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Sistemática de *Asemeia* Raf. *emend.* Small (Polygalaceae)

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Sistemática de *Asemeia* Raf. *emend.* Small (Polygalaceae)

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RESUMO

A família Polygalaceae (ordem Fabales) compreende 30 gêneros e cerca de 1.260 espécies distribuídas mundialmente, com exceção das regiões polares no planeta e alguns desertos. Polygaleae, a tribo mais numerosa em Polygalaceae, é considerada monofilética e caracterizada por suas corolas trímeras, que às vezes apresentam duas pétalas rudimentares. Polygaleae compreende 22 gêneros, passando nas últimas décadas por uma profunda redelimitação genérica, uma vez que *Polygala*, anteriormente polifilético, foi segregado em diversos gêneros, incluindo *Asemeia*. Esta tese inclui estudos sistemáticos em *Asemeia* com abordagens filogenéticas, revisão taxonômica, e um minucioso estudo morfológicos, como também revisão nomenclatural dos táxons e nomes relacionados ao gênero. Os resultados destes estudos estão apresentados em seis capítulos. Os dois primeiros capítulos (I e II) apresentam sete novas espécies de *Asemeia* descritas para o Cerrado brasileiro. O capítulo III, apresenta uma filogