher elevations from 2086 to 2800 m.

Specimens Selected. ARGENTINA. **Formosa:** Patiño, Ea. Muchutti, a 5 km al N de Lomitas por ruta 28, 30 Mar 1992, *R.H. Fortunato et al. 3381* (MO). **Salta:** General Güemes, R 34, Km 1362, 2 Nov 1974, *T.M. Peterson 10744* (MBM, NY); Rivadavia, Ruta 81, 16,5 Km W de

Capitán Pagé, 7 Mar 2001, *A. Schinini et al. 35380* (MBM); San Martin, Ruta 34 Km 1377, a 8 Km de Ballivián, 23°00'22"S 63°53'27"W, 16 Jan 2002, *V.S. Neffa 667* (MBM). **Santa Victoria:** Santa Victoria, 22 Jan 1983, *E.M. Zardini et al. 1733* (MO). **Santiago del Estero:** Banda, La Isla, em las inmediaciones de La Dársena, unos 7 Km al N.O. de La Banda, rumbo al Dique Los Quiroga, 13 Nov 1971, *A.T. Hunziker et al. 21578* (MBM, NY); Carlos Pellegrini, Cerro de Nemate, 6 Dec 1927, *S. Venturi 5645* (MO, NY); Robles, Turema, 6 Dec 1959, *A. Maldonado 255* (NY, WIS). **Tucumán:** Leales, Chañar Pojo, Nov 1919, *S. Venturi 654* (WIS). BOLÍVIA. **Chuquisaca:** Luis Calvo, El Salvador, Laguna Seca, 9 Dec 1992, *J. Pensiero & G. Marino 4417* (MO). **Santa Cruz:** Andres Ibanez, 1 km N of center of Cotoca, 17°45'S 62°59'W, 15 Jan 1987, *M. Nee 33569* (MO, NY, WIS); Chiquitos, SE side of Robore, near the railroad, 18°20'S 59°45'W, 23 Nov 1989, *M. Nee 37876* (NY, WIS); Cordillera, Ruta Boyuibe-Hito Villazón, 20°26'S 62°25'W, 12 Apr 1993, *C.S. Toledo et al. 11757* (MBM). **Tarija:** Gran Chaco, near the Yacuiba-Santa Cruz railroad, 21°12'59"S 63°23'56"W, 12 Feb 2006, *M. Nee & I.I. Linneo 54140* (NY). PARAGUAY. **Boqueron:** Between Parque Nacional Teniente Agripino Enciso and Nueva Asunción, 20°54'14"S 61°50'46"W, 27 Jan 1995, *E.M. Zardini & A. Acosta 42378* (MO, NY, WIS); Filadelfia, 22°20'S 60°05'W, 26 Nov 1982, *W. Hahn 798* (MBM, MO); Proposed National park Medanos del Chaco, 20°54'08"S 61°50'34"W, 13 Dec 1998, *E.M. Zardini & N. Duarte 49801* (MO, WIS).

36. **Tarenaya virens** (J.F. Macbr.) Soares Neto & Roalson, Acta Bot. Bras. 32: 544. 2018. *Cleome virens* J.F. Macbr., Candollea 5: 360. 1934. TYPE: PERU. Loreto, La Victoria on the Amazon River, August-September 1929, *L. Williams 2596* (holotype: F [image!]; isotype: G00226308 [image!]).

Scandent subshrub to shrub 1–2 m tall; branches glabrescent to glabrous. Stipular spines 1.5–3 × 2 mm, straight. Leaves 3–5-foliolate; petioles 3.5–10 cm long, glabrescent, discreetly armed with slender to stout prickles; leaflets lanceolate to elliptic, oblong-elliptic or oblanceolate, basally cuneate, apically acuminate to long acuminate, margin entire, ciliate; surface glabrous on both sides; midrib and secondary veins glabrous, without prickles; the central leaflet 6.5–12 × 2.5–5 cm, the other 4–12 × 2–5 cm; petiolules 1–15 mm long, glabrous, unarmed. Corymbiform racemes terminal and/or axillary, 25.5–31 cm long. Floral bracts absent. Pedicels 12–16 mm long, puberulent. Sepals 1.5–2 × 0.5 mm, linear-triangular to lanceolate, apically acuminate, margin ciliate, puberulent abaxially. Petals 2–8 × 1–3 mm, oblong-elliptic, apically obtuse, glabrous, green with yellowish hue. Nectary disciform, conspicuous fleshy, persistent in fruit. Filaments 6–8 mm long, green; anthers 1.5–2.5 mm long.

Ovary 5–7 mm long, cylindric, finely puberulent; style 1–5 mm long, persistent in fruit; stigma strongly capitate. Capsules 140–230 mm long, cylindric, slightly moniliform, glabrescent to glabrous; gynophore (5–)10–25 mm long, glabrous. Seeds 1.5–2 × 1–1.5 mm, suborbicular, subquadroid, longitudinally striate, rarely and few transversely ridged; cleft covered by a thin membrane connecting the claws.

Phenolophase. Flowering and fruiting throughout the year, it has been collected with flowers in January, February, May, and from July to December, and with fruits in January, February, April, May, and from July to December.

Distribution and habitat. Distributed in Brazil and Peru (Figure 25), at elevations of 115–350 m. Found in tropical rainforests, marshy forests, along riversides and on sandy river banks and in "várzea" and "terra firme" forests.

Vernacular names. In Peru is called "namaká nákari" (*V. Huashikat 860*).

Discussion. *Tarenaya virens* is related to *T. longipes* sharing the 3–5-leaflets leaves, disciform fleshy nectary persistent on fruit and longer capsules 140–230 mm long (vs. 150–300 mm long). However, *T. virens* is distinguished by the straight stipular spines (vs. curved), filaments 6–8 mm long (vs. 8.5–20 mm), gynophore (5–)10–25 mm long (vs. 130–300 mm) and subquadroids seeds, longitudinally striate (vs. orbicular, smooth).

Specimens Selected. BRAZIL. **Acre:** Sena Madureira, east of Rio Iaco, 10 km above Sena Madureira, 4 Oct 1968, *G.T. Prance et al. 7842* (NY); Tarauacá, Bacia do Alto Juruá, Reserva Indígena Praia do Carapanã, 8°26'50"S 71°20'40"W, 22 Nov 1995, *M. Silveira et al. 1099* (MO, NY). **Amazonas:** Bagua, rainforest along Río Santiago 3–5 km above mouth, Oct 1962, *J.J. Wurdack 2218* (NY); São Paulo de Olivença, várzea do Solimões do lado direito, 16 Oct 1931, *A. Ducke s.n.* (PEUFR, RB). PERU. **Amazonas:** Condorcanqui, Río Santiago, Canto de la Quebrada Caterpiza, 11 Sep 1979, *V. Huashikat 527* (MO); Río Santiago, 2 km atrás de la comunidad Caterpiza, banda este de Caterpiza, 11 Oct 1979, *V. Huashikat 860* (MO). **Cuzco:** Cuzco, Distrito Camisea, 11°48'36"S 72°53'02"W, 2 Oct 1997, *P. Acevedo-Rodríguez et al. 10079* (NY). **Loreto:** Above Pongo de Manseriche, right bank of Rio Santiago, beside streamlet, 10 Dec 1931, *Y. Mexia 6249* (MO, NY); Aguaytía, 26 Aug 1946, *F. Weytkewski 34442* (MO); Atún Cocha, 25 Aug 1983, *F. Ayala & E. Arévalo 4267* (MO); Explorama Lodge Tourist Camp, 3°28'S 72°50'W, 6 Jan 1991, *A. Gentry et al. 72184* (MO); Indiana, Reserva Explorama Yanamono, 3°30'S 72°50'W, 25 Sep 1990, *J.J. Pipoly et al. 12330* (MO); Iquitos, Río Itaya, Sanangal, 17 May 1980, *S. McDaniel & M. Rimachi 23737* (MO); Maniti, Recreo, 3°42'S 72°50'W, 15 May 1988, *R. Vásquez 10674* (MO); Mishuyaco, near Iquitos, Apr 1930,

G. Klug 1163 (NY); Mariscal Ramón Castilla, 6 Jul 1969, *S. McDaniel 11831* (MO); Napo, Tiputiui, Lagartococha, 1953, *F. Fagerlindi & P.G. Wibom 2392* (NY); Quebrada Tahuayo above Tamishiyaco, 29 Aug 1972, *T.B. Croat 19838* (MO); Río Itaya, 10 minutos arriba de San Juan de Muniches, 3°58'S 73°25'W, 21 Nov 1978, *C. Díaz 631* (MO); Varadero, Rio Amazonas, camino a Mazan (Río Napo), 30°30'S 73°10'W, 13 Nov 1980, *R. Vásquez 747* (MO). **Madre de Díos:** Tambopata Tourist Camp., Río La Torre Trail, 12°50'S 69°17'W, 17 Dec 1992, *A. Gentry & R. Ortiz 78199* (MO). **Solimões:** Yanache, 19 Aug 1923, *J.G. Kuhlmann 1554* (PEUFR, RB).

37. **Tarenaya werdermannii** (Alf.Ernst.) Soares Neto & Roalson, Acta Bot. Bras. 32: 544. 2018. *Cleome werdermannii* Alf.Ernst., Notizbl. Bot. Gart. Berlin-Dahlem 13: 378. 1936. TYPE: BOLIVIA. Depto. Sta. Cruz, Missiones Guarayos-Sta. Cruz de la Sierra, ca. 250–300 m ü. M., October 1926, *E. Werdermann 2597* (lectotype: B 10 0242098 [image!], designated by Soares Neto & al., Acta Botanica Brasilica 32: 544. 2018; isolectotypes: B 10 0242682 [image!], LPB [image!], MO-1000057!, S-R-8183 [image!], WIS0259089!).

Cleome consimilis Alf.Ernst., Notizbl. Bot. Gart. Berlin-Dahlem 13: 379. 1936. TYPE: BOLIVIA. Itiyuro, südöstlich von Lagunillas, 900 m ü. M., trockener Teichschlamm, 11 November 1927, *C. Troll 105* (holotype: B 10 0242699 [image!]).

Herb to subshrub 1–2 m tall; branches pubescent to glandular-puberulent. Stipular spines 1.5–4.5 × 1–4 mm, slightly curved at apex. Leaves 5–7-foliolate; petioles 2.5–9.5 cm long, glandular-puberulent, armed with few sparsely slender prickles, rarely unarmed; leaflets oblanceolate-elliptic, basally attenuate, apically acuminate to long acuminate, margin serreate-ciliate; surface with scattered short pointed eglandular or glandular hairs on both sides; midrib and secondary veins puberulent-glandular, without prickles; the central leaflet 3.5–7 × 1.2–2.8 cm, the other 4.2–6 × 1.2–2.3 cm; sessile. Corymbiform racemes terminal, 19–39 cm long. Floral bracts 7–18 × 4–10 mm, ovate, basally cordate, apically acute, scattered with short pointed eglandular hairs on both sides, margin serrulate-ciliate; sessile. Pedicels 16–27 mm long, densely puberulent. Sepals 5–7 × 1 mm, linear-triangular, apically acuminate, margin ciliate, densely puberulent abaxially. Petals 7–9 × 2.5–4 mm, oblong-elliptic, apically obtuse, glabrous, white, very faintly purple-tinged. Nectary conic, inconspicuous fleshy, obsolete in fruit. Filaments (17–)20–30 mm long, purple; anthers (3–)6–9 mm long. Ovary 2.5–4 mm long, cylindric, glabrous; style short elongated, 1 mm long; stigma capitate. Capsules 50–80 mm long, cylindric, glabrous; gynophore 10–23 mm long, glabrous. Seeds 1.5–2 × 1–1.5 mm,

suborbicular or orbicular, slightly flat, longitudinally striate, with few transverse ridges; cleft covered by a thin, inconspicuous membrane.

Phenophase. Collected with flowers and fruits in January, April, June, November and December.

Distribution and habitat. Species endemic to Bolivia (Figure 25), occurring in semideciduous forest, swamps, flooded forests and roadsides, between 346–650 m elevation.

Vernacular names. Known as "Nal-buonon" (*Badcock 849*).

Discussion. *Tarenaya werdermannii* resembles *T. psoraleifolia*, but differs by the margin of the leaflets serreate-ciliate (vs. margin sinuose-ciliate to serrulate-ciliate); pedicels 16–27 mm long (vs. 17–19 mm); sepals 5–7 × 1 mm (vs. 2.5–3 × 1 mm); oblong-elliptic petals 7–9 × 2.5–4 mm (vs. obovate, 5–6 × 2.5–3 mm).

Specimens Selected. BOLIVIA. **Chuquisaca:** Luis Calvo, El Salvador, zona central, 7 Dec 1992, *J. Pensiero & D. Marino 4311* (MO). **Cochabamba:** Km 405,Cochabamba-Santa Cruz, 8 Nov 1966, *Badcock 849* (MO). **Santa Cruz:** Andrés Ibáñez, ca. 500m de Paurito, 17°52'51"S 62°56'57"W, 16 Jun 2001, *A.L. Sánchez & G. Flores 1115* (MO); Ñuflo de Chávez, along bridge S. Ibáñez, flood plaino f the Río Pirai, ca 6 km NW of Santa Cruz, 17°45'S 63°11'W, 22 Apr 1985, *J.C. Solomon 13510* (MO).

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Iltis, H.H. & Cochrane, T.S. 2007. Studies in Cleomaceae V: A new genus and ten news combinations for the Flora of North America. *Novon* 17: 447–451.

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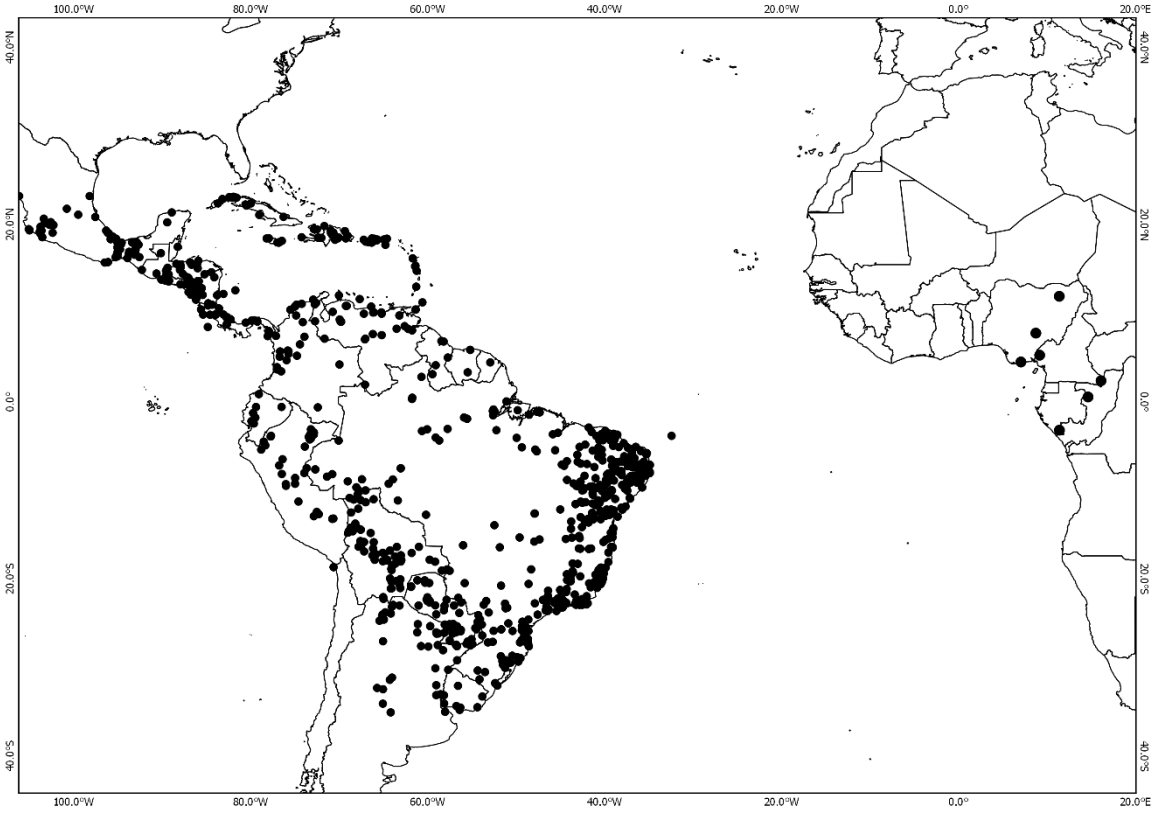

Figure 1. Distribution map of *Tarenaya* Raf.

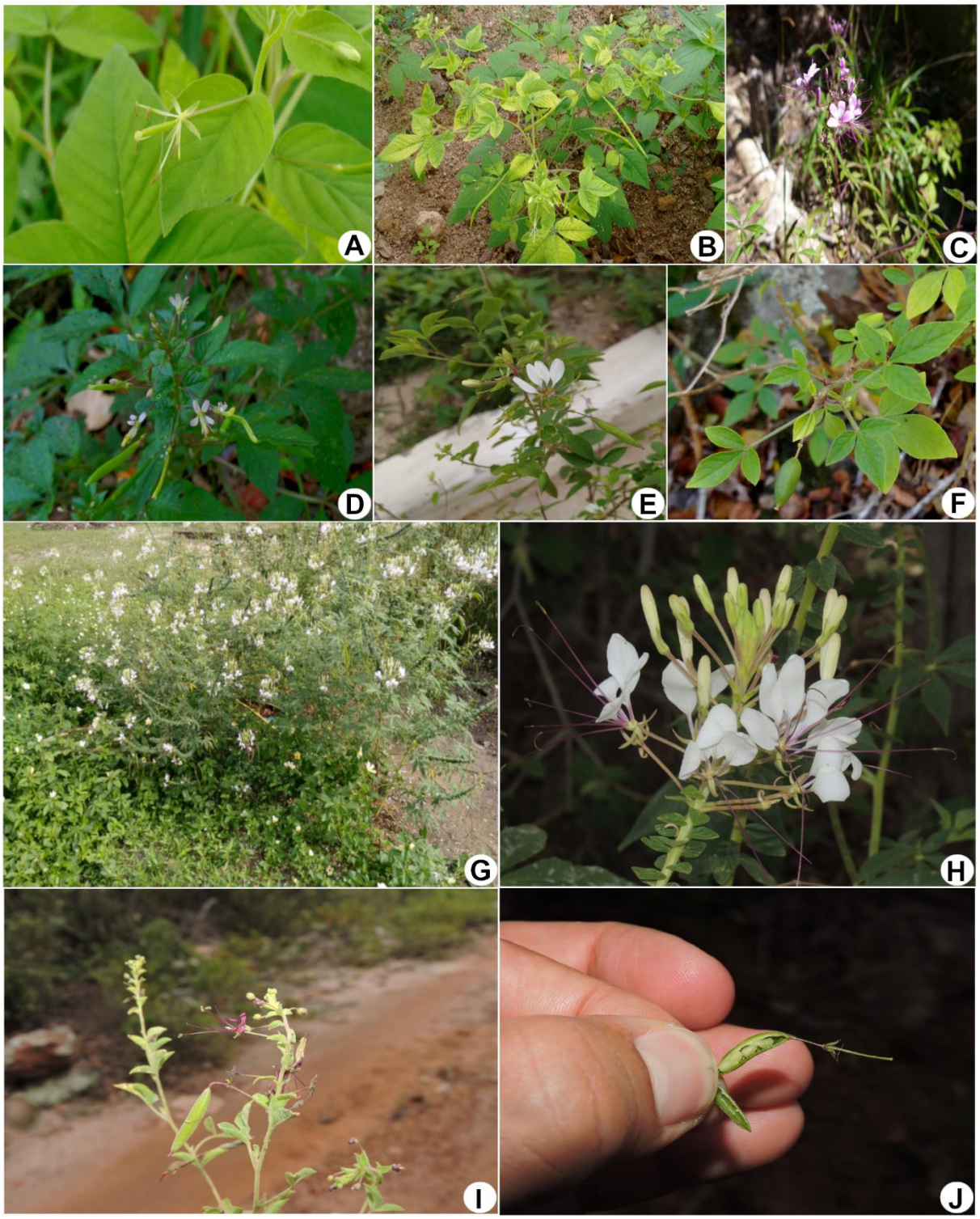

Figure 2. *Tarenaya aculeata* (L.) Soares Neto & Roalson. A – Detail of an immature fruit. B -Habit. *T.* bicolor (Gardner) Soares neto & Roalson. C – Inflorescence. *T. curvispina* Costa-e-Silva & Iltis ex Soares Neto & Roalson. D – Habit. *T. diffusa* (Banks ex DC.) Soares Neto & Roalson. E – Flowering and fruiting branch. F – Fruiting branch. *Tarenaya longicarpa* Soares Neto & Roalson. G – Habit. H – Inflorescence. *T. microcarpa* (Ule) Photos: C – Gabriel Wolfsdorf; H, I, J – Rubens Teixeira Queiroz.

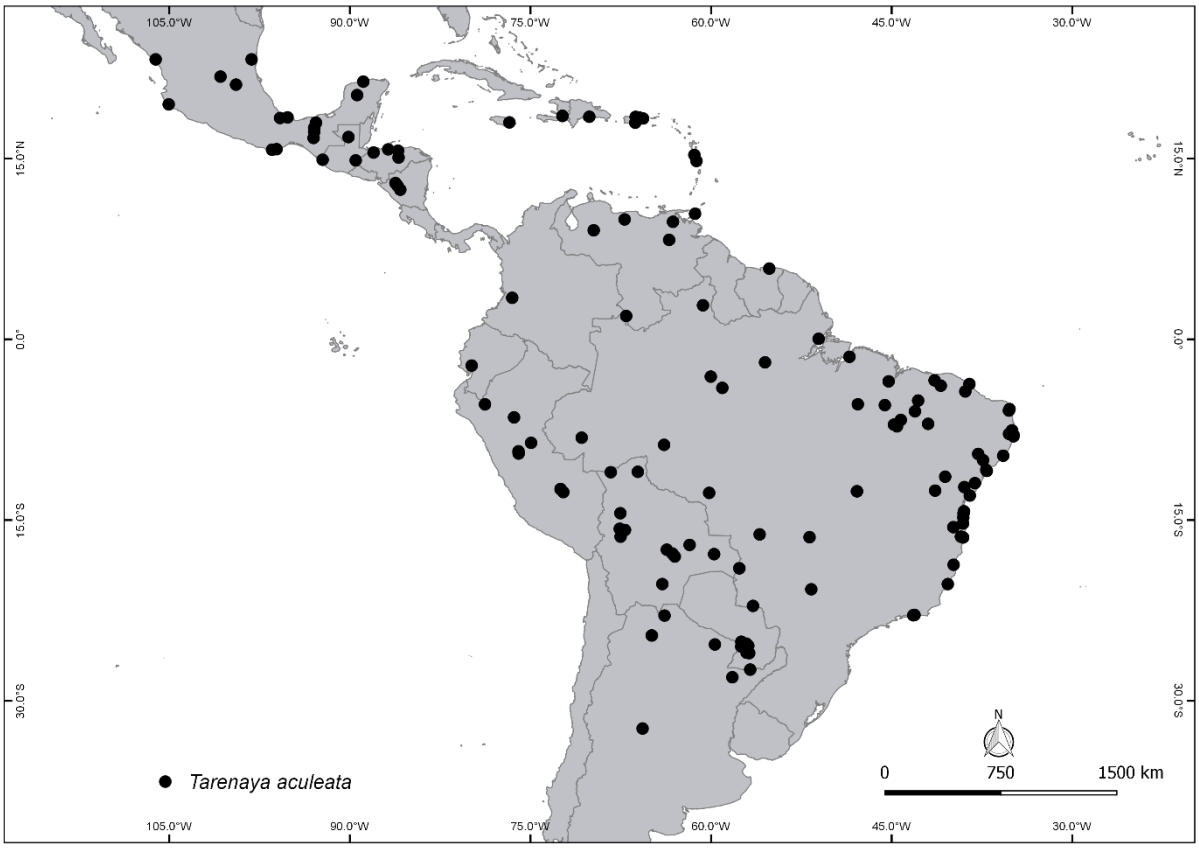

Figure 3. Distribution map of *Tarenaya aculeata*.

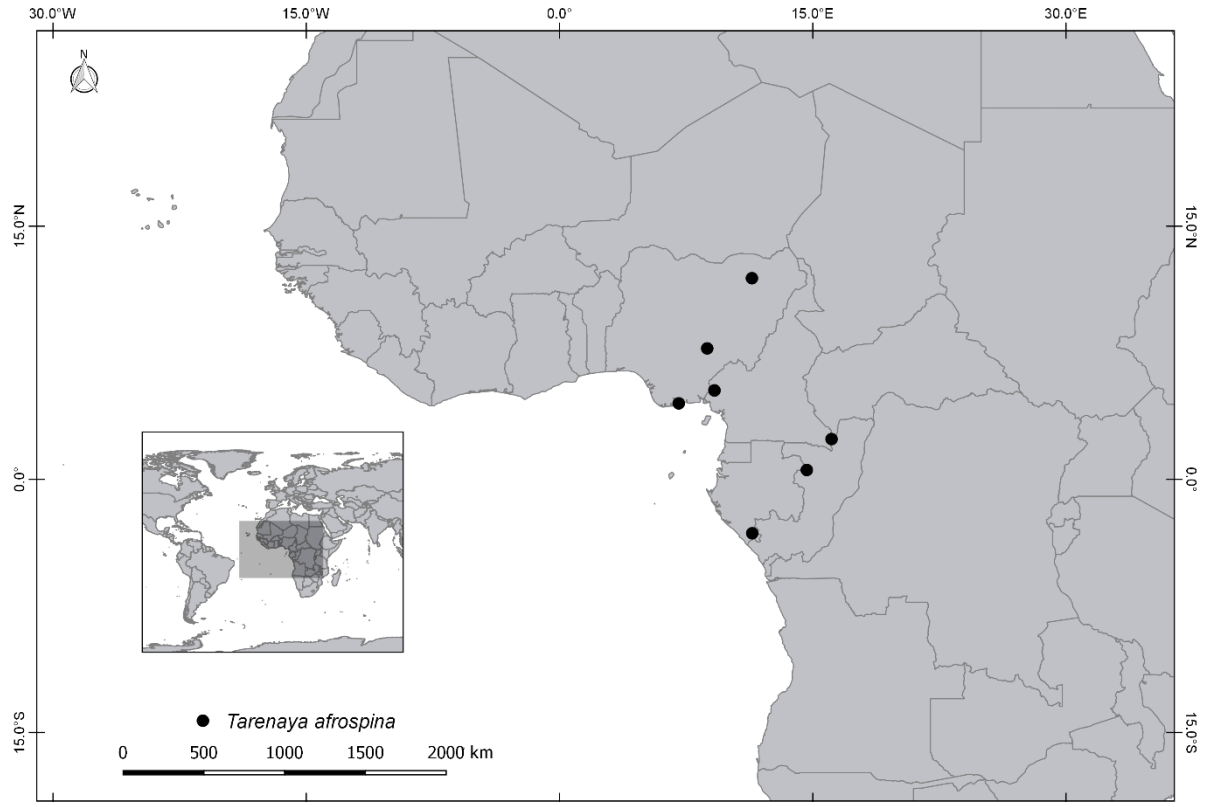

Figure 4. Distribution map of *Tarenaya afrospina*.

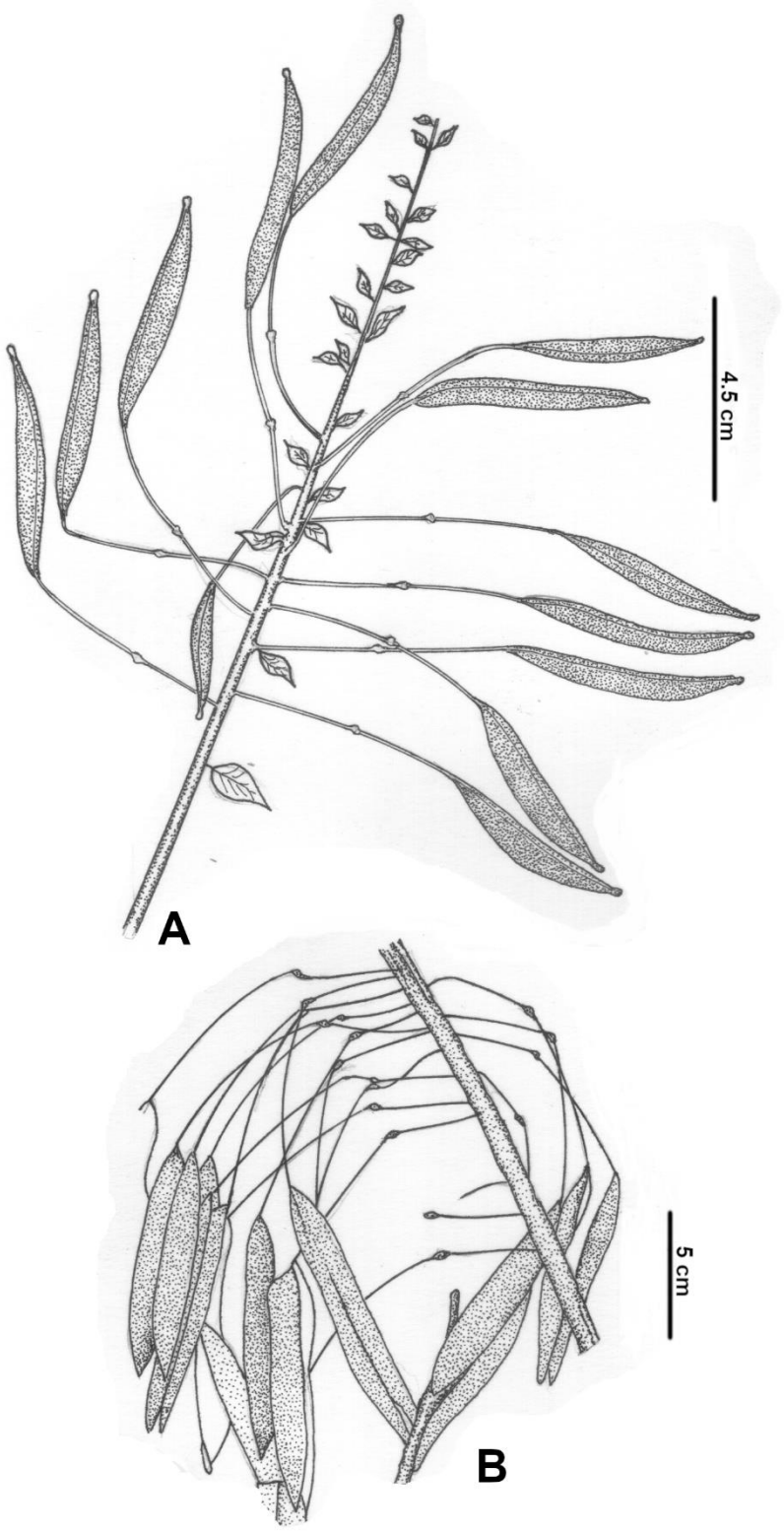

Figure 4. *Tarenaya afrospina* (Iltis) Soares Neto & Roalson. A – Fruiting branch (*W.D. Thomas 8090*). *Tarenaya atropurpurea* (Schott) Soares Neto & Roalson. B – Fruiting branch (*Bovini & Faria 3683*).

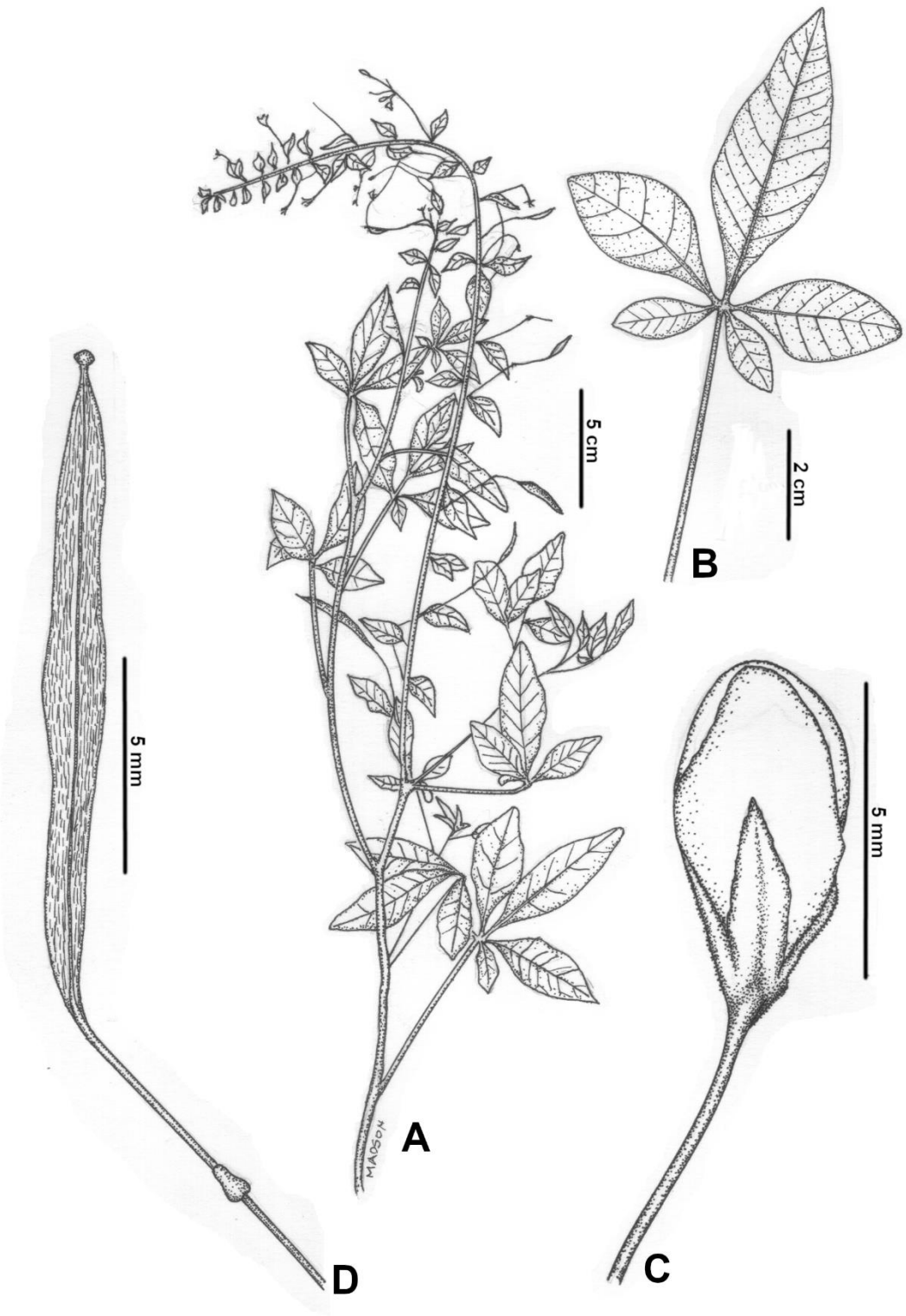

Figure 5. *Tarenaya bernadeteana* Soares Neto. A - Branche with bud flower, and immature fruits. B – 5-foliolate leave. C – Bud flower. D. Immature fruit (*V. Demuner et al. 4832*).

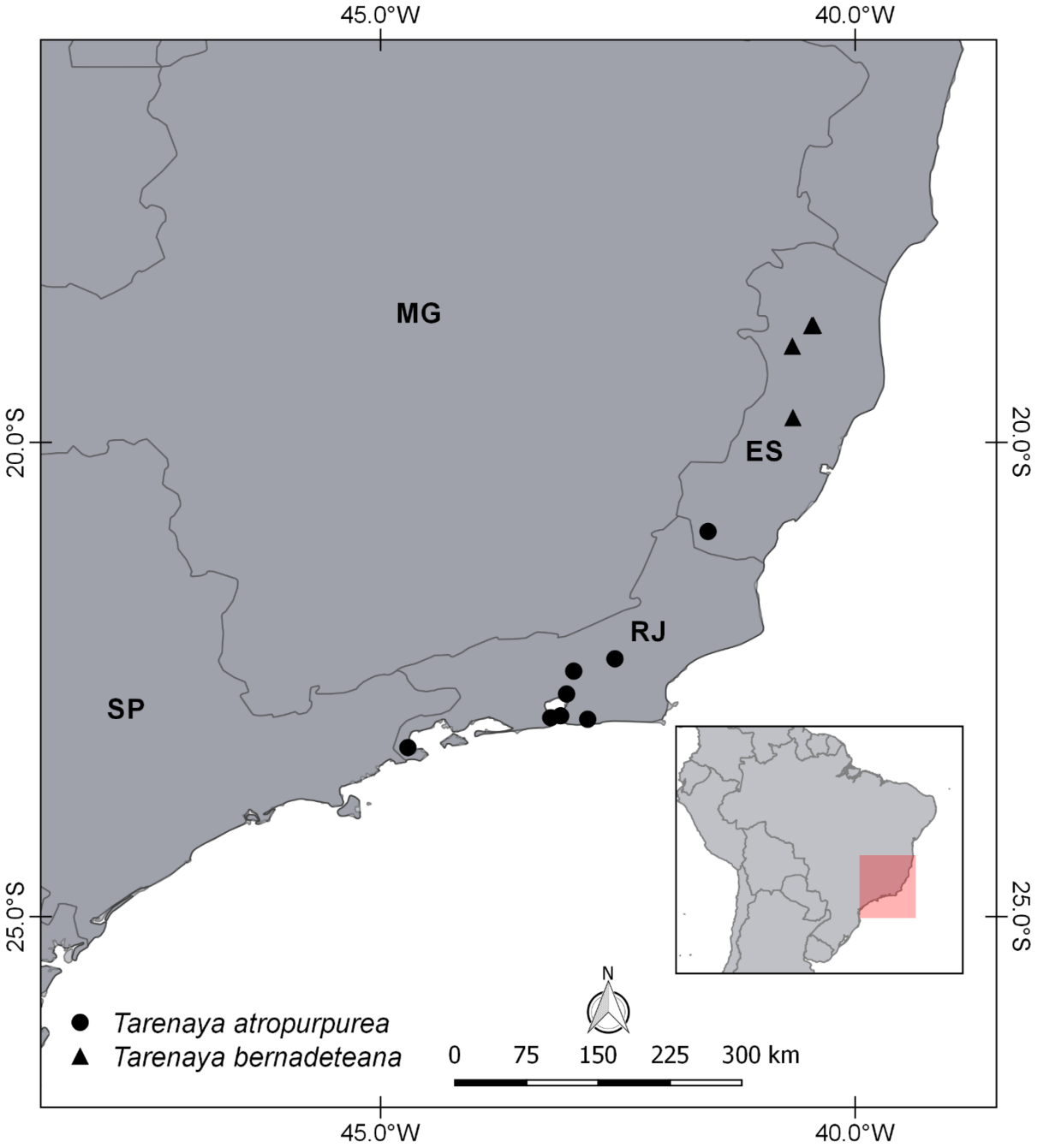

Figure 7. Distribution map of *Tarenaya atropurpurea* and *T. bernadeteana*.

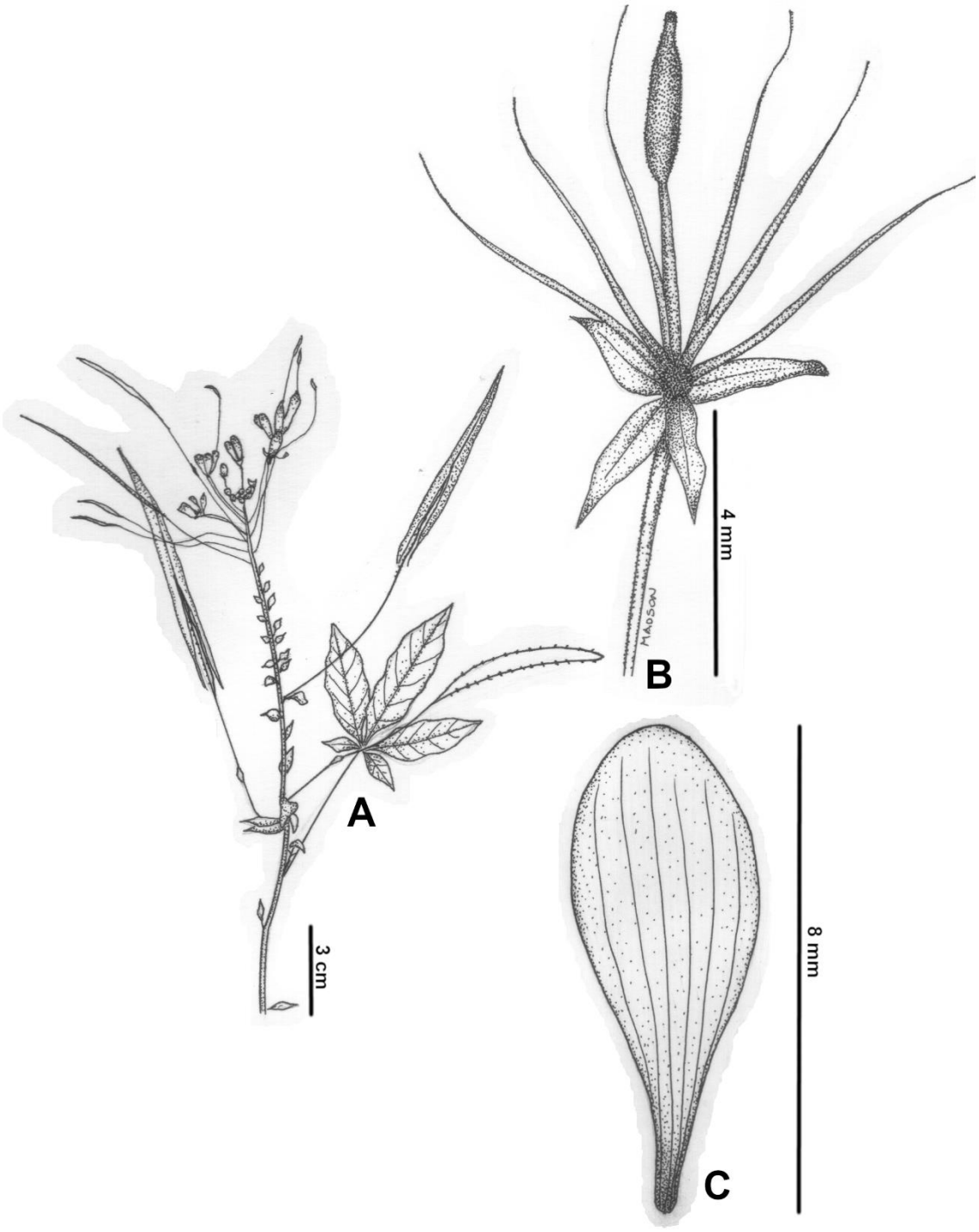

Figure 8. *Tarenaya bicolor* (Gardner) Soares Neto & Roalson. A – Branching beraing bud flower, open flowers, and opening fruits. B – Open flower highlighting the nectary. C – Petal (*Kollmann & Fontana 8516*).

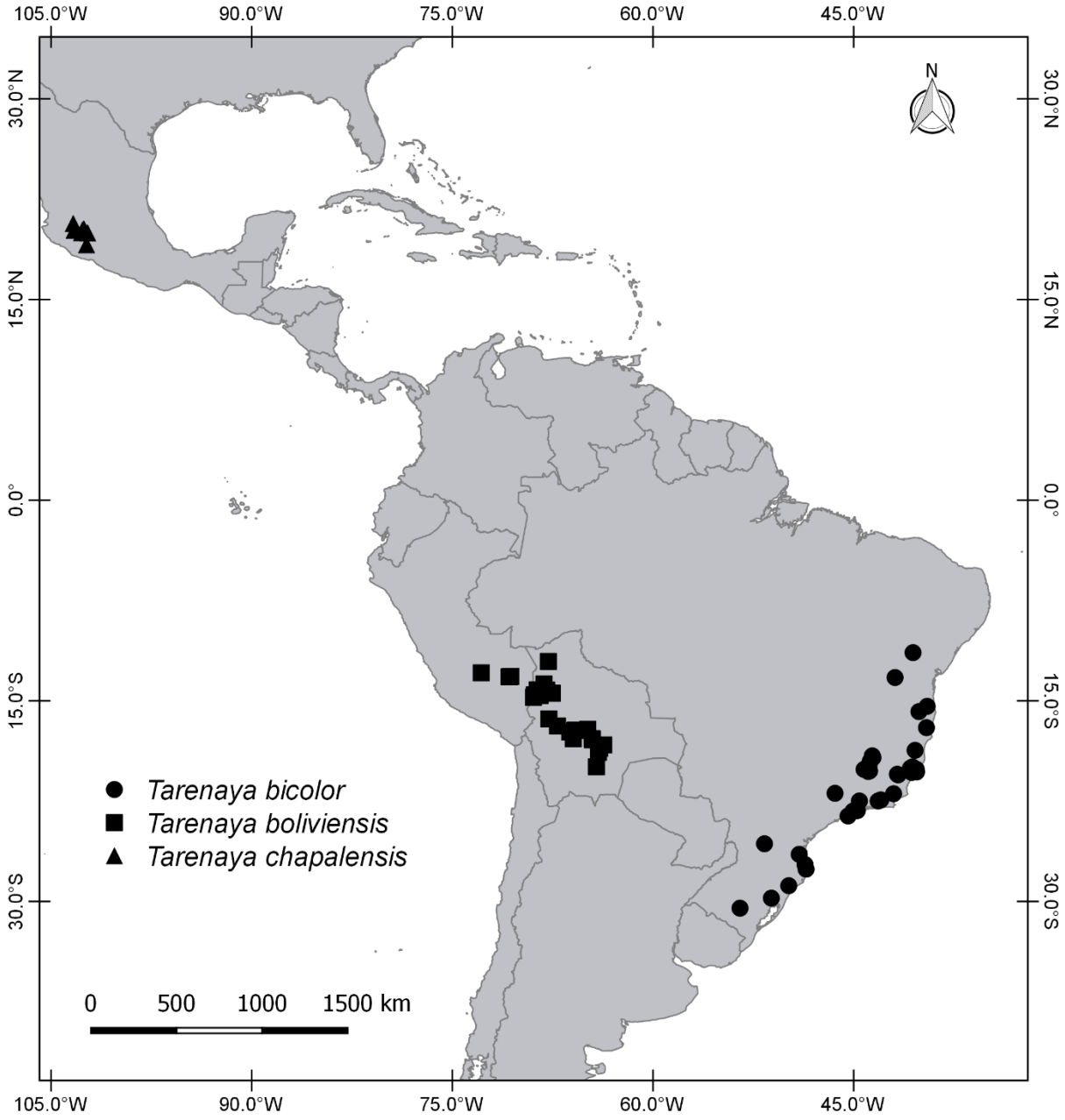

Figure 9. Distribution map of *Tarenaya bicolor*, *T. boliviensis* and *T. chapalensis*.

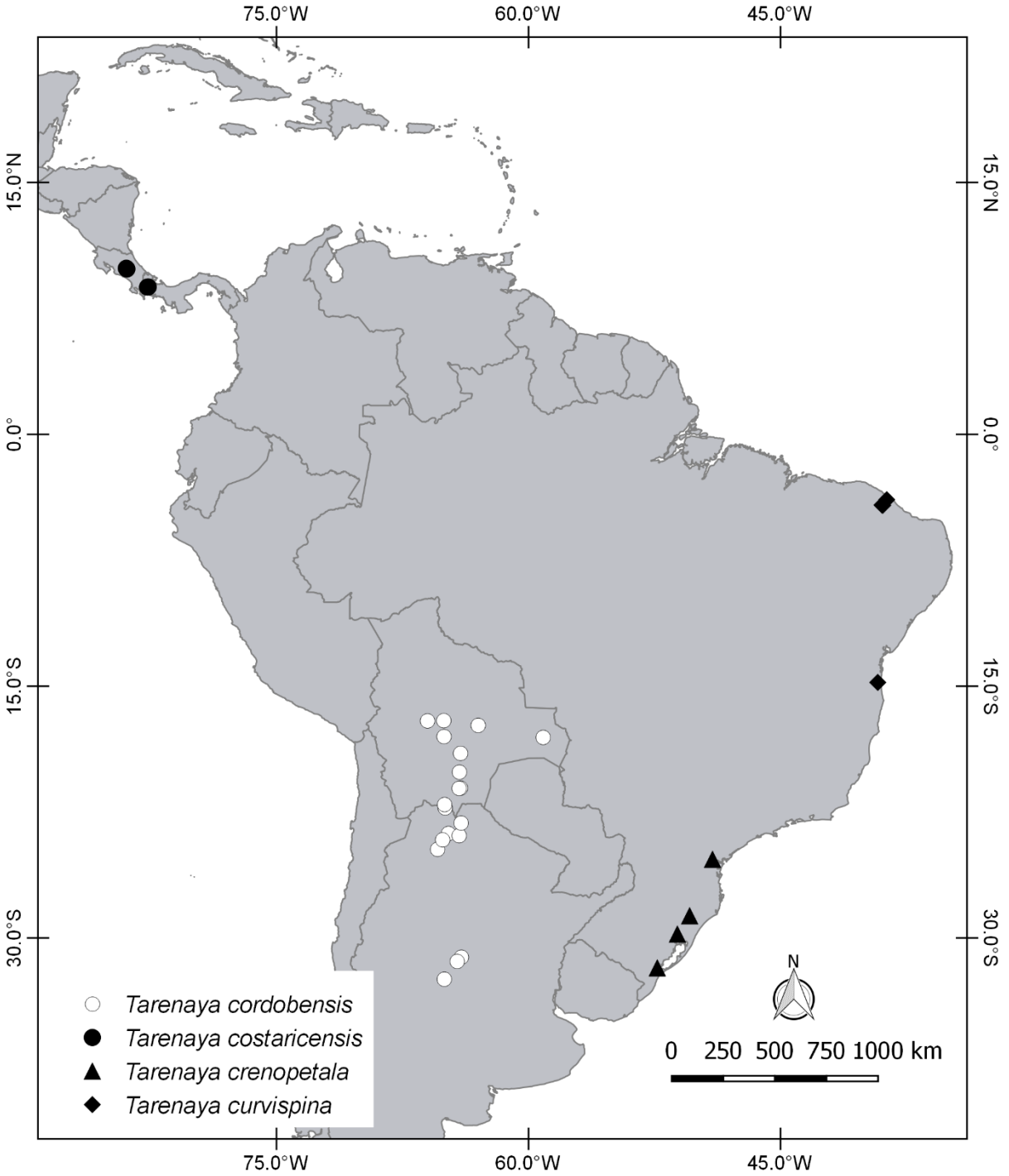

Figure 10. Distribution map of *Tarenaya cordobensis*, *T. costaricensis*, *T. crenopetala* and *T. curvispina*.

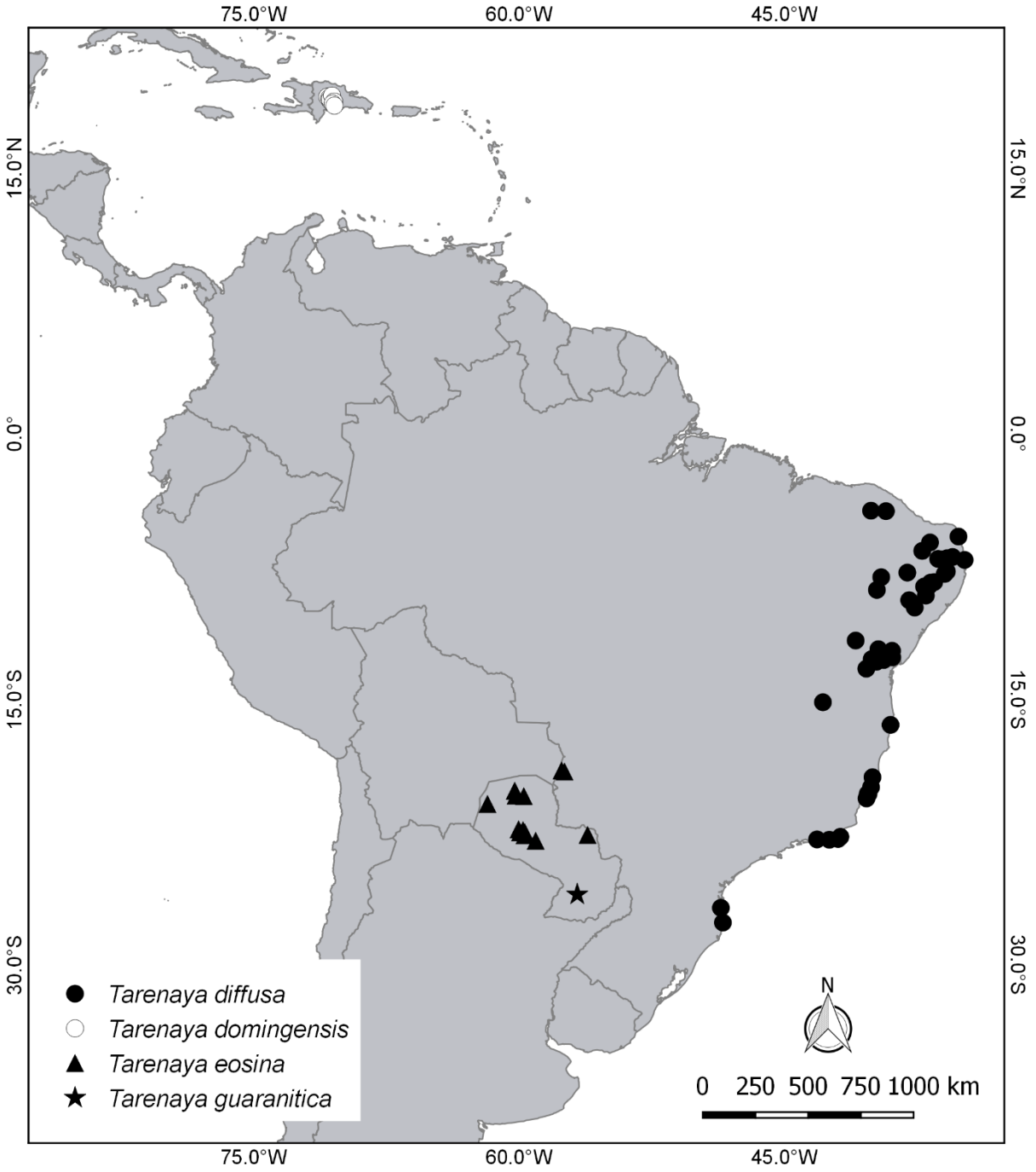

Figure 11. Distribution map of *Tarenaya diffusa*, *T. domingensis*, *T. eosina* and *T. guaranitica*.

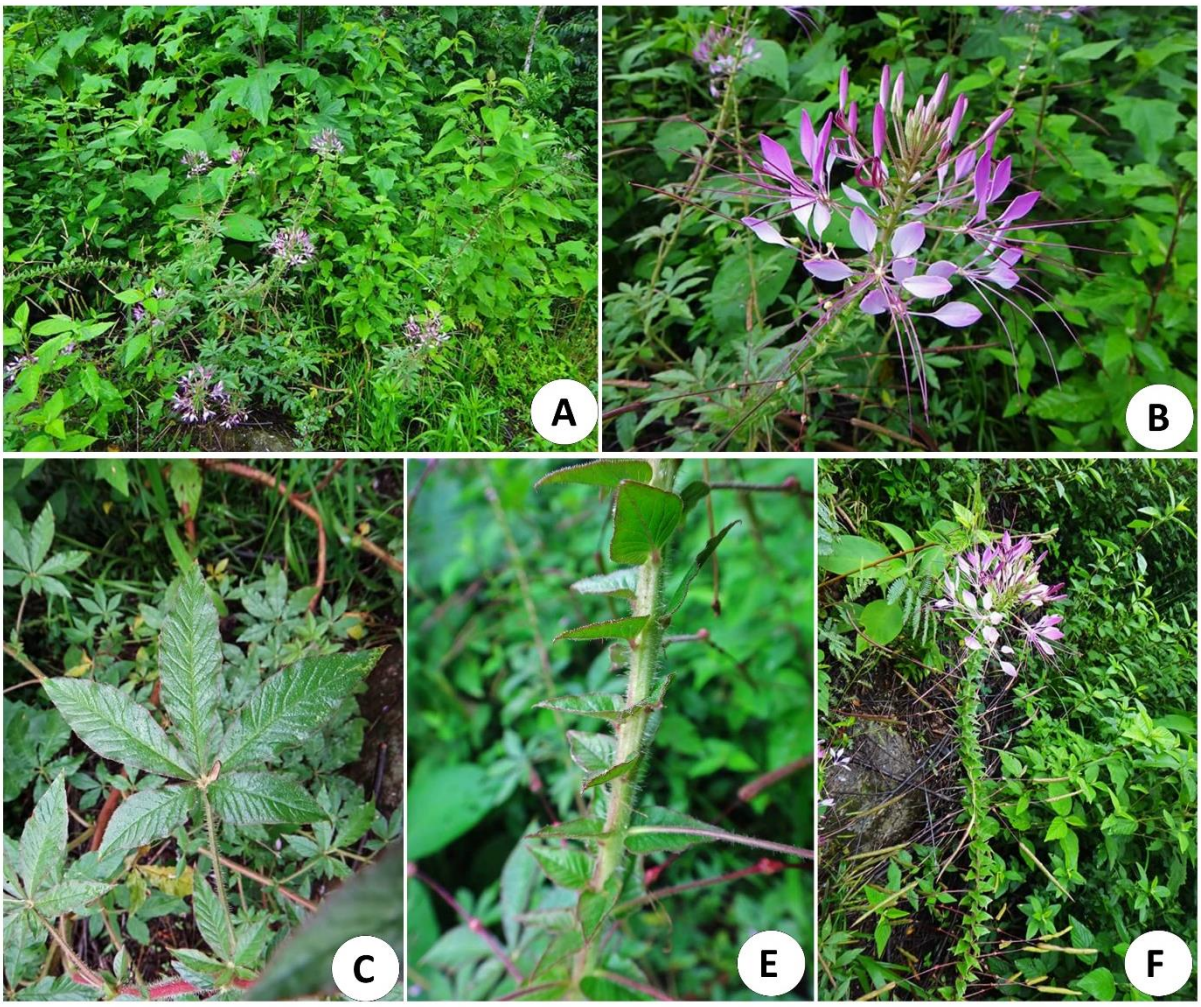

Figure 12. *Tarenaya hassleriana* (Chodat) Iltis. A – Habit. B – Inflorescence with open flowers. C – 5-foliolate leave. D – Detail of floral bracts with pubescent indumentum. E – Inflorescence. Photos: Rodrigo Penati.

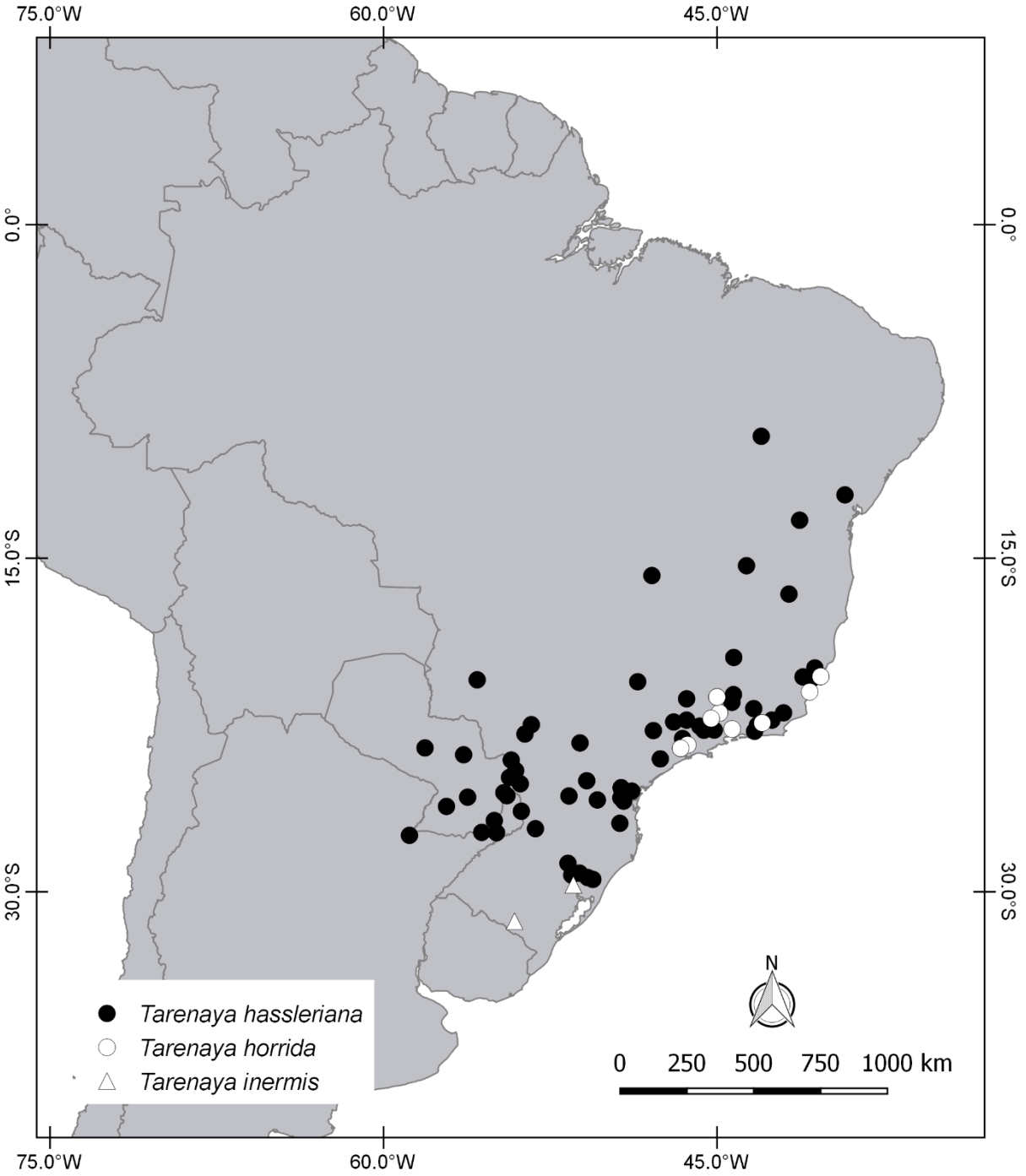

Figure 13. Distribution map of *Tarenaya hassleriana*, *T. horrida* and *T. inermis*.

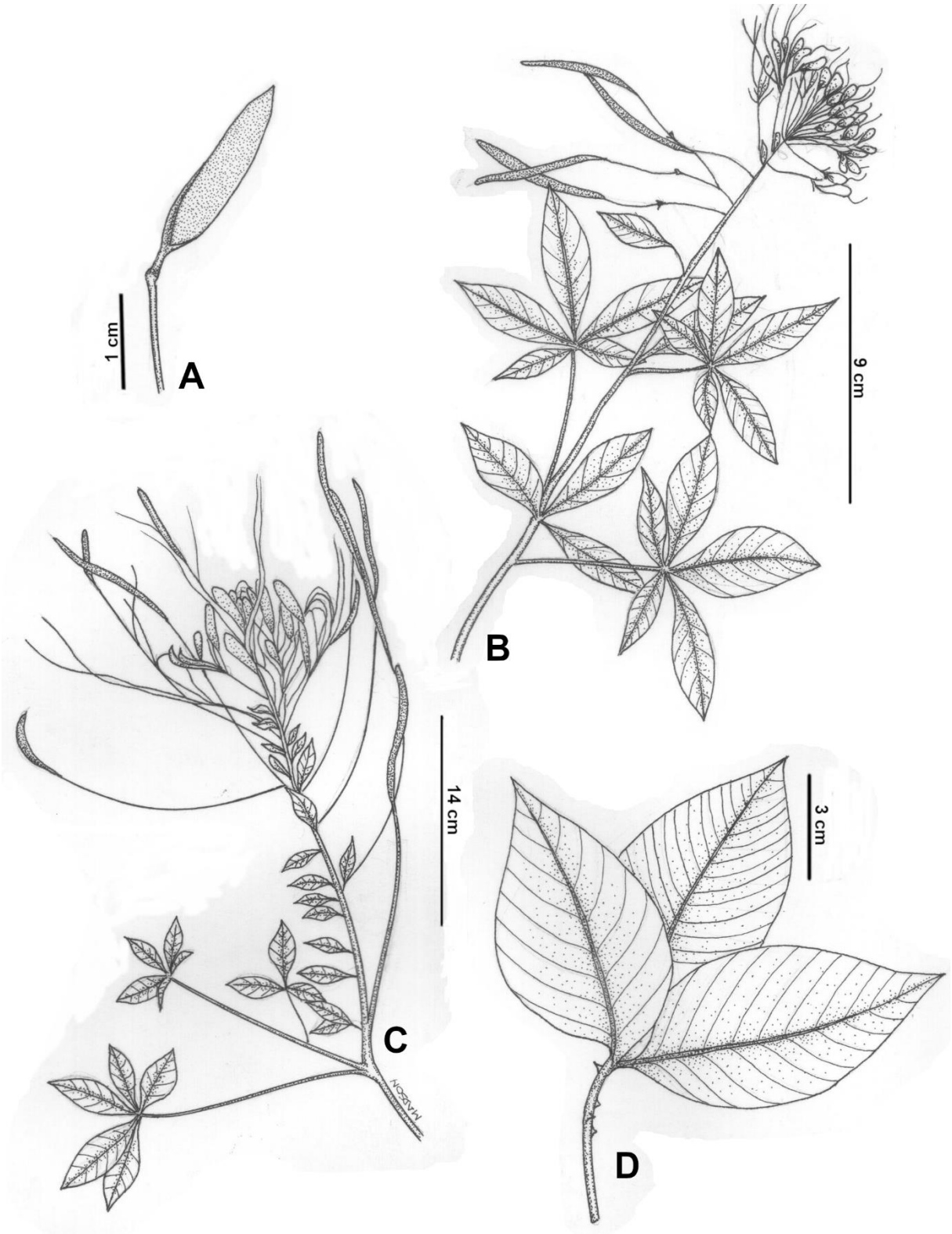

Figure 14. *Tarenaya eosina* (J.F. Macbr.) Soares Neto & Roalson. A – Fruit (*V.J. Pott et al. 3258*). *T. inermis* (Malme) Soares Neto & Roalson. B – Flowering and fruiting branching (*I. Fernandes 690*). *T. lilloi* (S.A. Gómez) Arana & Oggero. C – Flowering and fruting branching (*A. Krapovickas et al. 46321*). *T. longipes* (DC.) Iltis. D – 3-foliolate leave (*Killip & Smith 26681).*

Figure 15. Photography of the lectotype of *Tarenaya houstonii* (R. Br.) Soares Neto & Roalson.

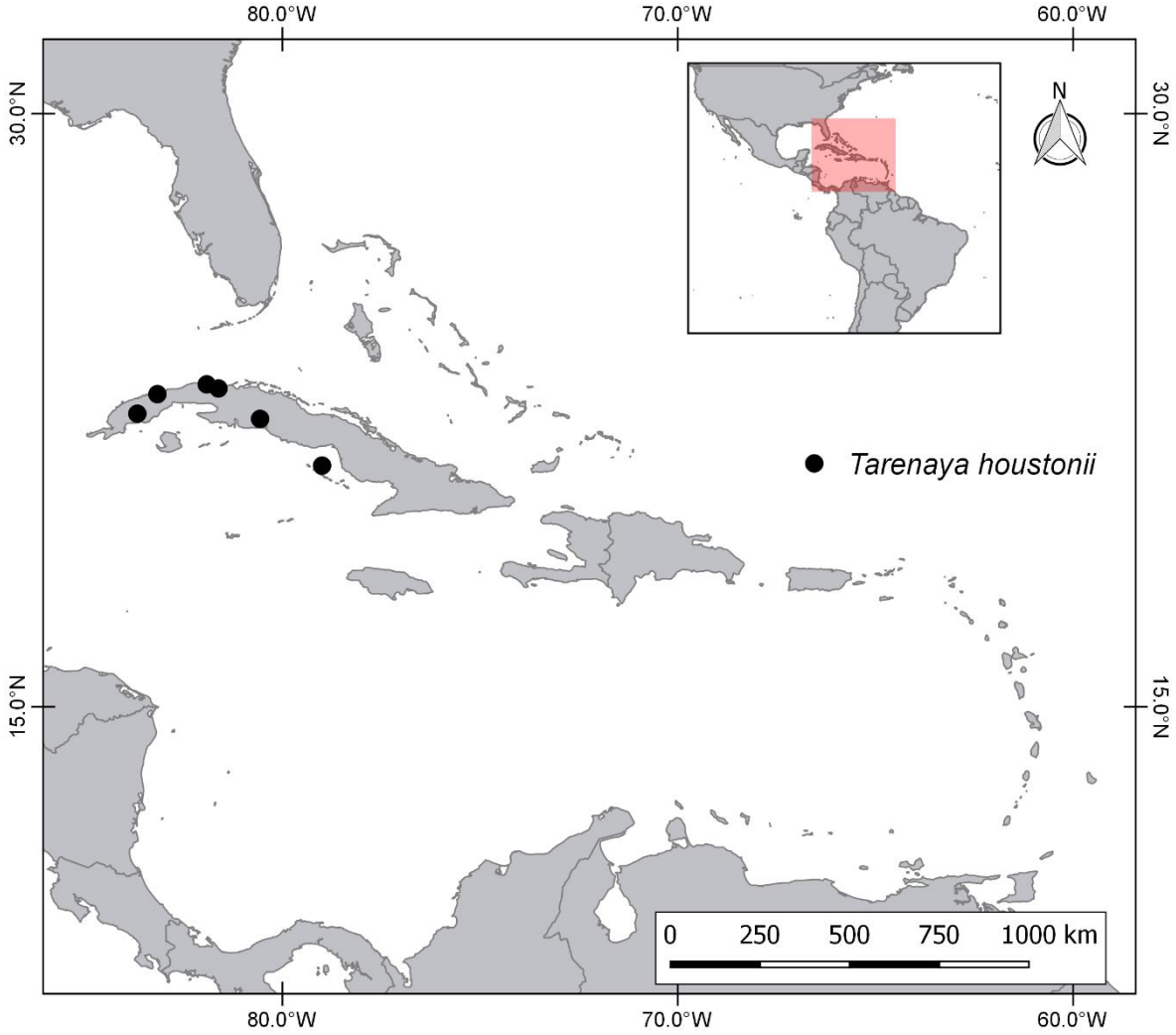

Figure 16. Distribution map of *Tarenaya houstonii*.

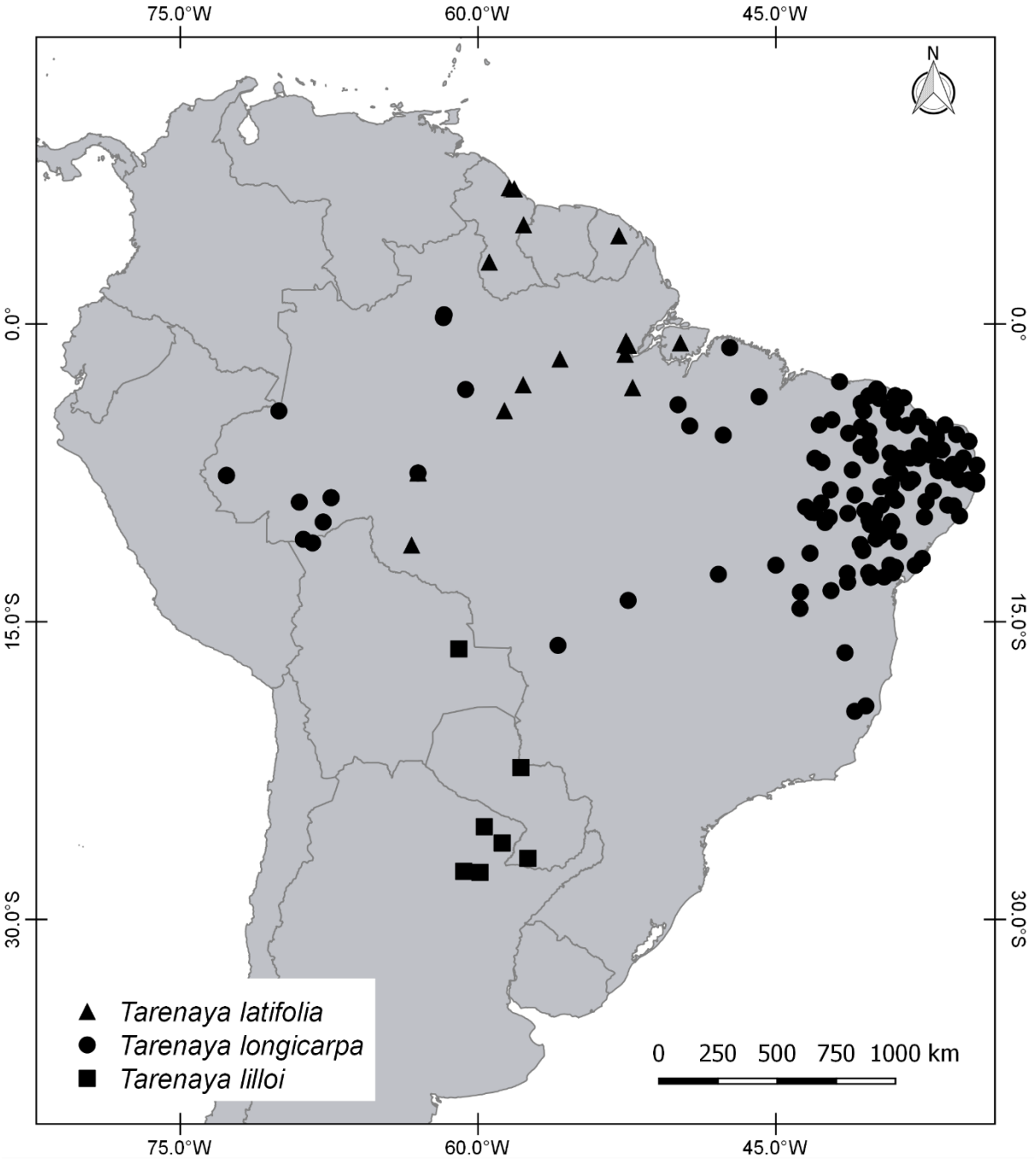

Figure 17. Distribution map of *Tarenaya latifolia*, *T. longicarpa* and *T. lilloi*.

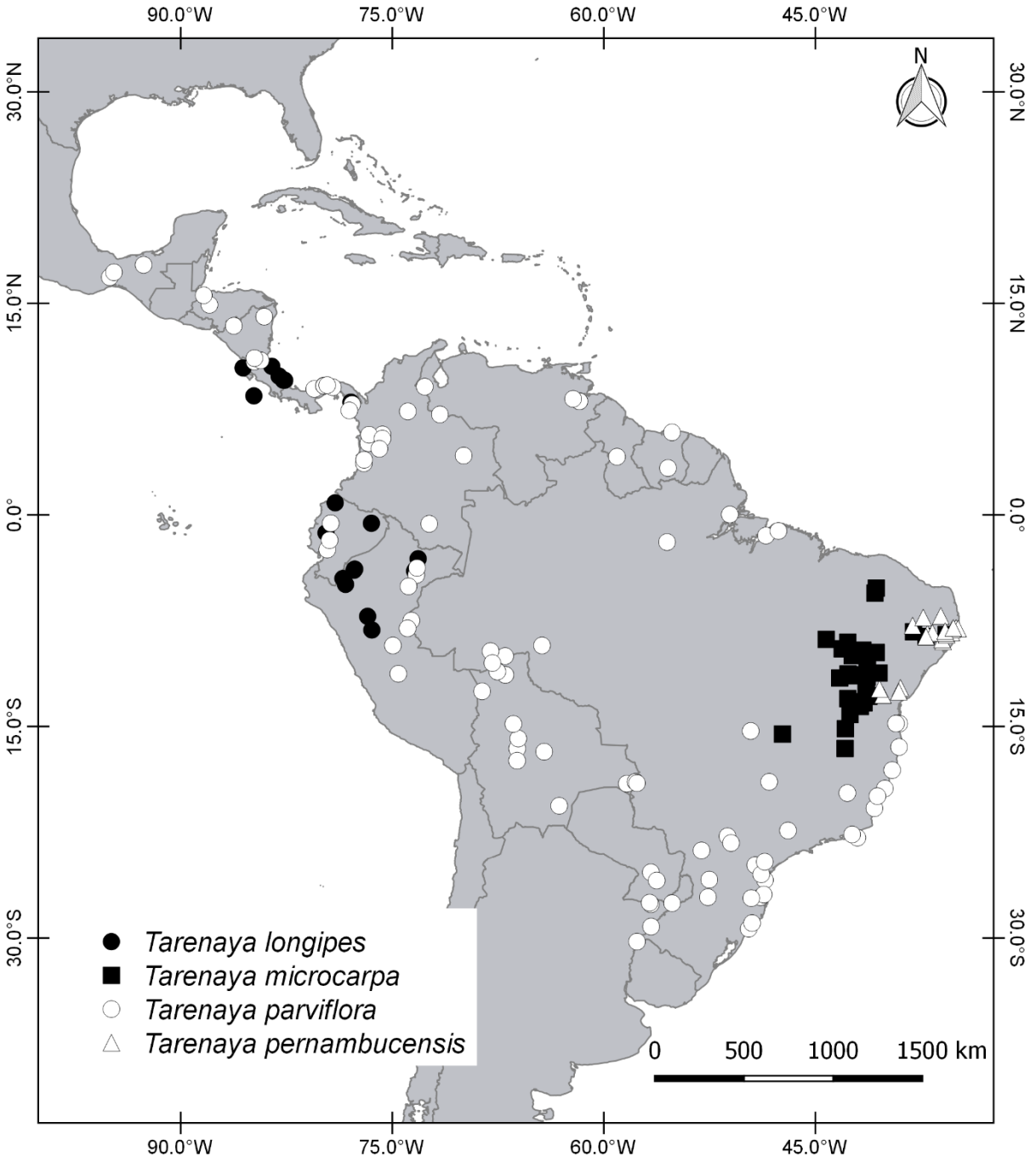

Figure 18. Distribution map of *Tarenaya longipes*, *T. microcarpa*, *T. parviflora* and T. *pernambucensis*.

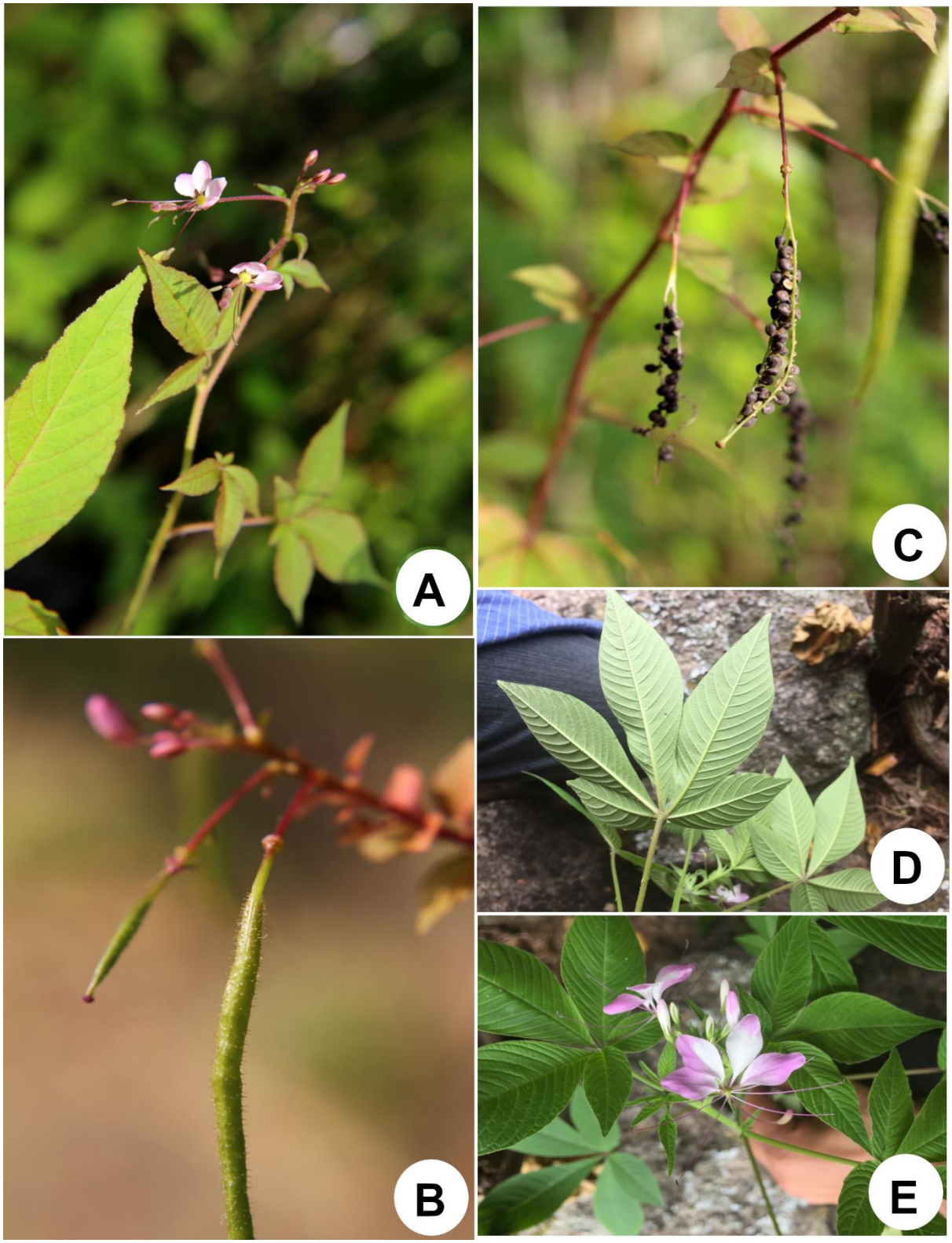

Figure 20. *Tarenaya parviflora* (kunth) Iltis. A – Detail of inflorescence with open flowers. B – Imatture fruits highlighting the gynophore. C – Seeds attached to the replum. *T. rosea* (Vahl ex DC.) Soares Neto & Roalson. D – 5-foliolate leaves. E – A open flower highlighting the bicolor petals. Photos: A–C Nicco Faria; D–E Diogo Luiz.

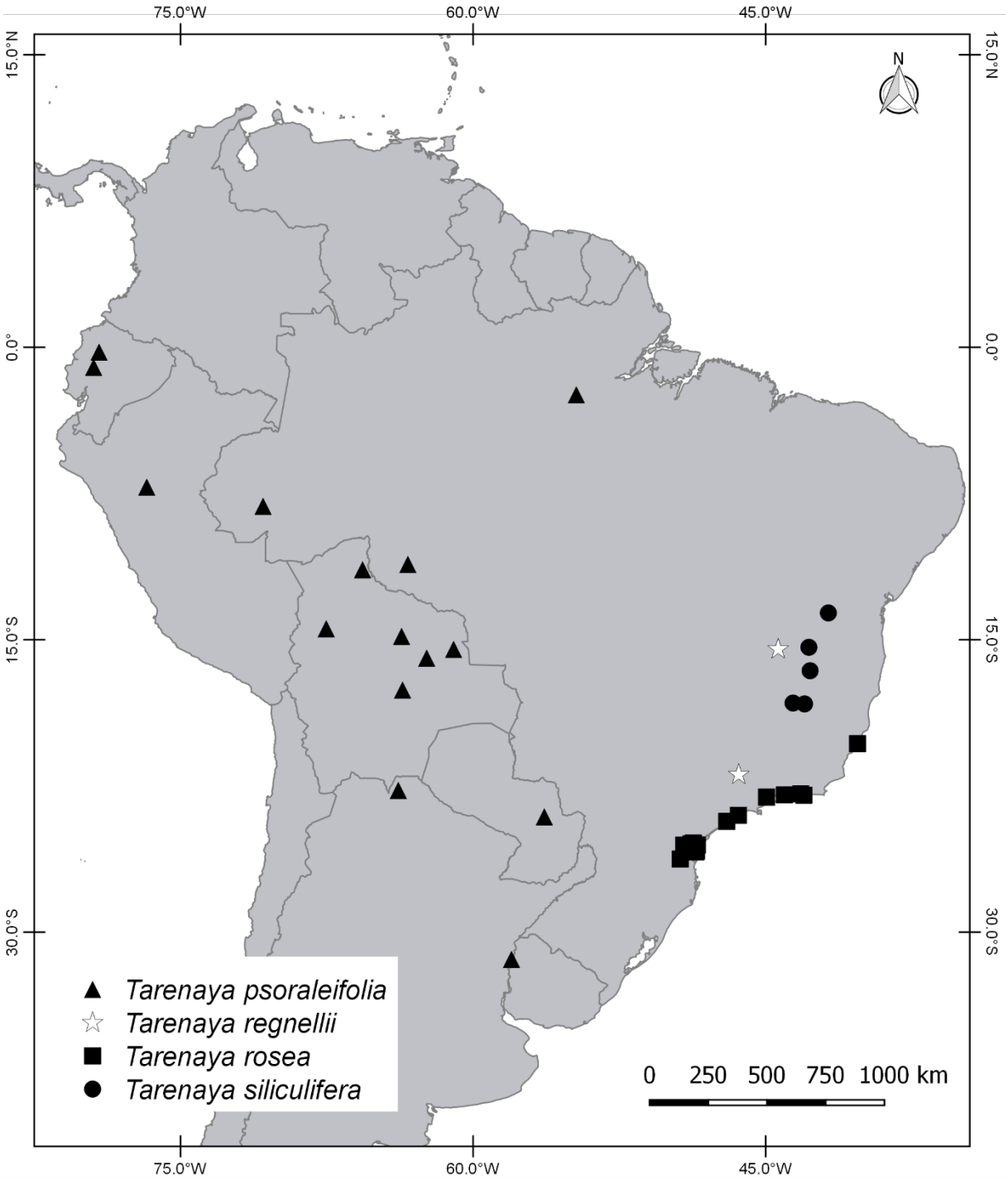

Figure 21. Distribution map of *Tarenaya psoraleifolia*, *T. regnellii*, *T. rosea* and *T. siliculifera*.

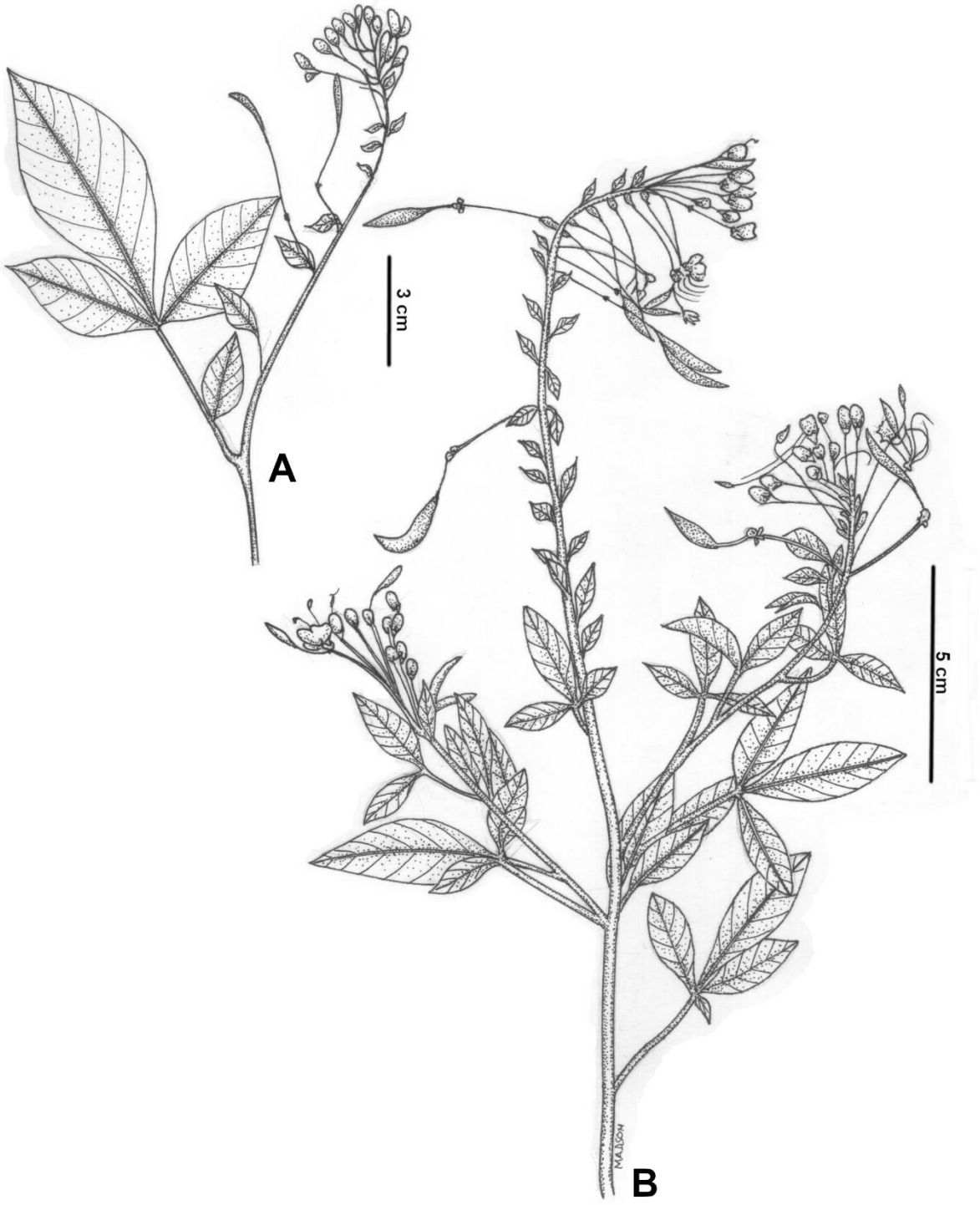

Figure 22. *Tarenaya latifolia* (Vahl ex DC.) Soares Neto & Roalson. A – Branch with bud flowers and young fruits (*O. de Carvalho 6*). B – *Tarenaya regnellii* (Eichler) Soares Neto & Roalson. B – Reproduticve branch with bud flowers, open flowers, and fruits (*C.D.M. Ferreira et al. 34*).

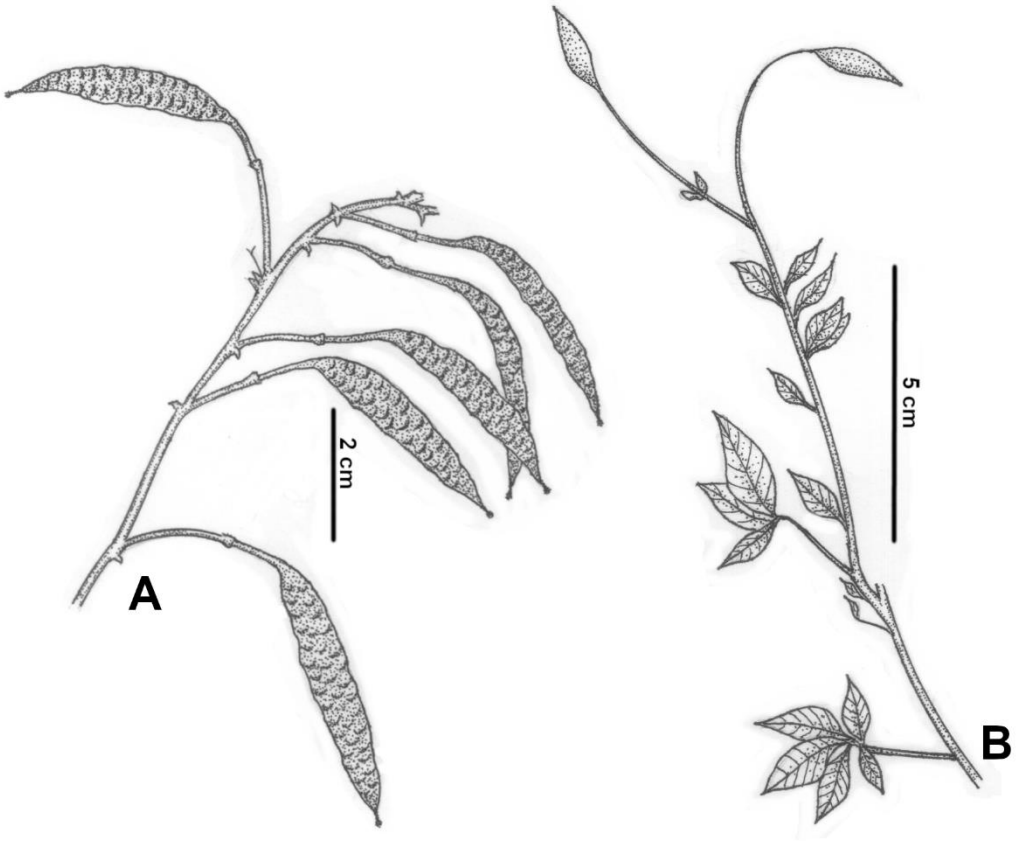

Figure 23. *Tarenaya titubans* (Speg.) Soares Neto & Roalson. A – Fruiting branch (*G. Martinelli 3987*). *Tarenaya tucumanensis* (Iltis) Arana & Oggero. B – Fruiting branch with immature fruits (*Neffa et al. 667*).

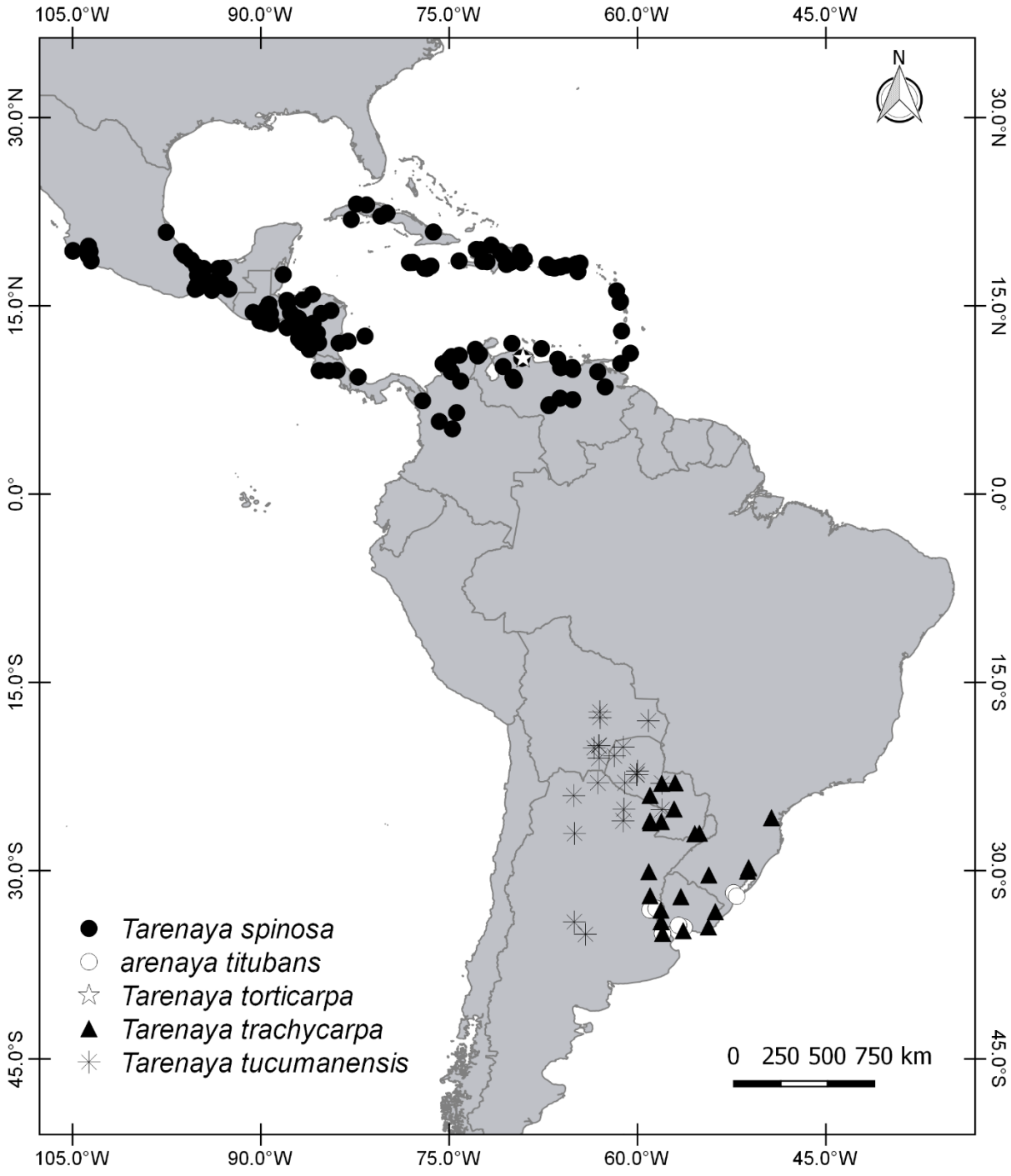

Figure 24. Distribution map of *Tarenaya spinosa*, *T. titubans*, *T. torticarpa*, *T. trachycarpa* and *T. tucumanensis*.

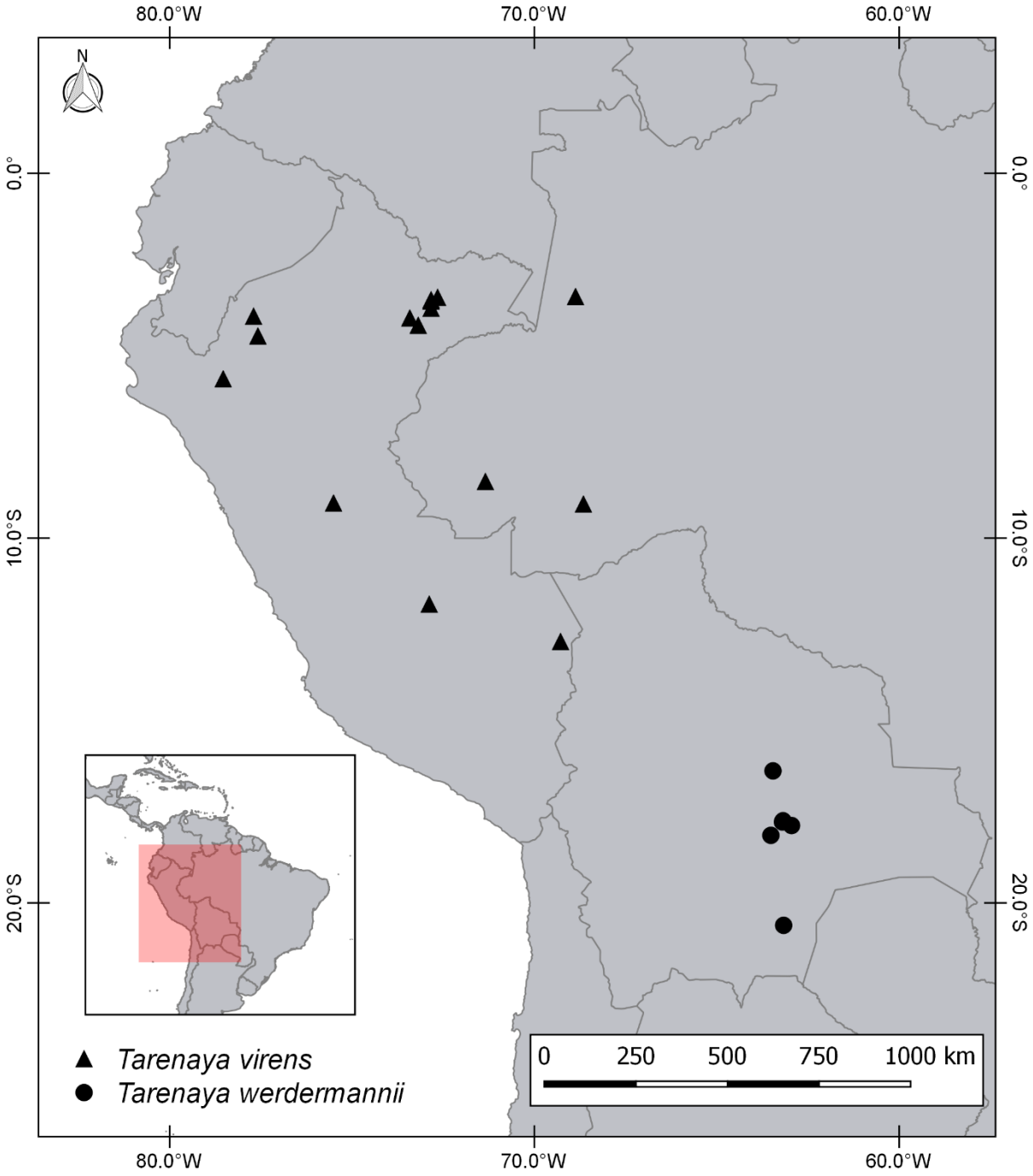

Figure 25. Distribution map of *Tarenaya virens* and *T. werdermannii*.

APPENDIX 1. List of species and examined material of *Tarenaya*. In the list of exsiccatae, specimens are arranged alphabetically by the name of first collector; number in parenthesis follow the list of species.

1. *T. aculeata*; 2. *T. afrospina*; 3. *T. atreopurpurea*; 4. *T. bernadetiana*; 5. *T. bicolor*; 6. *T. boliviensis*; 7. *T. chapalensis*; 8. *T. cordobensis*; 9. *T. costaricensis*; 10. *T. crenopetala*, 11. *T. curvispina*; 12. *T. diffusa*; 13. *T. domingensis*; 14. *T. eosina*; 15. *T. guaranitica*; 16. *T. hassleriana*; 17. *T. horrida*; 18. *T. houstonii*; 19. *T. inermis*; 20. *T. latifolia*; 21. *T. lilloi*; 22. *T. longicarpa*; 23. *T. longipes*; 24. *T. microcarpa*; 25. *T. parviflora*; 26. *T. pernambucensis*; 27. *T. psoraleifolia*; 28. *T. regnellii*; 29. *T. rosea*; 30. *T. siiculifera*; 31. *T. spinosa*; 32. *T. titubans*; 33. *T. torticarpa*; 34. *T. trachycarpa*; 35. *T. tucumanensis*; 36. *T. virens*; 37. *T. werdermanii*.

A— Abbott, J.R. & Mostacedo, B. 16139(6); Abraham, D. 191(31); Abrão, H.R.S. 198(16); Abreu, C.L.B. *et al*. 184(12); Acevedo-Rodríguez, P. 2824(31); Acevedo-Rodríguez, P. & Reilly, A. 1993(31); Acevedo-Rodríguez, P. & Siaca, A. 3777(31); Acevedo-Rodríguez, P. *et al*. 669(31); Adams, C.D. 13061(1); Agostini, G. *et al*. 2680(31); Agra, M.F. 47(22), 541(22); Agra, M.F. & Silva, M.G. 1610(22); Aguiar, C.M.L. 6(22), 22(22), 23(22); Aguila, M.D. & Gullison, R.E. 144(25); Aguillar, M. 116(1); Alain, B. 1784(18); Albuquerque, A.C. *et al.* 18(22), 50(22), 82(22); Alunos de Taxonomia da UFPI *s.n.*(1, 1); Álvaro *s.n.*(22); Amorim, A.M.A. *et al*. 7833(5); Ancuash, E. 87(23), 1492(23); Anderson, W.R. 9216(28); Andrade, A.G. 1867(12); Andrade-Lima, D. 38(12), 601(26), 1151(12), 1204(12), 3977(24), 5791(12), 6340(26), 6392(26), 9582(26); Andreata, R.H.P. *et al*. 42(3), 106(3); Anselmo, S. 2060(1); Arango, J.G.R. 4583(31); Aona, L.Y.S. *et al.* 1596(22); Araquistain, M. & P. Moreno 1240(31), 1607(31); Araújo, A. *et al*. 1273(1); 1298(6), 1397(6), 2075(6), 2111(6), 2725(6), 2968(6); Araújo, A.G. 8(16); Araújo, A.M.S. 41(12); Araújo, A.P.P. 477(1); Araújo, D. *et al*. 1271(24); Araújo, F.S. 174(12), 425(24); Arbeláez, F.P. 4861(31); Arbo, M.M. *et al*. 2608(1); Archer, W.A. 2990(31), 4674(1), 7659(1); Argeñal, F.J. 80(31), 183(31); Aronson, J. 698(36); Arouck-Ferreira, J.D.C. 254(12); Arroyo, L. & Intuias, Y. 6215(6); Asplund, E. 5272(25); Assis, S.M.P. *et al.* 6(22); Ataíde, M. 6(12), 68(1), 108(22), 669(22), *s.n.* (22); Atala, C.A. *s.n.*(16); Atala, F. 7(3); Atwood, J.T. 1086(31); Atwood, J.T. *et al*. 354(31); Aulestia, M. 2369(23); Austin, D.F. 7449(1); Austin, D.F. *et al*. 7434(25); Ayala, A. *et al*. 3138(25); Ayala, F. 1924(25); Ayala, F. & Arévalo, E. 4267(36); Ayala, M.G. 91-87(31); Aymard, G. 96(1), 3131(1); Aymard, G. & Ortega, F. 860(31), 1416(1); Aymard, G. & Stergios, B. 901(31); Assis, A.M. & Flores, F.M. 2058(5).

B—Badcock 849 (37); Baksh, Y.S. & Adams, C.D. 465(1); Bandeira, F.P. 174(12); Bang, M. 485(6); 1585(1); Barbosa, G.T.P. 15(16); Barbosa, M. 24318(16); Barbosa, M.S.M. 12(22); Barbosa, V.P. 222(22); Barku, E.E. 14(31); Barrados, H. *s.n.* (22); Barreto, K.D. *et al*. 2996(16), 3107(16); Barreto, M. 2235(5), 8391(16), 8439(16), 9225(16), 10745(5); Barreto, V. 170(12); Barros, A.M.M. 4709(3); Barros, A.M.M. *et al*. 511(16); Barros, E.O. & Souza, M.M.A. 205(22); Barros, P.H.D. *et al*. 139(5); Barros, R. *et al*. 2940(24); Basualdo, I. & Zardini, E.M. 1474(1); Bautista, H.P. 3033(1); Beck, S.G. 4803(1), 5682(1), 6237(8), 6420(1), 6987(6), 13251(6), 17108(1), 17781(6); Bedi, R. 139(1); Belém, R.P. 3910(16); Belforge, J.G. 3(16); Bentacur, J. & Churchill, S. 2237(25); Berg, C. van den 883(12), 956(12); Berg, C.C. & Henderson, A.J. *s.n.*(22); Berthoud-Coulon, M. 442(1), 443(25), 444(25); Bertoni 579(16); Bezerra, P. *s.n.* (1, 1, 22); Billiet, F. & Jadin, B. 7445(1); Black 2351-B (17); Black & Avelino *s.n.*(22); Blanco, C. 785(20); Bocage, A. 382(22); Bolson, M. 249(1); Boone, W. 469(22); Bosco, J. 34(22); Bourobou, H.P. 441(2); Bovini, M.G. & Faria, M. 3683(3); Bovini, M.G. *et al*. 1081(29), 3633(29), 9768(31); Bowie, J. & Cunningham, A. 116(12); Brade, A.C. 11040(3), 11082(12), 11212(3), 15300(3), 15838(3), 19474 (17), 20041(3); Braga, J.M.A. 971(3); Braga, J.M.A. *et al*. 873(3), 883(3), 4385(22); Braga, R. 72(16); Brand, J. *et al*. 1306(25); Braz, E. 53039(22); Breedlove, D.E. 26137(1), 28041(31); Breedlove, D.E. & Thorne, R.F. 30337(31), 30480(31); Brenckle, J.F. 47-297(31); Breteler, F.J. 3793(25); Brito, M.F.M. de 270(22); Brito, N.M.P. de 70(12); Britto, K.B. 47(12), 48(26); Britton, E.G. 10035(18); Brittton, N.L. 1716(31), 2382(31); Britton, N.L. & Cowell, J.F. 329(18); Britton, N.L. & Hollick, A. 2118(31); Britton, N.L. *et al*. 249(31), 381(18); Broadway, W.E. 23(1); 537(1); 1730(1), 3391(31), 5155(1), 5153(1), 6228(31), 7319(31), *s.n.* (31); Brooke, W.M.A. 5963(1); Brooks, R.R. & Zardini, E.M. MS358(1); Bruch, C. Bovini, M.G. & Bruno, F. *s.n.*(22, 22); Buchtien, O. 229(1); Burch, D. 5481(25); Bustillo, S. 181(31); Buttura 255(16).

C—Cabrera, A.L. *et al*. 28804(16), 30386(1), 31493(1); Calatayud, G. 4521(1); Calderón, J.G. 71(31); Calderón, G.M. 131(1), 1101(31); Calvente, A.M. *et al*. 57(3); Calzada, J.I. & Elizondo, J. 8535(31); Cámbar, I. 201(31); Campbell, D.G. *et al*. 8984(25); Campos, J. & Díaz, O. 2163(1); Cano, O. *et al*. 807(24); Carauta, P. 987(22), 1857(22); Carballo, R.A. *et al*. 4(31); Cárdenas, D. 1921(25); Cardoso, D. & Lima, W.J. 506(12); Cardoso, D. *et al*. 851(22); Cardoso, L.J.S. 87(29); Carneiro, J. *s.n.* (22); Carrion, A. & Ramos, E. 718(25); Carrion, A. *et al*. 623(25); Carvajal, S. & Suárez, J.C. 44(7); Carvajal, S. & Moreno, A. 708(7); Carvalho, A. 330(22), *s.n.* (22); Carvalho, A.M. de 600(22), 1131(24), 3173(25), 3848(22), *s.n.*(1); Carvalho, A.M.M. *s.n.*(22); Carvalho, D.N. 218(12), 325(12); Carvalho, H.C.S. 2(29); Carvalho, L.F. de

s.n. (5); Carvalho, O. de *s.n*. (20); Cartaxo, S.L. *s.n.* (22); Casas, J.F. 7721(6), 7901(6); Casas, J.F. & Molero, J. 4247(16), 4390(14), 6124(14), 6277(1); Casas, J.F. & Susanna 8388(25); Casari, M.B. 119(3); Cascon, P. *s.n.* (22); Castellanos, A. & Duarte, L. 566(22); Castellar, A. *et al*. 3(5); Castillo, A. & Franca, A. 2628(31); Castillo, A. *et al*. 2832(31), 3216(31); Castillo, A.Z. del 555(8); Castro, A.J. *s.n.*(22); Castro, R.M. *et al*. 2122(16); Catari *et al*. 150(25); Cavalcanti, F.S. 660(22), *s.n.* (22, 22); Cavalcanti, F. *s.n*.(22); Cerón, C.E. 20936(6), 18022(25); Cerqueira, J. 12(12); César, S. *s.n*. (22); Cestaré, E.D. *s.n*.(16); Chacon, L. 868(1); Champluvier, D. 5274(2); Chaves, E.M.F. 157(1); Chorley, M. 79(25); Chrostowski, M.S. 70-7(1); Chuckr, N.S. *et al*. 9698(30); Clark, O.M. 6627(1), 6827(1); Coelho, D.M. & Silva, R.A. 434(12); Colaço, M. 215(12); Colonnello, G. 2119(31); Combs, R. 98(31), 632(18); Conceição, A.A. *et al*. 1576(22), 1755(24), 1755(24), 2731(22); Conceição, A.S. 162(22); Conceição, C.A. 2795(25); Conceição, G.M. 6(22); Constantino, D. 94(16); Conway, R. & Johnson, C.D. 385(1); Coradin, L. & Cordeiro, M.R. 598(1); Coradin, L. *et al.* 5985(22), 6305(24); Cordeiro, J. 24(16); Córdoba, W.A. 418(25); Cornejo, X. & Bonifaz, C. 6862(1), 7012(1); Coronado, I. & Almanza, P.A. 5938(31); Coronado, I. & Fernández, A. 4596(31), 5139(31); Coronado, I. & Reyes, J. 6597(31); Coronado, I. & Rueda, R.M. 3766(31); Coronado, I. & Soriano, J. 608(31); Coronado, I. *et al*. 1149(31); Correa, M.D. & Lazor, R. 1445(9); Correia, C. & Nascimento, J.G. 86(22); Correia, I.L. 22(1); Costa, R.C. 204(24); Costa, R.C. & Lima-Verde, L.W. *s.n.* (22); Costa-e-Silva, M.B. 296(1), 340(12), 355(22), 1200(22), 1210(22), 1216(22), 1232(22), 1245(22), 1252(22), 1276(1), 1286(16), 1431(22), 1468(22), 1477(22), 1484(22), 1487(22), 1491(1), 1509(12), 1523(26) 1533(1), 1612(24); Costa-e-Silva, M.B. & Laurênio, A. 1507(22); Costa-e-Silva, M.B. & Melo, M.R.C.S. de 1443(22), 1445(22), 1468(22), 1470(22), 1472(22), 1473(22), 1484(22), 1488(22); Costa-e-Silva, M.B. *et al.* 321(22), 1497(22), 1498(22); Costa, E.L. & Ribeiro, R. 214(3); Costa Neto, E.M. 3(22); Costa, J.A. 12(1); Costa-Lima, J.L. 114(22); Costa-Lima, J.L. *et al*. 408(22); Cowell, J.F. 95(31); Cremers, G. 9533(1); Cremers, G. & Hoff, M. 10606(1); Croat, T.B. 12(13), 6403(25), 38431(31), 51144(1); 51534(6); Croat, T.B. & Hannon, D.P. 64535(1), 65319(1); Cronemberger, C. *et al*. 7(3); Crosby, M.R. *et al*. 63(31); Cruz, M.E. 220(31); Cuadros, H. 888(25); Cuatrecasas, J. 23048(25); Curran, H.M. 147(31), 392(31); Curti, M. & Souza-Stevaux, M.C. 3(16); Curtiss, A.H. 729(31), 740(18), *s.n*.(31); Czerwenka, J. & Feucht, S.P. 378.

D—Dahlgren, B.E. & Sella, E. 299(1); Daly, D.C. *et al*. 1263(22), 12049(25); D'Arcy, J.J. 6875(1); Damasceno, L. *et al*. 6(24); D'Arcy, W.G. 279a(13), 13365(31), 13395(1); D'Arcy, W.G. & D'Arcy, J.J. 6845(31), 6875(1); Davidse, G. & González, A.C. 12710(31); Davidse,

G. *et al*. 11789(24), 35512(31); Davidson, C. 5003(6); Dávila, M. 5(31); Debeaux, G. *s.n.* (1); Degen, R. & Mereles, F. 2613(35); Deger, R. & Zardini, E. 426(1), 506(1); Demuner, V. *et al*. 3131(5); Deodato, G. 65768(12); DeWolf Jr., G.P. 1922(1); Dias, A.S. *s.n.*(22); Diaz, C. *et al*. 631(36); Diaz, C. *et al*. 649(23); Dias, M.C. *et al*. 19(25); Diaz, W. 6081(25); Didrichsen, F. 4139(3); Dieterle, J.V.A. 4331(7); Dodson, C.H. 2824(25), 5224(25); Dodson, C.H. & Gentry, A. 9925(23); Dodson, C.H. *et al*. 14462(25); Dr. Bello *s.n.* (3, 12); Doppelbaur, H. *s.n.* (36); Duarte, A.P. 25(3), 1469(22), 1950(1), 3259(16), 3942(16), 6792(1), 6872(22), 7065(22), 8068(5), 8069(3), 8070(29), 8467(16), 8565(22), 8645(22), 9510(22), 9859(16), 10567(22), 13920(5),13988(5), *s.n.*(5, 16); Dressler, R.L. 1883(1), 1908(1); Duarte, I.W. *s.n.* 21660(22); Duarte, L. & Castellanos, A. 430(22); Ducke, A. *s.n.*(36, 36); Duke, J.A. 8689(25); Dunaiski Jr., A. 101(16); Duno, R. *et al*. 314(31); Duré, R. & Hahn, W. 260(1); Dusén, P. 611a(25), 14034(25), 7365(10); Duss, P. 2276(1), 2277(31); Dutra, E.A. 2(12); Dutra, L.K.P. 3761(22).

E— Eiten, G. 6388(16); Eiten, G. & Eiten, L.T. 4901(22), 4925(22), 10290(1); Ekman, E.L. 2075(1), 14267(13); Elias, B. 1211(31); Emrich, K. 4152, *s.n.* (16, 16, 16); Emperaire, L. *s.n.* (24); Espinal, M. 5(31); Espinal, S. & Ramos, J.E. 2796(25); Esteves, V. & Esteves, R. 321(3); Eyerdam, W.J. 24917(8).

F— Falcão, J.I.A. *et al.* 831(22), 1079(22); Farfán, J. *et al*. 651(25); Farney, C. *et al*. 3654(12); Félix, L.P. 1262(1); Félix, L.P. & Dornelas, G.V. 639(22); Félix, L.P. & Miranda, A.M. 6553(26), 7971(22), *s.n.* (26, 26); Félix, L.P. *et al.* 5611(22); Fendler, A. 209(31); Fernandes, A. *s.n.*(1, 1); Fernandes, A. & Nunes, E. *s.n.*(22); Fernandes, A. & Matos *s.n.*(22, 22); Fernandes, A. *et al*. *s.n.*(12, 24); Fernandes, D. *et al*. 15(22); Fernandes, D.S. 1(1), 2(1); Fernández, R. 4150(1); Ferrari, G. 418(22); Ferrera, A. 192(31); Ferreira, C.A.C. & Nelson, B.W. 2609(22); Ferreira, C.A.C. *et al*. 5164(22); Ferreira, E. 158(1); Ferreira, J.L. *et al*. 281(24); Ferreira, L. & Ming, L.C. 99(22); Ferreira, L.M. *et al. s.n*. (12); Ferreira, M.C. 601(12); Ferruci, M.S. & Figueiredo, M.A. 1144(22); Ferrucci, S. *et al*. 553(16); Feucht, S.P. 509(31); Filho, J.J. FAB67(1); Figueiredo, M.A. *et al.* 58(22), 660(22); Florentín, T. *et al*. 649(14); Folli, D.A. 2554(16), 3782(12); Fonseca, V.S. *et al*. 117(12); Fontana, A.P. *et al*. 6570(22); Fontella, J. *et al*. 3104(12); Fonseca, M.R. *et al*. 1352(24); Forero, E. *et al*. 2142(25), 2335(25), 4020(25), 4202(25), 5134(25); Fortunato, H. *et al*. 3381(35); Fortunato, R.H. *et al*. 3356(1); Forzza, R.C. *et al*. 5503(5), 6835(22); Fosberg, F.R. 29101(1); Fox *s.n.*(12); Frade, C.S.B. *s.n.*(16); Fraga, C.N. de *et al*. 192(5); França, F. 3541(12), 5169(12); França, F. & Melo, E. 1067(26); França, F. *et al.* 1220(22), 1663(22), 3128(24), 4352(30), 4702(24), 5476(22); Frank, M. *s.n.* (16); Frazão, A. *s.n.*(3, 12, 12, 16); Fredholm, A. 3029(31); Fr. Allemão *s.n.*(12);

Fr. Allemão & Cysneiros, M. de 38(12), 39(12); Fr. Muller 104(25); Freire & Vidal 189(3); Freire, F.M.T. *s.n.* (1, 22); Freitas, B. *s.n.*(22); Friebrig, K. 2029(8); Friedrichs, E. *s.n.*(16); Fryxell, P.A. 3707(1); Furlan, A. *et al. s.n.*(22); Fuentes, A.F. 1323(1), 6167(1), 6172(6); Fuentes, A.F. *et al*. 9189(6), 14270(6), 14387(6); Funch, R. 137(24); Funez, L.A. 556(16).

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4 CONCLUSÕES

Dados de literatura sugeriam que a circunscrição de *Tarenaya* abrangeria cerca de 40 espécies, porém, nenhuma circunscrição conhecida foi apresentada. A circunscrição proposta aqui foi inicialmente baseada apenas em caracteres morfológicos e corroborada pelas análises de reconstrução filogenética molecular. Assim, atualmente o gênero compreende 37 espécies. Os principais caracteres para reconhecer as espécies de *Tarenaya* são o par de espinhos na base do pecíolo, as estípulas espinescentes; as inflorescências portando brácteas florais foliáceas, e a ornamentação da testa da semente.

Por se tratar do estudo mais abrangente incluindo as espécies de *Tarenaya*, os estudos filogenéticos além de contribuirem para corroborar a atual circunscrição do gênero, mostraram que as relações entre as espécies são moderadas a fortemente sustentadas. Algumas espécies que mostravam problemas de delimitação taxonômica como por exemplo *Tarenaya bicolor*, *T. inermis* e *T. rosea*; *T. parviflora* e *T. psoraleifolia*; *T. spinosa* e *T. longicarpa*, mostraram tratar-se de espécies distintas. É necessário investir em mais estudos genéticos com *T. aculeata* para compreender melhor a história evolutiva dessa espécie.

As análises biogeográficas sugerem que *Tarenaya* teria surgido há 17 milhões de anos atrás no Mioceno, com um ancestral comum mais recente nas áreas secas da América do Sul, sofrendo principalmente a influência de eventos de dispersão de longa distância durante sua diversificação nos Neotrópicos, sendo as regiões Chaquenha e Floresta Atlântica ambientes importantes para a diversificação das suas espécies.

A revisão taxonômica do gênero fornece um tratamento taxonômico com um conjunto de dados morfológicos, geográficos, imagens e ilustrações, chave de identificação que auxiliam na correta identificação das espécies de *Tarenaya*, evitando erros bastante comuns como a má aplicação de nomes para espécies distintas.

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APÊNDICE A – ARTIGO PUBLICADO NO PERIÓDICO *PHYTOTAXA*

Two new species of *Tarenaya* (Cleomaceae) from Brazil

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Abstract

Two new endemic species of *Tarenaya* from Brazil are described and illustrated here. These species have been previously recognized, but never published. They resemble each other by the armed petioles, corymbiform racemes, small flowers and sessile to subsessile mature capsules with deflexed and persistent sepals. *Tarenaya curvispina* is characterized by the curved stipular spines, serrulate-ciliate margins of the leaflets, and ascending fruits, while *T. pernambucensis* is characterized by being puberulent-glandular throughout, straight stipular spines, the margin of leaflets entire, and ciliate and deflexed fruits.

Introduction

The broad paraphyly of *Cleome* Linnaeus (1753: 671) has resulted in the segregation of many genera from *Cleome* sensu stricto (Iltis & Cochrane 2007, Cochrane & Iltis 2014, Roalson *et al*. 2015, Barrett *et al*. in press, Roalson & Hall in press, Thulin & Roalson in press). These generic circumscriptions are generally based on a combination of morphological and phylogenetic data, and were initially proposed in the preparation of modern taxonomic treatments for species of *Cleome* in regional floristic works (Iltis & Cochrane 2007, Tucker & Vanderpool 2010). Currently, these new circumscriptions have been addressed in the family clade by clade, based on the results of the most recent phylogenetic studies combined with morphological data, in order to make these genera monophyletic.

Tarenaya Rafinesque (1838: 111) is a New World genus segregated from *Cleome* and was reestablished by Iltis & Cochrane (2007) based on seed characters and chromosome numbers (*2n*= 20, 30 or 40). It has a close relationship with *Hemiscola* Rafinesque (1838: 11), another New World genus that also was reestablished by Iltis & Cochrane (2007), based on shared characteristic stipular spines. However, these genera are not monophyletic because *Hemiscola* is embedded within a paraphyletic *Tarenaya*. Unification of both genera into a broader *Tarenaya* has been proposed (Feodorova *et al*. 2010, Patchell *et al*. 2014). Currently, eight species of *Tarenaya* are formally recognized (Iltis & Cochrane 2007, 2014; Arana & Oggero 2016). It is supposed that circa 40 species need to be circumscribed in the genus, including new combinations of currently recognized *Cleome* species and description of new species.

Tarenaya species are recognized by their herbaceous to subshrub habit, puberulent-glandular to pubescent indument, stipular spines, palmately-compound leaves, corymbiform racemes that are usually bracteate, nectaries that are disciform, conic or obsolete, and by a usually thin membrane connecting the tips (cotyledonar and radicular "claws") of the horseshoe-shaped testa of seeds.

The new species described here were previously recognized and identified on herbarium sheet labels of many Brazilian and other herbaria; however, they were never published.

Taxonomic treatment

1. *Tarenaya curvispina* M.B. Costa-e-Silva & Iltis ex Soares Neto & Roalson *sp. nov*. (Fig. 1a–b, 2a–d)

Type:—BRAZIL. Bahia, Ilhéus, Quadra D do CEPEC, 9 September 2015, *R.L. Soares Neto & J.G. Jardim 130* (holotype JPB!, isotypes CEPEC!, RB!, NY!, WIS!).

Diagnosis:—Related to *Tarenaya pernambucensis*, differing by being glabrescent to glabrous plants, by the curved stipular spines with a broad base, margin of the leaflets serrulate-ciliate and by the subsessile and ascending mature capsules.

Herb 0.25 to 1.20 m tall, highly branched; branches glabrescent to glabrous. Stipular spines curved with a broad base, 1.5–2 × 1–1.5 mm. Leaves 3–5-foliolate; petioles glabrous, armed with slender to stout prickles, 3.5–8 cm long; leaflets elliptic to oblanceolate, apically acuminate, basally long attenuate, membranaceous, with scattered short-pointed hairs on both faces, prickles on the central midrib on the abaxial face, margin serrulate-ciliate, central leaflet

5.5–7.8 × 1.8–2.3 cm, outermost 2–5.5 × 0.8–1.7 cm; petiotule glabrous, sometimes armed, 3–8 mm long. Racemes corymbiform, terminal, 7–15 cm long. Bracts 1-foliolate, the lower 3-foliolate, ovate to elliptic, apically acute, basally cuneate to rounded, margin serrulate-ciliate, 4–17 × 2–10 mm; petioles glabrous, 1–5 mm long. Flowers zygomorphic, on glabrous pedicels, 7–13 mm long, purple. Sepals lanceolate, glabrescent to glabrous on the outside, margin minutely serrulate, c. 1 × 0.5 mm, greenish, deflexed and persistent in fruit. Petals unguiculate, claw 0.5–1 mm long, blade oblong, apically obtuse, 1.5–2 × 1 mm, glabrous, white, becoming purple at apex. Nectary disciform. Stamens 6, filaments glabrous, 1–2 mm long, white; anthers ca. 1mm long, yellowish. Ovary oblong to oblanceolate, 2 × 0.5 mm, glabrous; stigma capitate, subsessile. Mature capsules oblong to oblanceoloid, 1.8–3.2 cm long, ascending, glabrous; gynophores ca. 0.5 mm long. Seeds horseshoe-shaped, c. 1–1.2 × 1 mm, finely longitudinally striate, pronouncedly transverse ridged, cleft narrow, covered by a porous membrane.

Distribution and habitat:—This species has a disjunct distribution between the states of Bahia and Ceará (Fig. 3). In Bahia, all the collections are from the same place, in Ilhéus/Itabuna, on cocoa plantations. In Ceará it occurs in mountainous areas, as an agricultural invasive, at 980 m elevation.

Etymology:—Epithet based on the curved stipular prickles.

Phenology:—Flowers and fruits from June to October.

Vernacular names:—Unknown.

Additional specimens examined (Paratypes):—BRAZIL. **Ceará:** Guaramiranga, Capoeira humida, 4°20’S 39°W, 20 July 1908, *A. Ducke s.n.* (WIS v 0324883 WIS, v 0324884 WIS); Maranguape, Serra de Maranguape, 3°50’S 38°45’W, 28 June 1981, *P. Martins & E. Nunes s.n.* (EAC 10550); *loc. cit.*, Serra de Maranguape, 16 July 1946, *A. Fernandes s.n.* (EAC 881); Pacoti, arredores, 4°12’S 38°55W, June 1988, *F.J.A. Matos s.n.* (EAC 16495); Redenção, Manoel Dias, Sítio Furna da Onça, 29 March 2015, *M.I.B. Loiola et al. 2579* (EAC). **Bahia:** Ilhéus, área do CEPEC, Km 22 da Rodovia Ilhéus/Itabuna (BR 145), 4 August 1981, *J.L. Hage 1150* (CEPEC, RB); *loc. cit.*, CEPEC, 26 August 1970, *T.S. Santos 1027* (CEPEC, WIS); *loc. cit.*, CEPEC, 28 October 1978, *S.A. Mori 10994* (CEPEC, WIS); *loc. cit.*, área do CEPEC, Km 22da Rodovia Ilhéus/Itabuna (BR 415), 30 June 1981, *J.L. Hage & E.B. dos Santos 1013* (CEPEC, RB); *loc. cit.*, área do CEPEC, Km 22 rodovia Ilhéus/Itabuna, Quadra D, 12 August 1978, *S.A. Mori 10405* (CEPEC, WIS); *loc. cit.*, CEPEC, Km 7 da rodovia Itabuna-Ilhéus, 9

July 1964, *C.M. Magalhães 33* (CEPEC); Itabuna, CEPLAC, low ground in cocoa plantation, 9 July 1994, *N.T. Silva 58318* (GH, NY, UB, US, WIS).

Tarenaya curvispina is characterized by curved stipular spines with a broad base, margin of the leaflets serrulate-ciliate, armed petioles and the midrib with prickles on the abaxial face, corymbiform racemes with small flowers and ascending mature capsules with persistent sepals. It resembles *T. pernambucensis* by the armed petioles, racemes corymbiform, small flowers and mature siliques, differing by being glabrescent to glabrous (vs. puberulent-glandular throughout), the leaflet margin serrulate-ciliate (vs. entire, ciliate) and the ascending fruits (vs. deflexed fruits).

This species was discovered during a taxonomic revision of the Brazilian *Cleome* (M.B. Costa-e-Silva 2000, unpublished), and was named and identified in several Brazilian and exterior herbaria sheets by Costa-e-Silva and Iltis as *C. curvispina*. The name, however, was never validly published.

2. *Tarenaya pernambucensis* Iltis & M.B. Costa-e-Silva ex Soares Neto & Roalson *sp. nov.* (Fig. 4a–c)

Type:—BRAZIL. Pernambuco, São Lourenço da Mata, Tapera, São Bento, Upon a rock, 25 June 1932, *B. Pickel 3045* (holotype IPA!; isotypes BH, F v0053149F [image!], GH GH00042342 [image!], LCU, MASS 00319664 [image!], MICH, MO!, RM RM0005356 [image!], UC, WIS v 0324960 WIS!).

Diagnosis:—Resembles *Cleome bicolor*, being distinguished by the puberulent-glandular indument, conspicuous straight stipular spines (1–1.5 mm long), disciform nectary and deflexed, subsessile mature capsules.

Herb 0.10 to 0.80 m tall, highly branched; puberulent-glandular throughout. Stipular spines straight, 1–1.5 mm long. Leaves 3–7-foliolate; petioles puberulent, armed with slender prickles, 2.5–9 cm long; leaflets elliptic to oblanceolate, apically acute, basally attenuate, membranaceous, puberulent on both faces, discreetly armed on the abaxial face, margin entire, ciliate, central leaflet 2–5.5 × 0.8–2 cm, outermost 1.5–4 × 0.5–1.5 cm; petiolules puberulent, armed, c. 2 mm long. Racemes corymbiform laxiflorous, terminal, 9–23 cm long. Bracts 1-foliolate, cordate or ovate, apically acute or obtuse, basally cordate or obtuse, margin ciliate, 3–6 × 2–4 mm; petioles puberulent, 0.5–1 mm long. Flowers zygomorphic, on puberulent pedicels, (5–)8–15 mm long, greenish. Sepals ovate to lanceolate, densely puberulent to

glabrescent outside, margin entire, ciliate, 2–2.5 × 0.5–1 mm, greenish, deflexed and persistent in fruit. Petals unguiculate, claw ca. 1 mm long, blade spathulate, apically obtuse, 1.5–2.5 × 0.5–1 mm, glabrous, white, becoming pink at apex. Nectary disciform. Stamens 6, filaments glabrous, 2–3 mm long, white; anthers 1.5–2.5 mm long, yellowish. Ovary linear-cylindrical, 1.5–2.5 × 0.5–1 mm, densely puberulent; stigma discoid, sessile. Mature capsules linear-cylindrical, sometimes slightly curved, 2–3 × 0.3 cm, deflexed, puberulent; gynophore 1–2 mm long. Seeds horseshoe-shaped, 1–1.5 × 1 mm, glabrous, with densely transverse ridges, cleft narrow, covered by a thin and little attached membrane, connecting the tips of the seeds.

Distribution and habitat:—Known from Alagoas, Bahia, Paraíba, and Pernambuco (Fig. 3), in the edge and upon rocks in semideciduous forests, and in riparian forests, between 245–450 m elevation.

Etymology:—The epithet is a reference to the State of Pernambuco, Brazil, where the species was first recorded.

Phenology:—Flowers from February to December, and fruits from April to December.

Vernacular names:—Unknown.

Additional specimens examined (Paratypes):—BRAZIL. **Alagoas:** São José da Laje, Usina Serra Grande, 21 February 2002, *M. Oliveira & A.A. Grillo 793* (HUEFS, IPA, UFP, UFRN). **Bahia:** Cachoeira, Vale dos rios Paraguaçu e Jacuípe, 12°38’S 39°05’W, September 1980, *Grupo Pedra do Cavalo 712* (CEPEC, HUEFS); Feira de Santana, Fazenda Boa Vista, Serra de São José, 12°15’S 38°58’W, 10 May 1984, *L.R. Noblick 3191* (CEPEC, HUEFS, PEUFR); *loc. cit*., Fazenda Boa Vista, Serra de São José, 12°15’S 38°58’W, 9 June 1984, *L. Noblick & W.J. Hahn 3363* (HUEFS, WIS [4 sheets]); Iaçu, Rod. BA–046, 17 July 1982, *G. Hatschbach & O. Guimarães 45081* (CEPEC, MBM, WIS); Itaberaba, ARIE Serra do Orobó, Fazenda Bom Jardim, 12°19’55”S 40°27’00”W, 14 July 2006, *L.P. de Queiroz & D. Cardoso 12220* (HUEFS). **Paraíba:** Maturéia, Pico do Jabre, 28 May 2005, *P.C. Gadelha Neto et al. 1406* (JPB); Pocinhos, sem local determinado, 8 July 1994, *L.P. Félix & A.M. Miranda 6553* (PEUFR). **Pernambuco:** Arcoverde, Estação Experimental, 21 July 1971, *D. Andrade-Lima 6340* (EAC, IPA); Bezerros, Serra Negra, 16 September 1998, *M.I.B. Loiola et al. 519* (PEUFR); *loc. cit*., Parque Municipal de Serra Negra, 8°21’S 35°46’W, 8 July 1995, *M. Sales et al. 203* (WIS); *loc. cit*., Serra Negra ao lado de um olho d’água, 18 October 1999, *M.B. Costa-e-Silva 1523* (WIS [3 sheets]); Bonito, Reserva Municipal de Bonito, 8°29’40”S 35°41’45”W, 21 May 1996, *E.M.O. Villarouco et al. 189* (PEUFR); *loc. cit*., Reserva Municipal de Bonito,

21 May 1996, *M. Oliveira et al. 299* (WIS); *loc. cit*., Reserva Municipal de Bonito, 8°029'40'S 35°841'45"W, 21 May 1996, *S.S. Lira 190* (WIS); *loc. cit*., dentro da mata em local úmido, 10 January 1998, *M.B. Costa-e-Silva 1480* (WIS); *loc. cit*., sobre pedras, próximo às cachoeiras, 10 April 1998, *M.B. Costa-e-Silva 1481* (WIS); Camocim de São Félix, sob lajedo, 12 April 1997, *A.M. Miranda et al. 2636* (HST, WIS); Chã de Alegria, estrada que dá acesso ao engenho Aratangi, 20 December 1996, *M.F.A. Lucena & A. Laurênio 688* (PEUFR); Primavera, Cachoeira do Urubu, 8 September 1996, *M.F.A. Lucena et al. 651* (PEUFR); Quipapá, Água Branca, Fazenda Pelada, 12 September 1950, *D. Andrade-Lima 601* (IPA, WIS); São Lourenço da Mata, Estação Ecológica do Tapacurá, Mata do Alto da Buchada, 1 July 1997, *A. Laurênio & M.I.B. Loiola 542* (PEUFR); *loc. cit*., Próximo à barragem de Tapacurá, na mata do Toró, 26 October 1999, *M.B. Costa-e-Silva 152*9 (WIS [5 sheets]); Triunfo, Lagoa Nova, 7 June 1997, *A.M. Miranda et al. 2697* (HST, WIS); *loc. cit*. Lagoa do Mariano, 30 April 1996, *L.P. Félix & A.M. Miranda s.n.* (HST 5298, WIS v 0324910 WIS); Vitória de Santo Antão, Engenho Pombal, primeira vereda após a ponte, em direção ao rio Tapacurá, 26 September 1998, *A. Laurênio & M.I.B. Loiola 1379* (PEUFR); *loc. cit*., Engenho Pombal, Próximo a barragem de Tapacurá, 10 April 1999, *M.B. Costa-e-Silva et al. 1513* (WIS [3 sheets]).

Notes:—*Tarenaya pernambucensis* is characterized by its puberulent-glandular indument, straight stipular spines, cordate bracts, small flowers and deflexed mature capsules with persistent sepals. It resembles *Cleome bicolor* Gardner (1843: 330) in the general appearance, indument and length of mature capsules, but differing by the conspicuous stipular spines, 1–1.5 mm long (vs. spines less than 1 mm long or not developed, seemingly lacking), disciform nectary (vs. conic), short staminal filaments, 2–3 mm long (vs. 15–21 mm long), and by the subsessile mature capsules with persistent sepals (vs. capsules stipitate from elongation of gynophore without persistent sepals).

This species was previously identified by H.H. Iltis (1952, unpublished) as an infraspecific taxon of *Cleome rosea* Vahl ex DC., *C. rosea* subsp. *pernambucensis*, based on *B. Pickel 3045*, chosen here as the type. Latter on, it was recognized as a distinct species by Costa-e-Silva (2000 unpublished), and identified on several Brazilian herbaria sheets. Like C. *curvispina*, the name *C. pernambucensis* was never validly published.

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were consulted (CEPEC, EAC, HST, HUEFS, IPA, JPB, MBM, PEUFR, RB, UFP, UFRN); and Rhudson Cruz for preparing the illustrations.

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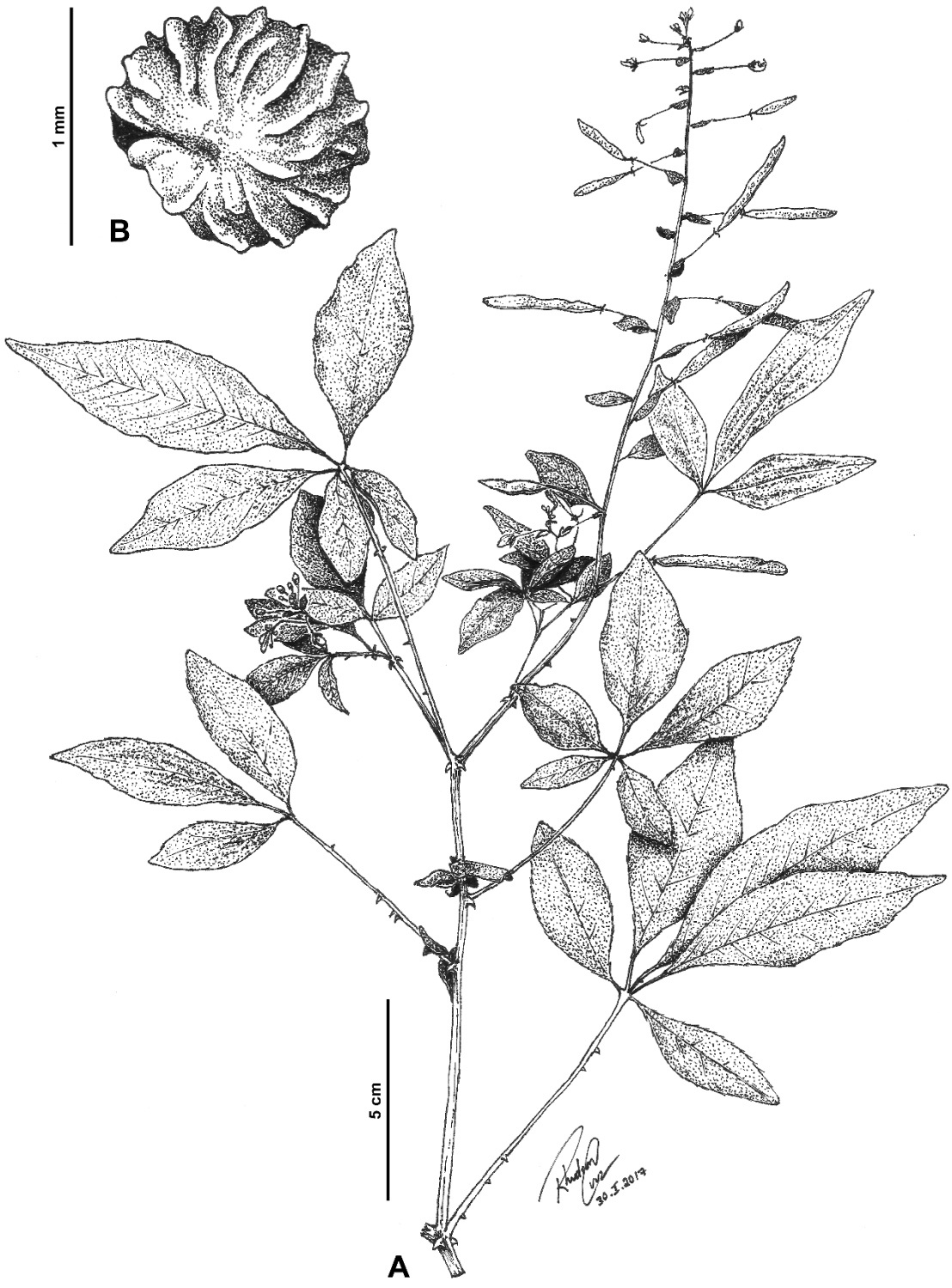

Figure 1. a–b: *Tarenaya curvispina*. a. Habit with flowering and fruiting branch; b. Seed.

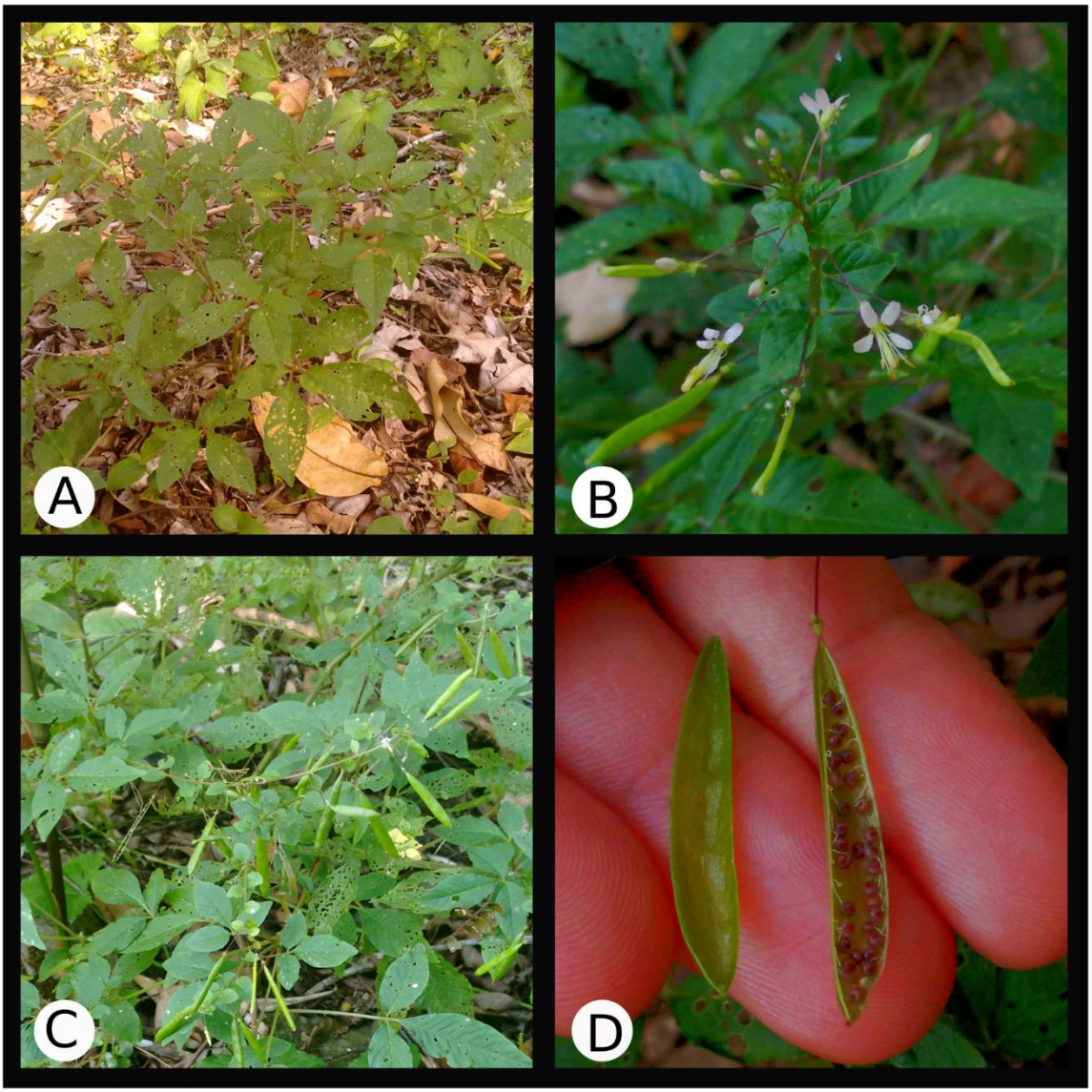

Figure 2. a–d: *Tarenaya curvispina*. a. Overview of the habit; b. Detail of inflorescence highlighting the flowers and the foliaceous bracts; c. Fruits branching; d. Open silique with seeds in maturation.

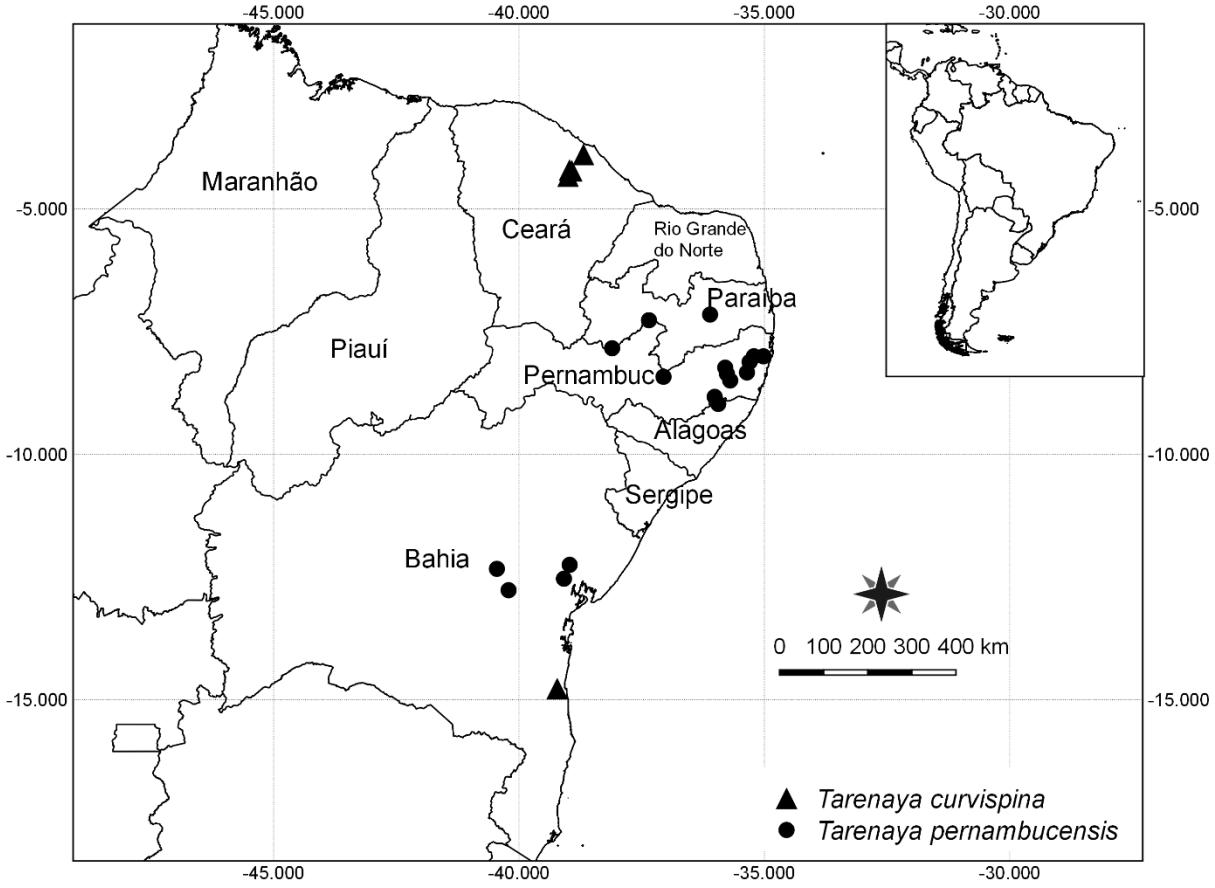

Figure 3. Geographic distribution map of *Tarenaya curvispina* and *T. pernambucensis*.

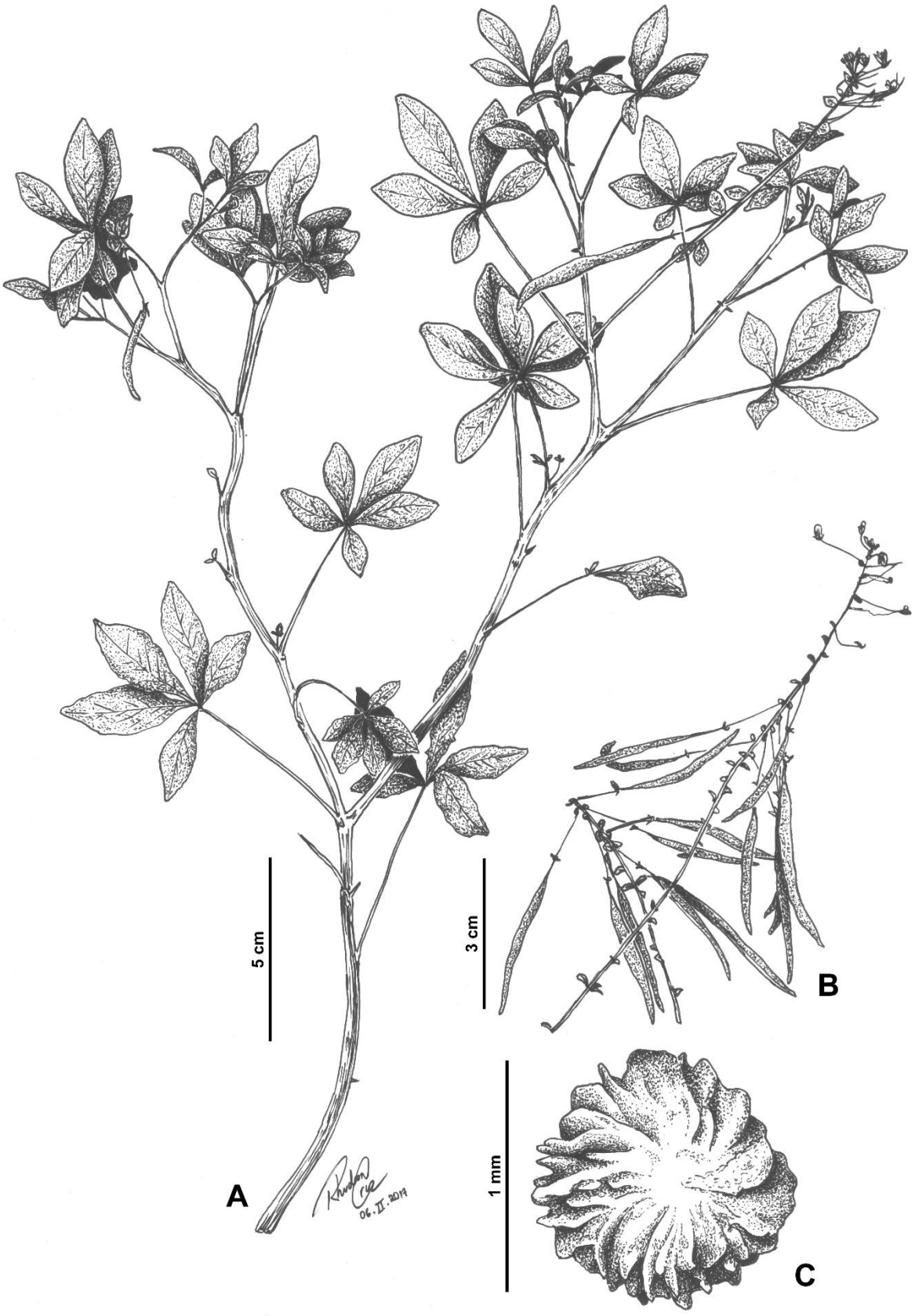

Figure 4. a–c: *Tarenaya pernambucensis*. a. Habit and flowering branch; b. Details of flowering and fruiting branch, highlighting the deflexed fruits; c. Seed.

APÊNDICE B – ARTIGO PUBLICADO NO PERIÓDICO *ACTA BOTANICA BRASILICA*

New combinations and taxonomic notes for *Tarenaya* (Cleomaceae)

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Abstract

Tarenaya includes 37 species based on its current circumscription, but only 10 species have names in the genus. Based on hypothesized phylogenetic relationships and on the stipular spine synapomorphy, we present 25 new combinations for those species without names in *Tarenaya*. We further refine the typification of 13 *Tarenaya* species. Ten lectotypes and three neotypes are designated here. One generic synonym is also typified.

Keywords: *Cleome*, *Hemiscola*, nomenclature, *Tarenaya*, type

Introduction

Tarenaya Raf. was segregated from *Cleome* L. by Rafinesque (1838) with one species, *T. spinosa* (Jacq.) Raf. (based on *Cleome spinosa* Jacq.), because he did not agree with the broad concept of *Cleome*. He based his proposal on the habit, type of leaf, number of leaflets, number of stamens, presence and morphology of nectaries, length of gynophore, and geographic distribution. *Tarenaya* was generally not adopted in taxonomic treatments and was instead considered to be a synonym of *Cleome* for the next ~170 years. In 1952, when Iltis [unpublished] revised the New World *Cleome* species, the genus was treated as a section, *Cleome* sect. *Tarenaya*, comprising 24 species and characterized by spines and prickles of

epidermal origin (characters not shared by three species and one subspecies, currently recognized under *Cleoserrata* Iltis and unarmed forms in various species), seeds with an aril and a large cleft. Later, Jacobs (1960), Iltis (1967), Iltis & Zapata (1997), and Costa-e-Silva (2000) used *Tarenaya* informally in their classifications, and the name was finally formally established as a section by Iltis (2005) when he described a new species of *Cleome* from the Andes. By that time Iltis (2005) considered section *Tarenaya* to comprise a group of 40 species from the New World and one from East Africa.

The recognition of *Cleome* as a paraphyletic genus (Hall *et al*. 2002; Sanchez-Acebo 2005; Hall 2008; Inda *et al*. 2008; Feodorova *et al*. 2010, Patchell *et al*. 2014) has led to the deconstruction of *Cleome s.l.*, and consequently multiple genera have been segregated and reorganized (Iltis & Cochrane 2007, 2014, 2015; Cochrane & Iltis 2014; Roalson *et al*. 2015; Thulin & Roalson 2017; Barrett *et al*. 2017; Roalson & Hall 2017; Soares Neto *et al*. 2017), including *Tarenaya* (Iltis & Cochrane 2007). This taxonomic reorganization was based on morphology, chromosome number, and phylogenetic relationships, and specific nomenclatural recombinations were made for Flora of North America (Iltis & Cochrane 2007) and Flora Mesoamericana (Iltis & Cochrane 2014, 2015).

The *Tarenaya* clade is defined by an easily recognized synapomorphy: a pair of spines at the base of the petioles (stipular spines) and is well supported in all phylogenetic studies of the family (Hall *et al*. 2002; Sanchez-Acebo 2005; Hall 2008; Inda *et al*. 2008; Feodorova *et al*. 2010, Patchell *et al*. 2014; Barrett *et al*. 2017). Not all of the presumed species of *Tarenaya* have been sampled for molecular phylogenetic studies, but based on those sampled to date, and on the stipular spine synapomorphy, *Tarenaya* comprises 37 species. *Hemiscola* Raf., another segregate genus recognized by Iltis & Cochrane (2007), shares the stipular spines and is embedded within *Tarenaya*. For these reasons, the unification of these genera in a broader concept of *Tarenaya* has been proposed (Feodorova *et al*. 2010, Patchell *et al*. 2014). Its species range from Mexico to Argentina, except for one species found exclusively in East Africa (Iltis 2005; Iltis & Cochrane 2015).

Despite broad agreement that *Tarenaya* should be recognized at the generic level, only 10 of the 37 species thought to belong to the genus have had names established in *Tarenaya* (Iltis & Cochrane 2007, 2014; Arana & Oggero 2016; Soares Neto *et al*. 2018). In addition to these species, two new species are being described (Soares Neto *et al*. in prep.). In this study, we present 25 new combinations for those species hypothesized to be part of the *Tarenaya* lineage, but that do not have nomenclatural combinations within *Tarenaya*. We also include

combinations necessary to include *Hemiscola* with *Tarenaya*. Ten lectotypes, three neotypes, and one typification of a generic name are provided to stabilize the nomenclature discussed here.

Materials and Methods

Type specimens that have been examined in person by the authors are annotated with exclamation marks. Images of type specimens examined online are annotated as "[image!]", and a barcode number, if available, is given. Original protologues were studied for all names treated here.

Results and Discussion

***Tarenaya* Raf.**, Sylva Tellur. 111. 1838. Type: *Tarenaya spinosa* (Jacq.) Raf., Sylva Tellur. 111. 1838. *Cleome spinosa* Jacq., Enum. Syst. Pl. 26. 1760. *Cleome* sect. *Tarenaya* (Raf.) Iltis, Novon 15(1): 146. 2005.

=*Hemiscola* Raf., Sylva Tellur. 111. 1838. Type: *Hemiscola aculeata* (L.) Raf., Sylva Tellur. 111. 1838. *Cleome aculeata* L., Syst. Nat., ed. 12. 3: 232. 1768.

=*Scolosperma* Raf., Sylva Tellur. 111. 1838. Type: *Scolosperma dendroides* (Schult.f.) Raf., Sylva Tellur. 111. 1838. *Cleome dendroides* Schult.f., Syst. Veg., ed. 15 bis [Roemer & Schultes] 7(1): 28. 1829.

=*Lianodes* Kuntze, Lex. Gener. Phaner. 129. 1903. nom. nud., nom. inval.

=*Neocleome* Small, *p.p.*, Man. S.E. Fl. 577. 1933. Type, designated here: *Neocleome spinosa* (Jacq.) Small, Man. S.E. Fl. 577. 1933. *Cleome spinosa* Jacq., Enum. Syst. Pl. 26. 1760.

Notes—Small (1933), when delimiting the genus *Neocleome*, made two new combinations, *N. spinosa* and *N. serrata*, but did not designate a type species for the new genus. One of these species is now placed in *Tarenaya* (*N. spinosa*), but the other (*N. serrata*) is assigned to the genus *Cleoserrata*. We believe Small intended to include in *Neocleome* a broader diversity of *Tarenaya* (he states: "… about 70 species, natives, mainly, of tropical regions.") and we therefore typify *Neocleome* based on *Tarenaya spinosa*.

Herbs to subshrubs or shrubs, annual or perennial, branched from the base; pubescent to puberulent-glandular indument at branches or totally glabrous; stipular spines at the base of petioles; leaves palmately-compound with 3–7(–12) leaflets; racemes corymbiform, flowers bracteate, the lower with leaf-like bracts with 3–5 leaflets, becoming 1-foliolate in the

inflorescence axis; flowers tetramerous, zygomorphic petals unguiculate, white or white becoming pink or purplish at apex, pink to purplish, or a pair of each color; nectary annular; stamens 6, elongated by a short androgynophore enrolled by the nectary; mature capsules cylindrical, ellipsoid, fusiform, oblanceoloid, sessile or short to long elongated stalks; seeds horseshoe-shaped, longitudinally striate and transversely ridged, cleft covered by a membrane attaching both tips (cotyledonar and radicular "claws").

1. ***Tarenaya aculeata*** (L.) Soares Neto & Roalson, comb. nov. *Cleome aculeata* L., Syst. Nat., ed. 12. 3: 232. 1768. Type: Habitat in America, *D. Zoega s.n.* (lectotype, designated by Al-Shehbaz (1988): BM-LINN 850.17 [image!]). ≡ *Hemiscola aculeata* (L.) Raf., Sylva Tellur. 111. 1838.

2. ***Tarenaya afrospina*** (Iltis) Soares Neto & Roalson, comb. nov. *Cleome afrospina* Iltis, Amer. J. Bot. 54(8): 955. 1967. Type: REPUBLIC CONGO. Environs Coquilhatville, Ile du Fleuve [du R. Congo], 28 September 1928 [1925], *W. Robyns 767* (holotype: BR 88677575 [image!]; isotypes: BR 8867063, [image!], BR 88677070 [image!], BR 8867520 [image!], GH GH00042345 [image!], K K000230602 [image!], US US00100469 [image!]).

3. ***Tarenaya atropurpurea*** (Schott) Soares Neto & Roalson, comb. nov. *Cleome atropurpurea* Schott, in Schreib. Nachr. Oestr. Naturf. 1: 129. 1820. Type: BRAZIL. Sine loco, *H.W. Schott s.n.* (lectotype, designated here: W 0060314 [image!]). Additional syntype: BRAZIL. Rio de Janeiro, *H.W. Schott 4442* (W 0060315 [image!]).

= *Cleome dendroides* Schult.f., Syst. Veg., ed. 15 bis 7(1): 28. 1829. *Cleome arborea* Weinm., Syll. Pl. Nov. 1: 227. 1824, nom. illeg., non *C. arborea* Schrad. 1821. Neotype, designated here: t. 3296 in Curtis's Botanical Magazine, v. 61, ser. 2: v. 8. 1834. ≡ *Scolosperma dendroides* (Schult.f.) Raf., Sylva Tellur. 111. 1838.

Notes—The species commonly known as *Cleome dendroides* requires the application of an older name. Here we make the combination *Tarenaya atropurpurea*, as *Cleome atropurpurea* is the oldest name for this taxon. Iltis considered this name "nom. subnud." as annotated on the syntype *Schott 4442*; however, Schott clearly presents a diagnosis of this species with his publication of *Cleome atropurpurea*. For this reason, we apply that name here. There are two original collections of Schott at W, and we designate W 0060314 as the lectotype as it is the more complete specimen with leaves and flower buds. The other syntype material is of

significant importance, though, as it includes mature fruits, which are lacking from the lectotype.

Cleome arborea Weinm. was described based in an individual cultivated in the Horto Imperiali Paulowskiensi, near St. Petersburg, from seeds from Brazil. Schultes *filius* (1829) renamed *Cleome arborea* as *C. dendroides*, taking into account the earlier homonym, *C. arborea* Kunth. Schultes *filius* cited one collection of Weinmann's, probably the type, which was not found in LE nor in any other herbarium. Hooker (1834) in Curtis's Botanical Magazine presented notes about this *Cleome*, improving its description and also presenting a beautiful illustration highlighting the stipular spines, purple flowers, fruits, and seeds. This illustration is here chosen as the neotype for this name.

4. ***Tarenaya bicolor*** (Gardner) Soares Neto & Roalson, comb. nov. *Cleome bicolor* Gardner, London J. Bot. 2: 330. 1843. Type: BRAZIL. [Rio de Janeiro] Organ Mountains, hab. in open rocky and cultivated places, April 1837, *G. Gardner 309* (lectotype, designated here: BM BM000573983 [image!]; isolectotypes: E E00326206 [image!], E E00326207 [image!], F, G G00226190 [image!], G G00226191 [image!], GH 00042326 [image!], K K000220447 [image!], K K000220448 [image!], P P00076106 [image!], NY 00215151!, US 00100471 [image!], WIS 0258903!).

Notes—*Gardner 309* has a large number of known duplicates designated only as "typus" without any herbarium holding a clear holotype. Many of these specimens are good representatives of the species, bearing flowers and mature fruits, characters useful in recognizing this species. The specimen BM000573983, however, is from the Gardner herbarium and is labeled with Gardner's handwriting and, therefore, is being designated as the lectotype.

5. ***Tarenaya boliviensis*** (Iltis) Soares Neto & Roalson, comb. nov. *Cleome boliviensis* Iltis, Novon 15(1): 147. 2005. Type: BOLIVIA. La Paz: "Plantae Andium Boliviensium, Prov. Larecaja, vicinus Sorata, Challapampa, ad rivum, in schistosis, Reg.[ion] temp[lada], 2600 m, September 1857– January 1958", *G. Mandon 938* (holotype: WIS 0258904!, isotypes: BM, F, G G00226276 [image!], G G00226277 [image!], GH 00042328 [image!], K K000220474 [image!]; LE 00001884 [image!], LE 00001885 [image!], LPB, MPU 013699 [image!], MPU 013700 [image!], NY!, P P00076103 [image!], P P00741914 [image!], P P00741915 [image!], PR, S S-R-7312[image!], W, WIS 0258905!).

6. ***Tarenaya chapalensis*** (Iltis) Soares Neto & Roalson, comb. nov. *Cleome chapalensis* Iltis, Bol. Inst. Bot. Univ. Guadalajara 5: 428. 1998. Type: [MEXICO. Michoacán] Wet roadsides and shallow water courses, on road to La Barca, 1/3 km N of the R.R., station at Zamora, 19°58'N, 102°16'W, 1520 m, 29 July 1960, *H.H. Iltis et al. 490* (holotype: WIS WIS0258906!, isotypes: BM BM000629040 [image!], ENCB, F [image!], G, GH 00042307 [image!], GUADA, IBUG IBUG0001788 [image!], IEB 000157790 [image!], K K000220427 [image!], LE, LIL, MEXU 00140923 [image!], MICH 112011 [image!], MO 107291!, MSC, NY 00387673!, SMU, TEX, UC 1332256 [image!], US, WIS WIS0258910!, WIS0258907!, WIS0259808!, WIS0258909!, WIS0258912!, WIS 0258911!, WIS0258913!, XAL XAL0106658 [image!], ZEA).
7. ***Tarenaya crenopetala*** (A.DC.) Soares Neto & Roalson, comb. nov. *Cleome crenopetala* A.DC., Mém. Soc. Phys. Genève 6(1): 220. t. 2. 1833. Lectotype, designated here: t. 2. in DC. & A.DC., Cinq. notice sur. les pl. rares du Jardin de Genève, Mém. Soc. Phys. Genève 6 (1). 1833).

Notes—According to the protologue, the description of this species was based on an individual growing in the gardens of Geneva from seeds from Uruguay. No specimen was found in any herbaria matching the type, and, therefore, the illustration presented together with the original description is being here designated as the lectotype.

We are also correcting here the authorship of *Cleome crenopetala* that has been erroneously attributed to Augustin de Candolle, but was in fact described by Alphonse de Candolle, as can be seen at the end of the original description.

8. ***Tarenaya diffusa*** (Banks ex DC.) Soares Neto & Roalson, comb. nov. *Cleome diffusa* Banks ex DC., Prodr. 1: 241. 1824. Type: BRAZIL. Rio de Janeiro: v. s. in h. Banks (holotype: BM BM000573979 [image!]). ≡ *Cleome aculeata* var. *diffusa* (Banks ex DC.) Kuntze, Revis. Gen. Pl. 3(3): 7. 1898. ≡ *Hemiscola diffusa* (Banks ex DC.) Iltis, Novon 17(4): 448. 2007.

9. ***Tarenaya domingensis*** (Iltis) Soares Neto & Roalson, comb. nov. *Cleome domingensis* Iltis, Brittonia 10: 56. 1958. Replaced name: *Cleome erosa* Urb., Symb. Antill. (Urban) 7(2): 224. 1912, nom. illeg., non *Cleome erosa* (Nutt.) Eaton, 1836. Type: DOMINICAN REPUBLIC. [Santo Domingo] Hab. in Sto. Domingo ad Rio Jimenoa, 1190 m alt., in margine sylvarum, May 1910, *H. von Türckheim 3303* (holotype: B B100242710 [image!]; isotype: NY 00074435!).

10. ***Tarenaya eosina*** (J.F.Macbr.) Soares Neto & Roalson, comb. nov. *Cleome eosina* J.F.Macbr., Publ. Field Mus. Nat. Hist., Bot. Ser. 4: 170. 1929. Replaced name: *Cleome*

microcarpa Hassl., Repert. Spec. Nov. Regni Veg. 12: 254. 1913, nom. illeg., non *Cleome microcarpa* Ule 1908. Type: PARAGUAY. Bella Vista, *E. Hassler 11013* (holotype: G; isotype: MPU MPU013707 [image!]).

11. ***Tarenaya guaranitica*** (Chodat & Hassl.) Soares Neto & Roalson, stat. & comb. nov. *Cleome rosea* Vahl ex DC. var. *guaranitica* Chodat & Hassl., Bull. Herb. Boissier, sér. 2, 3: 797. 1903. Type: PARAGUAY. Chololo: ad marginem silvae, in valle fluminis Y-aca, December 1900, *E. Hassler 6707* (holotype: G G001064449 [image!]; isotypes: B B100242716 [image!], BM BM000537896 [image!], G G00106446 [image!], G G00106447 [image!], G G00106448 [image!], K K000220457 [image!], NY 00215161!, P P00076111 [image!], S S-R-7343 [image!], WIS WIS0259073!; WIS0259074 [frag!]). ≡ *Cleome guaranitica* Briq., Annuaire Conserv. Jard. Bot. Genève 17: 371. 1914.
12. ***Tarenaya horrida*** (Mart. ex Schult.f.) Roalson & Soares Neto, comb. nov. *Cleome horrida* Mart. ex Schult. & Schult.f., Syst. Veg., ed. 15 bis 7(1): 32. 1829. Type: BRAZIL. Espírito Santo: Itapemirim, *Prinz Max. von Neuwied s.n.* (lectotype, designated here: BR 698551 [image!], isolectotypes: BR 698580 [image!]; WIS 0258937!). ≡ *Cleome spinosa* L. f. *horrida* (Mart. ex Schult. & Schult. f.) Eichler, Fl. Bras. 13(1): 253. 1865. ≡ *Cleome spinosa* Jacq. var. *horrida* (Mart. ex Schult. & Schult. f.) Fawc. & Rendle, Fl. Jamaica 3: 226. 1914.

Notes—Two specimens at BR are annotated as the holotype. Both are from the same collection by Prinz Max. von Neuwied and so are presumed syntypes. We here designate BR 698551 as the lectotype because it has both flowers and fruits on it, both of which are necessary for distinguishing *T. horrida* from closely related species.

13. ***Tarenaya houstonii*** (R.Br.) Soares Neto & Roalson, comb. nov. *Cleome houstonii* R.Br. Hort. Kew., ed. 2 [W.T. Aiton] 4: 131. 1812. Lectotype, designated here: t. 45. in Martyn, Hist. Plant. Rar. v. 5, 1736.

Notes—*Cleome houstonii* was described based on *Sinapistrum indicum*, which was described based on plants grown from seeds from Cuba and cultivated in England by Houston in the year 1730. Although de Candolle (1824) cited dried material from Jamaica, and Grisebach (1864) also cited a material collected by Houston from Jamaica, no specimen has been found for this collection. The illustration presented with the description of *Sinapistrum indicum* is a good plate highlighting a branch with bud, flowers, and fruits and provides details of the petals, stamens, and ovary. This plate provides all of the characters necessary to recognize the species and is therefore here designated as the lectotype.

14. ***Tarenaya inermis*** (Malme) Soares Neto & Roalson, comb. nov. *Cleome inermis* Malme, Ark. Bot. 22A, no. 7: 5. 1928. Type: BRAZIL. Rio Grande do Sul: Cachoeira, in silvula clara, 10 January 1902, *G. Malme II 1041* (lectotype, designated here: S S-R-7321 [image!]; isolectotypes: B B 10 0242693 [image!], S S10-16936 [image!], WIS 0258939!, WIS 0258940!).

Notes—There are two type collections of *Malme 1041* in S, and therefore one needs to be designated the lectotype. We designate S-R-7321 as the lectotype as it is more mature, having expanded inflorescences and mature fruits.

15. ***Tarenaya latifolia*** (Vahl ex DC.) Soares Neto & Roalson, comb. nov. *Cleome latifolia* Vahl ex DC., Prodr. 1: 239. 1824. Type: [GUIANA] In Guiana, v. s. in h. Vahl. (neotype, designated here: French Guiana, 1858, *P.A. Sagot 1170*, P P00076114 [image!]; isoneotypes: GOET [photo at WIS], P P00745091 [image!], P P00076129 [image!]).

Notes—De Candolle described *Cleome latifolia* based on a specimen seen in the Vahl herbarium; however, we have found no records of such specimen in C (Olof Ryding, pers. comm.), nor in G-DC. Given such, we are designating as the neotype *Sagot 1170*, one of the specimens studied by Eichler (1865) for *Flora Brasiliensis* and Iltis (1952) in his revision of New World *Cleome*.

16. ***Tarenaya microcarpa*** (Ule) Soares Neto & Roalson, comb. nov. *Cleome microcarpa* Ule, Engl., Bot. Jarhb. Syst. 42: 201. 1908. Type: BRAZIL. Piauhy [Piauí]: Catinga der Serra Branca, January 1907, *E. Ule 7428* (lectotype, designated here: HBG HBG-522391 [image!]; isolectotypes: B B 10 0242701 [image!], K 000220462 [image!], F neg 5766 [image!]).

Notes—HBG-522391 is being designated as lectotype, because of the two collections seen by Ule, the collection at HBG is the one labeled as "*Cleome microcarpa* s. nv.", while the specimen at B was labeled first as "*Cleome viridiflora* s. nv." (crossed off) and later as *C. chlorantha* s. nv. (ined.).

17. ***Tarenaya psoraleifolia*** (DC.) Soares Neto & Roalson, comb. nov. *Cleome psoraleifolia* DC., Prodr. 1: 239. 1824. Type: BRAZIL. v. s. in h. Mus. Par. [*A. Ferreira s.n.*] (holotype: P P00141286 [image!]).
18. ***Tarenaya regnellii*** (Eichler) Soares Neto & Roalson, comb. nov. *Cleome regnellii* Eichler, Vidensk. Meddel. Naturhist. Foren. Kjøbenhavn 190: 1870. Type: BRAZIL. Ad Caldas in

prov. Minas Geraës [Minas Gerais], *A.F. Regnell coll. III n. 147* (lectotype, designated here: BR 698554 [image!]; isolectotypes: B B 10 0242684 [image!], BR 698555 [image!], F neg. [image!], K K000220449 [image!], LD 1314574 [image!], LE 00001896 [image!], S (2 sheets) [image!], WIS 0259069!, WIS 0259070!).

Notes— We here designate specimen BR 698554 as the lectotype for several reasons. The B specimen label bears three names, each in a different script, entered in the sequence *Cleome rosea*, *C. polygama* (scratched), and then *C. regnellii*, the latter in a fancy penmanship that does not appear to be that of Eichler. On that label in this same calligraphy also appears a full citation of the place of publication of Eichler's species, making it unlikely that this annotation pre-dated the publication of his 1870 paper. These facts impede the selection of the B specimen as lectoype. However, two sheets in BR, BR 698554 and BR 698555, are annotated as *C. regnellii* in Eichler's handwriting. Eichler, who with Urban completed the Flora Brasiliensis, certainly saw Martius's herbarium, which included specimens collected by many others and which is now at BR. For these reasons, it seems plausible that the BR collections, having been seen by Eichler, are the proper type material. BR 698554 is a better, more complete specimen than BR 698555 and is therefore chosen as the lectotype.

19. ***Tarenaya rosea*** (Vahl ex DC.) Soares Neto & Roalson, comb. nov. *Cleome rosea* Vahl ex DC., Prodr. 1: 239.1824. Type: [BRAZIL. Rio de Janeiro] Ad Rio-Janeiro Brasiliae. v. s. in. h. Juss., *P. Commerson 255* (holotype: P P00671649!).

20. ***Tarenaya siliculifera*** (Eichler) Soares Neto & Roalson comb. nov. *Cleome siliculifera* Eichler, Fl. Bras. 13(1): 260. 1865. Type: [BRAZIL. Minas Gerais] Prov. Minarum: Habitat prope Cocaes et in Serra dos Pinheiros, [1839], *J. Pohl s.n.* (lectotype, designated here: BR 698586 [image!] ; isotypes: F (frag. + neg.) [image!], G G00226314 [image!], M M-0010385 [image!], LE, W [image!], WIS 0259077!).

Notes—As with the type of *C. regnellii* above, it is most likely that the BR specimen represents material used by Eichler, and we therefore lectotypify *C. siliculifera* with BR 698586.

21. ***Tarenaya titubans*** (Speg.) Soares Neto & Roalson, comb. nov. *Cleome titubans* Speg., Anales Soc. Ci. Argent. 15: 97. 1883. Type: ARGENTINA. [Buenos Aires] Província Bonaërensi: Inter dumeta in paludosis secus, "el Rio de la Plata", loco dicto "las Conchas", May 1881, *C.L.* Spegazzini *s.n.* (neotype, designated here: ARGENTINA. Buenos Aires,

Quilmes, loc. Bernal, March 1973, *F.M. Rodríguez 191*, SI 066837 [image!]; isoneotype: SI 066836 [image!]).

Notes—The Spegazzini type collection at LP does not appear to include the type of *Cleome titubans*, as expected. Costa-e-Silva (2000) also referenced her inability to find the type of this species for her review of Brazilian *Cleome*. Because no original material of *C. titubans* has been found among Spegazzini's collections, a neotype is designated here.

22. ***Tarenaya torticarpa*** (Iltis & T. Ruiz Zapata) Soares Neto & Roalson, comb. nov. *Cleome torticarpa* Iltis & T. Ruiz Zapata, Novon 7(4): 367. 1997. Type: VENEZUELA. Estado Falcón: Distrito Federación, Parque Nacional Cueva de la Quebrada el Toro, 10°50'N, 69°07'W, en selva de galería, bajo sombra, 200 m abajo de la "toma de agua" en la estácion del Parque, 600 m, 29 October 1983, *Thirza Ruiz Zapata & Teo Ruiz 4138* (holotype: MY; isotypes: COL, F, K, MER, MO!, NY NY00387680!, NY NY00345549!, US, VEN, WIS WIS0259083!, WIS0259084!, WIS0259085!).

23. ***Tarenaya trachycarpa*** (Klotzsch ex Eichler) Soares Neto & Roalson, comb. nov. *Cleome trachycarpa* Klotzsch ex Eichler, Fl. Bras. 13(1): 252. 1865. Type: [BRAZIL] Habitat in Brasilia austro-orientali, *Sello* [*F. Sellow*] *2059* (holotype: B 10 0242688 [image!]). ≡ *Cleome psoraleifolia* DC. var. *trachycarpa* (Klotzsch ex Eichler) Kuntze, Revis. Gen. Pl. 3(3): 7. 1898.

24. ***Tarenaya virens*** (J.F.Macbr.) Soares Neto & Roalson, comb. nov. *Cleome virens* J.F.Macbr., Candollea 5: 360. 1934. Type: PERU. Loreto: La Victoria on the Amazon River, August-September 1929, *L. Williams 2596* (holotype: F [image!]; isotype: G G00226308 [image!]).

25. ***Tarenaya werdermannii*** (Alf.Ernst) Soares Neto & Roalson, comb. nov. *Cleome werdermannii* Alf.Ernst., Notizbl. Bot. Gart. Berlin-Dahlem 13: 378. 1936. Type: BOLIVIA. Depto. Sta. Cruz: Missiones Guarayos-Sta. Cruz de la Sierra, ca. 250–300 m ü. M., October 1926, *E. Werdermann 2597* (lectotype, designated here: B B10 0242682 [image!]; isolectotypes: B B10 0242698 [image!], LPB [image!], MO 1000057!, S [image!], WIS WIS0259089 [frag.]!).

Notes—Both specimens of *Werdermann 2597* at B are good representatives for this species, but B 100242682 is chosen as the lectotype, because it is labeled "typus" in Ernst's hand.

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APÊNDICE C – ARTIGO ACEITO PARA PUBLICAÇÃO NO PERIÓDICO

SYSTEMATIC BOTANY

A well-known “mussambê” is a new species of *Tarenaya* (Cleomaceae) from South America

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Introduction

Tarenaya spinosa (Jacq.) Raf. (=*Cleome spinosa* Jacq.) is the most common and broadly applied name for those species of Cleomaceae which show a pair of spines at the base of the petiole and large flowers (Iltis 1967). This name, however, has been misapplied since the 18th century (Iltis 1952). The spider-flower, *Tarenaya hassleriana* (Chodat) lltis, a species native to South America and widely cultivated as an ornamental around the world, is one of the species most frequently wrongly identified as *T. spinosa* (Iltis 1967).

Cleome spinosa was proposed by Jacquin (1760) based on a specimen from Jamaica with 5–7-foliolate leaves, white flowers, and six stamens. The original description of this species is quite simple, with few specific diagnostic characters, and those presented overlapping when compared to descriptions of other *Cleome* L. species. In 1763 Jacquin provided a beautiful illustration of this species, making it possible to correctly identify the species. Since then, new species of *Cleome* have been described for Central America and the West Indies, many of which were later considered synonyms of *Cleome spinosa* (e.g., *C. heptaphylla* L., *C. pubescens* Sims., *C. pungens* Willd.).

The misapplication of the name *Cleome spinosa* on herbarium labels for many Neotropical *Cleome* species caught the attention of Iltis (1952) during his review of the New World *Cleome*. He noticed the confusion regarding the identity of those species as distinct and

tried to resolve what he called the "catch-all" *Cleome spinosa* complex. Characters of seed, flowers, fruits, and geographic distribution were used by him to distinguish species that had been incorrectly identified as *C. spinosa*: *C. horrida* Mart. ex Schult. f. (=*Tarenaya horrida* (Mart. ex Schult. f.) Roalson & Soares Neto); *C. lilloi* S.A. Gómez (=*T. lilloi* (S.A. Gómez) Arana & Oggero); *C. boliviensis* Iltis (=*T. boliviensis* (Iltis) Soares Neto & Roalson); *C. domingensis* Iltis (= *T. domingensis* (Iltis) Soares Neto & Roalson) and *C. chapalensis* (=*T. chapalensis* (Iltis) Soares Neto & Roalson). Furthermore, he redefined *C. spinosa* and separated it from *C. hassleriana* Chodat (=*T. hassleriana* (Chodat) Iltis).

Iltis (1952) considered *Cleome spinosa* a highly polymorphic species and recognized, but never published, four morphologically distinct subspecies with essentially allopatric distributions: *C. spinosa* subsp. *spinosa* (= *Tarenaya spinosa* s.s.), ranging from Mexico through Central America, the West Indies, Venezuela, Colombia and Ecuador; *C. spinosa* subsp. *longicarpa* Iltis, ined., occurring, according to him, in Brazil, Venezuela, Guyana, and French Guiana; *C. spinosa* subsp. *macrosperma* Iltis, ined. (= *T. costaricensis* (Iltis) Iltis), endemic to Costa Rica, and *C. spinosa* subsp. *werdermannii* (Alf. Ernst) Iltis, ined. (=*T. werdermanii* (Alf. Ernst) Soares Neto & Roalson), endemic to Bolivia. The main characteristics used by Iltis to distinguish the subspecies were the color of petals, the ratio of the length of the mature fruit and that of the gynophore, and the size of seeds. He also pointed out that, due to the existence of individuals with intermediate characteristics, he was not sure enough to treat these taxa as distinct species. For many years, therefore, he annotated herbarium labels with his informal and unpublished subspecies, until he published the first of his unpublished *C. spinosa* subspecies as a species (Iltis 2005): *Cleome costaricensis* Iltis (= *Tarenaya costaricensis* (Iltis) Iltis). Despite Iltis' intention, this procedure contributed a lot to the confusion about the identity of *Cleome spinosa* hereinafter.

The results of modern molecular phylogenetic studies (Inda *et al*. 2008, Feodorova *et al*. 2010) supported *T. chapalensis, T. domingensis, T. boliviensis, T. hassleriana, T. spinosa, T. longicarpa*, and *T. werdermannii* as distinct lineages. *Tarenaya costaricensis, T. horrida*, and *T. lilloi* were not sampled in these studies. Furthermore, during an ongoing taxonomic review of *Tarenaya* (Soares Neto et al., unpubl. data), several specimens of these taxa were analyzed, and demonstrate clear morphological differences that distinguish them as separate species.

The new species of *Tarenaya* from South America we present here is supported by phylogenetic and morphological data. It has been well-known in the field for a long time and

was recognized by Iltis as one of his unpublished subspecies. We also provide comments about its affinities, geographic distribution, an illustration, and a taxonomic key to identify the species related to the *Cleome spinosa* complex.

Material and Methods

Morphological description was based on traditional taxonomic methods. To perform this study, specimens from the following herbaria were analyzed: ALCB, ASE, BHCB, CEPEC, CVRD, EAC, ESAL, FLOR, HUEFS, HUESB, ICN, IPA, JPB, MBM, MBML, MO, NY, PACA, PEUFR, R, RB, TEPB, UESC, UFRN, UPCB, VIES, and WIS, following Thiers (2018, continuously updated), and HST, not indexed.

Taxonomic treatment

Tarenaya longicarpa Soares Neto & Roalson, sp. nov. **TYPE** — BRAZIL. Ceará: [Aquiraz] Waste places on banks of Rio Pacoty, 6 km S of Aquiraz, fl., fr., 15 October 1935, *F. Drouet 2615* (holotype MO 247740!; isotypes F V0053152F [image!], GH 00042343 [image!], IPA!, US, WIS!).

Species morphologically related to *Tarenaya spinosa* and characterized by a puberulent-glandular indument covering the branches, petioles, leaves and sepals, sticky when fresh; racemes corymbiform, exceeding 1 m in length; sepals green, deflexed; petals usually white, sometimes becoming pink at apex; stamens purple; mature fruits linear-cylindrical, two to three times the length of gynophore.

Herb to subshrub 0.5 to 2.5 m tall, highly branched; branches usually puberulent-glandular to glabrescent, very sticky when fresh. Stipular spines straight, 1.5–2 × 1–1.5 mm. Leaves 5–7-foliolate; petioles puberulent-glandular to glabrescent, unarmed, 3.5–8 cm long; leaflets lanceolate or narrowly elliptic to elliptic, basally long attenuate, apically acute to acuminate, membranaceous, with scattered, short-pointed, eglandular or glandular hairs on both faces, the veins without prickles, the margin minutely serrulate-ciliate, the central leaflet 6.7–7.8 × 1.8–2 cm, the outermost leaflet 2–5.5 × 0.8–1.7 cm; petiolule densely puberulent, 3–8 mm long. Racemes corymbiform, terminal, up to 1.0 m long, the basal portion with leaf-like bracts each with 3–5-leaflets, many of these bracts not subtending flowers, apically becoming densely flowered. Bracts densely distributed along raceme, the distal ca. 60% subtending flowers, each bract 1-foliolate; petiole glabrous, 1–5 mm long, without prickles at base; blade

ovate to cordiform, apically acute, basally rounded or cordate, the margin serrulate-ciliate, 4–17 × 2–10 mm. Pedicels puberulent-glandular to glabrescent, 25–35 mm long, purple. Sepals lanceolate, apically acuminate, puberulent to glabrescent abaxially, the margin ciliate, 8–10 × 0.5–1 mm, greenish, deflexed. Petals unguiculate, the claw 5–10 mm long, the blade oblong, apically obtuse, 9–20 × 4–8 mm, glabrous, essentially white, purple, or white becoming purple near apex. Nectary conic, obsolete. Filaments 35–50 mm long, glabrous, purplish; anthers 8–12 mm long, yellowish to brown. Ovary linear-cylindrical, glabrous; gynophore 15–35 mm long; style not elongated; stigma capitate, sessile. Fruit subtended by a gynophore of 4.5–7 cm long; mature capsule linear-cylindrical, 11–19.5 cm long, ascending, glabrous, rarely puberulent to glabrescent, usually 2–3 times longer than the gynophore. Seeds horseshoe-shaped, ca. 1–1.2 × 1 mm, finely longitudinally striate, pronouncedly transverse ridged, cleft narrow, covered by a porous membrane. Figure 1.

***Distribution and habitat*—**Species known from Brazil and Bolivia. In Brazil, it is widespread distributed through the Northeast, mainly in the dry deciduous thorn-scrub or *caatinga*. Easily found planted or escaped in urban centers, in disturbed areas, waste disposal areas, around lakes or along water and sewage treatment channels. Also occurs in semideciduous forests, riparian forests, along riversides, roadsides, and in Igapó forests in the Amazonia.

Etymology—Epithet based on the longer mature capsules and gynophore.

Phenology—Flowers and fruits all the year.

Uses—Used as an ornamental and medicinally. The roots, when cooked, are used against asthma and bronchitis (*M.F. Agra 541*). A tea made from its flowers is used against coughs (*V.L. Nascimento & C.F. Martins 7*). The juice from leaves is used for earaches (*A. Furlan CFCR 365*).

Vernacular names—Known as *catinga de negro*, *mussambê de espinhos*, and *sete-Marias* (*Grupo Pedra do Cavalo 830*). It is also called *estaladeira* (*G. Teixeira 2571*), *murrambi* (*A. Fernandes & E. Nunes* EAC 25724), *muçambê* (*M. Ataíde et al. 669*), *mussambê* (*J.M. Negreiro 15*), and *mussambê branco* (*E.P. Guedes 54*).

Notes—*Tarenaya longicarpa* resembles *T. spinosa* as both species share the highly branched herb to subshrub habit, long corymbiform racemes, green deflexed sepals, usually white petals, and purplish staminal filaments. However, *T. longicarpa* has no prickles on the

petioles (vs. inconspicuous to many slender to stout prickles on the petioles), has large petals (claw/blade: 5–10 mm long/ 9–20 × 4–8 vs. 4–8 mm long/ 7–15 × 3–5 mm) and gynophores (4.5–7 cm long) and fruits (11–19.5 cm long) longer than those of *T. spinosa* (1.5–5 cm long and 5–12 cm long, respectively). Furthermore, *T. longicarpa* has an allopatric distribution with *T. spinosa*, ranging from Paraná through Acre, Brazil, and adjacent Bolivia, while *T. spinosa* ranges from Mexico through Central America, to the north of South America (Venezuela and Colombia) and West Indies.

Eichler (1865) and Grisebach (1864) already had observed that the Brazilian specimens of "*Cleome spinosa*" showed differences in the gynophore length and mature fruits when compared to specimens of *C. spinosa* from the West Indies and Central America. Nevertheless, until now, the name *C. spinosa* was applied to several Brazilian specimens.

Tarenaya longicarpa also can be confused with *T. hassleriana*, a highly branched subshrub, with a pubescent-glandular indument on stems, petioles, inflorescence axes, and sepals. However, *T. hassleriana* has prickles on the petioles, longer corymbiform racemes, with a pair of prickles at the base of each petiole of the bracts; pink or purple petals, and a fruit/gynophore ratio of ca. 1:1 (Table 1). The two species have allopatric distributions.

Additional Specimens Examined—**Bolivia.** PANDO: Nicolas Suarez, Cobija, 16 Oct 1988, *St. G. Beck 17030* (MO, WIS). **Brazil.** ACRE: Brasiléia, Reserva Extrativista Chico Mendes, 10˚51'S 68˚48'W, 28 Oct 1991, *L. Ferreira & L.C. Ming 99* (NY); Cruzeiro do Sul, Estrada do aeroporto da cidade, fl., 19 Oct 1984, *C.A.C. Ferreira et al. 5164* (MO, NY, WIS); Rio Branco, INPA, Rio Branco building, old airport terminal, 5 Oct 1980, *S.R. Lowrie 399* (MO, NY, RB, WIS); Sena Madureira, BR 364 trecho da Estrada entre Sena Madureira e Manoel Urbano, 29 Sep 1980, *C.A.C. Ferreira & B.W. Nelson 2609* (MO, NY, WIS). ALAGOAS: Maceió, Bairro do Barro Duro, 8 Nov 2006, *N. Larissa s.n.* (RB 631381); Pão de Açucar, Riacho Grande, 9°43'24"S 37°30'13"W, 23 Jun 2002, *R.P. Lyra-Lemos et al. 6920* (HUEFS); União dos Palmares, Fazenda Santo Antônio, 5 Jan 1964, *I.B. Pontual 54-64* (PEUFR). AMAZONAS: Benjamin Constant, Alto Solimões, 7 Sep 1962, *A.P. Duarte 6872* (PEUFR, RB); Boca do Acre, Rio Purus, beach on Rio Purus, 25 Sep 1966, *G.T. Prance et al. 2545* (NY, WIS); Humaitá, Madeira, 3 Sep 1923, *J.G. Kuhlmann 327* (RB); Manacapuru, 2 Feb 1963, *Lanna & Castellanos 494* (WIS). BAHIA: 26 km along road N of Urandi towards Guanambi, 22 Jan 1981, *R.M. King & L.E. Bishop 8589* (MO); Abaíra, Tijuquiho, subida do Garimpo da Mata, 13°16'S 41°54'W, 14 Nov 1992, *W. Ganev 1447* (HUEFS, NY); Abaré, 8°44'26"S 39°4'44"W, 1 Nov 2009, *E. Melo et al. 7035* (HUEFS); Andorinha, Sítio do Açude,

10°12’54”S 39°56’47”W, 18 Feb 2006, *F. França et al. 5476* (HUEFS); Anguera, Lagoa 6, Km 23, BA 052, 12˚10’S 39˚12’W, 8 Dec 1996, *F. França et al. 2026* (HUEFS, MBM); Barreiras, às margens do Rio de Ondas, 26 Oct 1965, *A.P. Duarte 9510* (RB, WIS); Bendengó, 2 km da cidade na direção a Uauá, 9°57’30”S 39°11’19”W, 23 Feb 2000, *A.M. Giulietti & R.M. Harley 1771* (HUEFS); Cachoeira, Vale dos Rios Paraguaçu e Jacuípe, 12˚32’S 39˚05’W, Oct 1980, *Grupo Pedra do Cavalo 830* (ALCB, EAC, HUEFS, RB); Campo Alegre de Lourdes, 9˚30’13”S 43˚2’40”W, 30 Sep 2005, *D. Cardoso et al. 851* (HUEFS); Canudos, Estação Ecológica de Canudos, 10°1’S 39°9’W, 20 Jun 2003, *F.H.M. Silva et al. 412* (HUEFS); Casa Nova, Fazenda Santárem, 9˚32’20”S 41˚21’31”W, 5 Oct 2003, *K.R.B. Leite et al. 408* (HUEFS, IPA); Conde, Sítio Conde, 25 Apr 1996, *E.C. Medeiros Neto s.n.* (EAC 31841); Curaçá, beira da estrada para a Serra da Natividade, 9°8’6”S 39°40’16”W, 12 Mar 2011, *E. Melo et al. 9342* (HUEFS); Entre Rios, 12°10’S 37°58’W, 6 Feb 2013, *A.V. Popovkin & J.C. Mendes 1349* (HUEFS); Feira de Santana, Rodovia Feira-Rio de Janeiro, Km 8, 19 Feb 1981, *A.M. de Carvalho 600* (ALCB, CEPEC, MBM, WIS); Iaçu, Rio Paraguaçu, 17 Jul 1982, *G. Hatschbach & O. Guimarães 45118* (MBM, MO, WIS); Itaberaba, margem do Rio Paraguaçu, 4 Jun 1995, *F. França et al. 1220* (HUEFS, MBM); Itiuba, margem do açude Jacurici, 10°43’S 39°51’W, 23 Oct 2001, *J.G. Nascimento & C. Correia 30* (HUEFS); Jaguarari, BR-407 entre Senhor do Bonfim e Juazeiro, 10˚6’11”S 40˚13’50”W, 19 Feb 2006, *E.B. Souza et al. 1512* (HUEFS); Jequié, Rod. BR 116 (Rio-Bahia), 19 Nov 1978, *S.A. Mori et al. 11228* (CEPEC, NY, WIS); Juazeiro, distrito de Massaroca, 9°50’53”S 40°18’5”W, 12 Jun 2009, *E. Melo et al. 6342* (HUEFS); Lagoa da Eugenia southern end and near Camaleão, 10°40’S 39°43’W, 20 Feb 1974, *R.M. Harley 16245* (EAC, IPA, MO); Malhada, Rod. BR-030, próximo ao trevo para Iuiú, 30 Oct 2004, *G. Hatschbach & E. Barbosa 78734* (ASE, MBM); Miguel Calmon, arredores da cidade, 11°25’S 40°36’W, 16 Jul 1985 *L.R. Noblick 3901* (HUEFS); Monte Santo, arredores da cidade, 18 Apr 2000, *R.P. Oliveira et al. 429* (HUEFS); Morpará, beira do Rio Paramirim, 11°33’S 43°16”W, 17 Dec 2007, *A.A. Conceição et al. 2731* (HUEFS); Mucugê, Parque Municipal de Mucugê, 24 Nov 2001, *E. Gallindo et al. 2* (HUEFS); Parnamirim, barragem de Zabumbão, 13°26’06”S 42°12’39”W, 6 Feb 1997, *B. Stannard et al. 5148* (ALCB, HUEFS); Paulo Afonso, Bairro of Vila Nobre, 6 Jun 1981, *S.A. Mori & B.M. Boom 14201* (CEPEC, NY, WIS); Pilão Arcado, caminho para Brejo do Zacarias, 10°0’9”S 42°30’35”W, 10 Nov 2005, *A.A. Conceição et al. 1576* (HUEFS); Remanso, estrada Remanso-Pilão Arcado, 9˚36’S 42˚6’W, 1 Dec 2003, *E.R. Souza & E. Gross 416* (HUEFS); Rodelas, ca. 4,5 km cidade, 8°52’53”S 38°55’24”W, 30 Oct 2009, *E. Melo et al. 6994* (HUEFS); Santa Terezinha, Serra do Jiboia, 12˚45’S 39˚32’W, 15 May 1999, *A.M. Giulietti & R.M. Harley 2537* (HUEFS); Serra

do Ramalho, ca. 18 km da entrada da cidade, 13˚30’38” 43˚45’8”W, 14 Apr 2001, *J.G. Jardim et al. 3465* (CEPEC, HUEFS, NY); Sobradinho, estrada para Santo Sé, 9˚32’40”S 40˚0’22”W, 22 Sep 2009, *E. Melo 6503* (ALCB, HUEFS); Tucano, Distrito de Caldas do Jorro, 1 Mar 1992, *A.M. Carvalho & D.J.N. Hind 3848* (CEPEC, MBML, MO, WIS); Uauá, caminho para distrito de Pilar, 9˚51’49”S 40˚5’42”W, 29 Mar 2000, *N.G. Jesus et al. 905* (ALCB, HUEFS, UESC); Valley of the Rio das Ondas, 5 Mar 1971, *H.S. Irwin et al. 31536* (MO, NY); Xique-Xique, Lagoa da Itaparica, 11°06’44”S 42°44’18”W, 19 Mar 1996, *E. Woodgyer et al. PCD 2549* (ALCB, HUEFS). CEARÁ: Km 443 of BR-116, 16 km N of Barro, just S of Paraíba boundary, 7°S 38°50’W, 13 Feb 1985, *Al Gentry et al. 50091* (EAC, MO, WIS); Sine loco, 24 Aug 1948, *A.P. Duarte 1469* (RB); Aiuaba, Estação Ecológica de Aiuaba, 6˚37’23”S 40˚11’56”W, 8 Oct 2013, *M.I.B. Loiola & F.A.L. Magalhães 2160* (EAC); Amontada, distrito Nascente, estrada Amontada-Morrinhos, 7 Sep 2013, *M.I.B. Loiola et al. 2093* (EAC); Aurora, açude Cachoeira, 9 Dec 2013, *A.J. Rangel 15* (EAC); Canindé, 24 Feb 1985, *F.S. Cavalcanti s.n.* (EAC 21939); Caridade, Fazenda Feijão Caridade, 19 Nov 1989, *B. Freitas s.n.* (EAC 16827); Caucaia, Parque Botânico do Ceará, 24 Sep 1997, *A. Fernandes & E. Nunes s.n.* (EAC 25724); Cratéus, Próximo a BR 226, 7 Mar 2010, *A.M.M. Carvalho s.n.* (EAC 46484); Crato, Açude Umari, 7˚06’04”S 39˚29’09”W, *A.C. Albuquerque et al. 50* (EAC); Fortaleza, Rio Siqueira, 31 Jan 2002, *E. Nunes s.n.* (EAC 30964); Guaramiranga, 24 Sep 1981, *F.S. Cavalcanti & F. Bruno s.n.* (EAC 10845); Iguatu, Sítio Sobreiro, 10 Jul 2010, *L.R.O. Normando et al. 511* (EAC); Independência, estrada para Quiterianópolis, 10 Apr 1998, *E.B. Souza s.n.* (EAC 26390); Ipaumirim, Sítio Bananeiras, 15 Feb 1958, *J.G. Oliveira s.n.* (EAC 1790); Ipu, Rio Acaraú, 25 Nov 2010, *J.R.A. Paiva & L.Q. Matias 13* (EAC); Irauçuba, Fazenda Cacimba Salgada, 5 May 2001, *A. Carvalho s.n.* (EAC 31763); Itaiçaba, Morro do Ereré 10 Apr 1982, *E. Nunes* (EAC11175); Itapipoca, Lagoa das Pedras, 31 May 2008, *H. Santos s.n.* (EAC 42777); Juazeiro do Norte, lagoa próximo ao Açude dos Carneiros, 7˚09’32”S 39˚19’53”W, 13 Jun 2015, *A.C. Albuquerque et al. 82* (EAC); Lavras da Mangabeira, açude Rosário, 7 Nov 2012, *A.S. Dias s.n.* (EAC 54023); Milagres, 20 Jan 2010, *J.R. Andrade et al. 293* (PEUFR); Missão Velha, 23 Mar 2008, *L.K.P. Dutra 3761* (EAC, HCDAL); Morada Nova, Fazenda Lagoa do Meio, 9 Mar 2009, *A.S. Silva 60* (HUEFS); Pacujá, 19 Dec 2007, *P.M. Teixeira 48* (HUEFS); Parambu, Fazenda Pau Preto, 23 May 1982, *E. Nunes s.n.* (EAC 11492); Pedra Branca, BR 020, 27 Apr 1981, *P. Martins* (EAC 101222); Quixadá, Horto de plantas medicinais do IFCE, 5 Dec 2013, *J.M. Negreiro 15* (EAC); Reriutaba, no sangradouro do açude Araras, 13 Apr 1979, *A.J. Castro s.n.* (EAC 5669); Santa Quitéria, CE 032, Km 165 Sobral-Canindé, 15 Jun 1979, *J. Coradin et al. 1965* (PEUFR); São Gonçalo do Amarante, Dunas do Pecém, 13 Mar 2004, *A.V. Vieira & M.F. Lima s.n.* (EAC

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Taxonomic key to the species of *Tarenaya* related to the *Cleome spinosa* complex

1. Leaflets broadly obovate, less frequently oblanceolate, apically obtuse-apiculate, margin ciliate; petals claw 15–18 mm long, blade 30–33 × 8–12 mm; filaments 9.5–11 cm long; stigma truncate; Paraguay ……...……. ***T. lilloi***

1'. Leaflets narrowly elliptic, elliptic to oblanceolate, oblanceolate-elliptic, apically acute, acuminate to long acuminate, margin minutely serrulate-ciliate to serrulate-ciliate; petals claw 2–13 mm, blade 7–25 × 4–12 mm; filaments 2–7.5 cm long; stigma capitate or discoid; Mexico, Central America, West Indies, Venezuela, Colombia, Brazil and Bolivia …… 2

2. Leaflets without prickles on the midrib and/or secondary veins ……...…… 3

3. Blade of petal obovate; nectary persistent in the fruit; Dominican Republic …..……...…..……***T. domingensis***

3'. Blade of petal oblong-elliptic; nectary not persistent in the fruit; from Mexico to Brazil and Bolivia ……...…...……. 4

4. Capsules fusiform, up to 5.5 cm long; Mexico ……...…. ***T. chapalensis***

4'. Capsules linear-cylindrical, 5–19.5 cm long; Mexico to West Indies, Venezuela and Colombia, Brazil and Bolivia …….. 5

5. Petioles unarmed; blade of petal 9–20 × 4–8 mm; filaments 23–55 mm long; anthers 8–12 mm long……..…… ***T. longicarpa***

5'. Petioles armed; blade of petal 7–15 × 2.5–5 mm; filaments 20–33 mm long; anthers 6–9 mm long …….…. 6

6. Leaflets sessile; sepals linear-triangular; style conspicuous; mature capsules glabrous; Bolivia …….…….. ***T. werdermannii***

6'. Leaflets on a 1–4 mm long petiolule; sepals lanceolate; style inconspicuous; mature capsules densely puberulent; Mexico to West Indies, Venezuela and Colombia …….….***T. spinosa***

2’. Leaflets with prickles on the midrib and/or secondary veins ……..……. 7

7. Plants glabrescent or essentially glabrous; margin of leaflets serrate; pedicels 15–20 mm long; filaments up to 25 mm long; gynophore 20–25 mm long; Costa Rica and Panama ……..…..……. ***T. costaricensis***

7’. Plants pubescent-glandular to glabrescent, pilose-glandular; margin of leaflets serrulate-ciliate; pedicels 20–50 mm long; filaments 40–75 mm long; gynophore 35–80 mm long; Brazil, Bolivia, Argentina, Paraguay and Uruguay …… 8

8. Bracts lanceolate to elliptic, apically mucronate, basally cuneate; sepals 7–10 mm long; capsules puberulent-glandular; Bolivia, Peru and Ecuador …...….. ***T. boliviensis***

8’. Bracts ovate or cordate, apically acute, basally obtuse to cordate; sepals 5–7 mm long; capsules glabrous; Brazil, Argentina, Paraguay and Uruguay ……... 9

9. Stipular spines straight; stigma discoid; Brazil (Bahia to Rio Grande do Sul), Argentina, Paraguay and Uruguay, widespread cultivated ……..... ***T. hassleriana***

9’. Stipular spines curved; stigma capitate; Brazil (Bahia, Minas Gerais, Espírito Santo and Rio de Janeiro) ..... ***T. horrida***

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Table 2. Comparative table of diagnostic characteristics for *T. hassleriana, T. longicarpa* and *T. spinosa*.

	Tarenaya hassleriana	*Tarenaya longicarpa*	*Tarenaya spinosa*
Petiole	Pubescent-glandular, usually armed with slender to stout straight prickles or unarmed	Puberulent-glandular, unarmed	Puberulent-glandular, sparsely armed with few slender to stout, straight to curved prickles
Leaflet shape	Elliptic to oblanceolate	Lanceolate or narrowly elliptic to elliptic	Elliptic to oblanceolate-elliptic
Pedicels	Pubescent-glandular, 20–50 mm long	Puberulent-glandular to glabrescent, 25–35 mm long	Puberulent-glandular 15–30 mm long
Petals, claws, blade length	8–13 mm long, 18–20 × 7–8 mm	5–10 mm long, 9–20 × 4–8 mm	4–8 mm long, 7–15 × 3–5 mm
Stamen length; anther length	50–70 mm long; 8–11 mm long	35–50 mm long; 8–12 mm long	21–33 mm long; 6–9 mm long
Fruit length	5–10 cm long	11–17(–19.5) cm long	5–12 cm long
Gynophore length	4–8 cm long	4.5–7 cm long	1.5–5 cm long
Seed length	2–2.5 × 1.5–2 mm	1–1.2 × 1 mm	1.5–2 ×1–1.2 mm

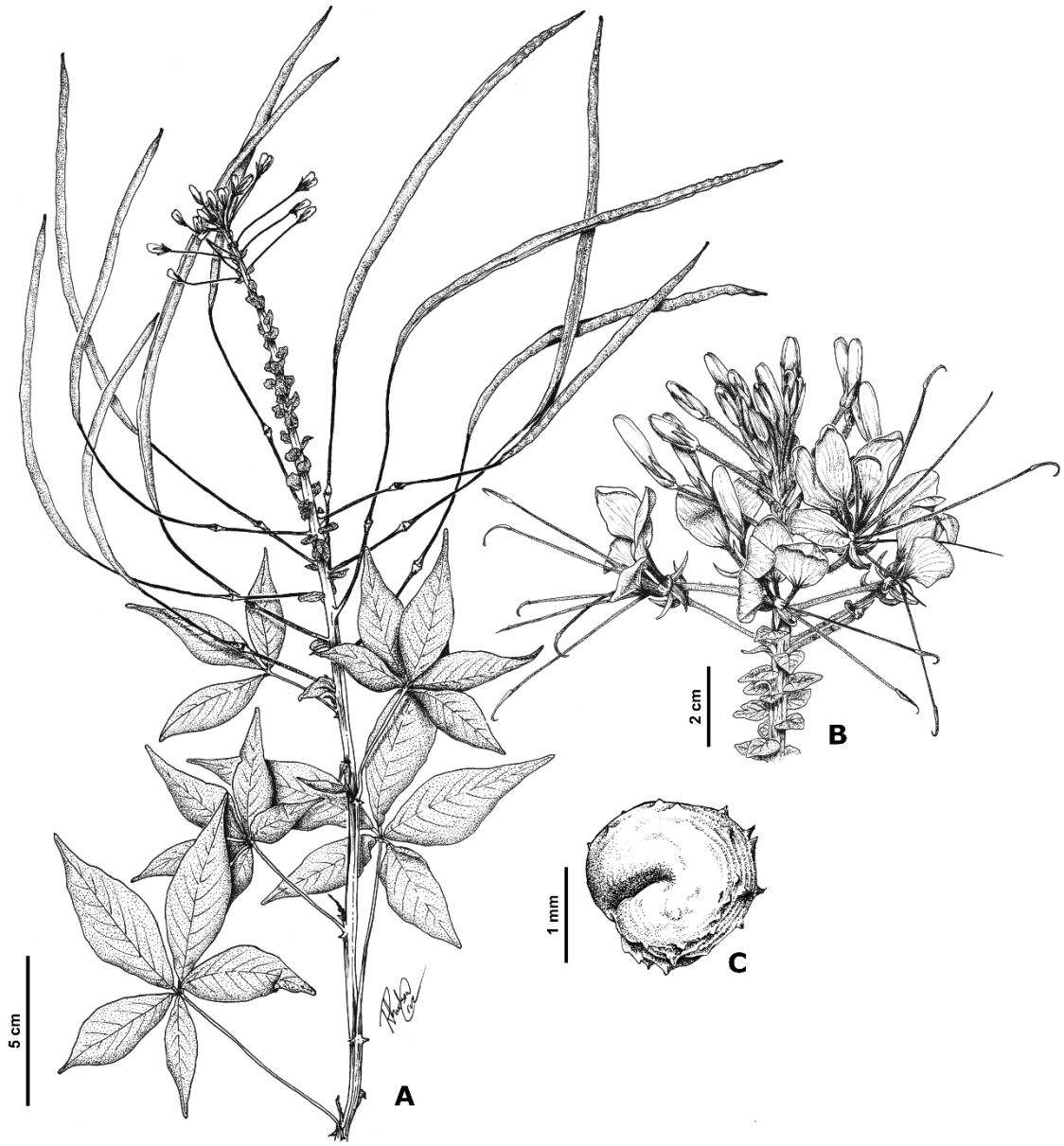

Figure 9. *Tarenaya longicarpa* Soares Neto & Roalson. A. Fruiting branch with mature capsules. B. Detail of the inflorescence highlighting the bracts, bud and open flowers. C. Seed.

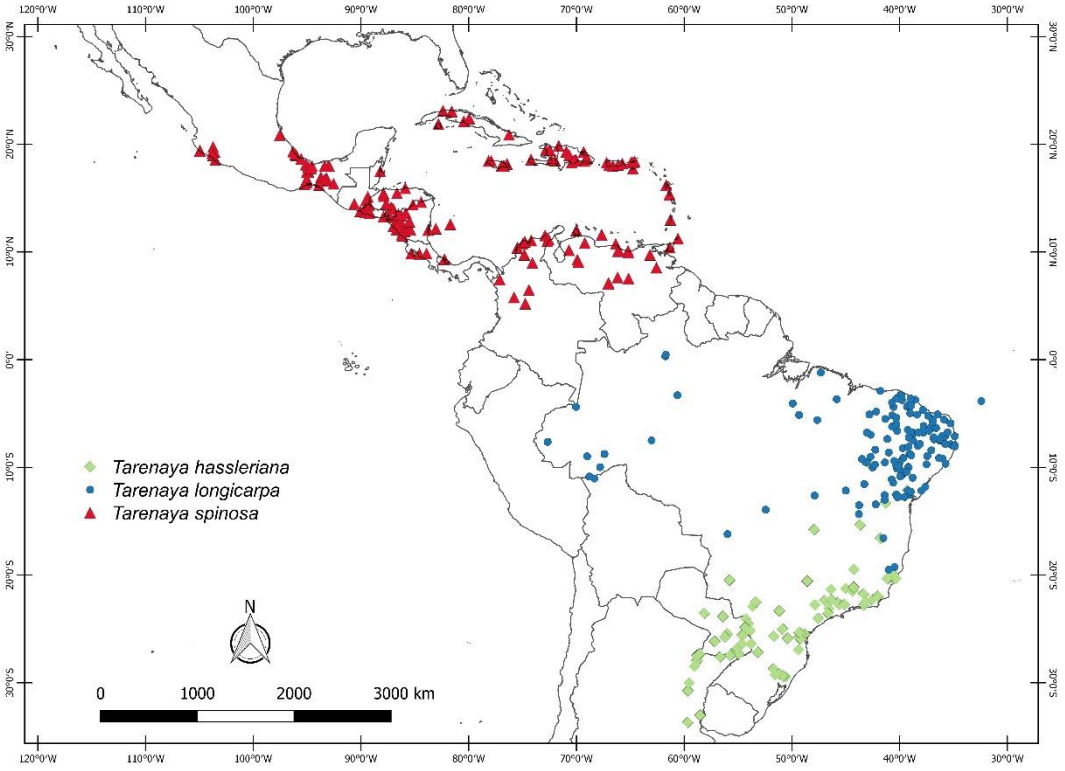

Figure 2. Distribution map of *Tarenaya longicarpa*, *T. hassleriana*, and *T. spinosa*.

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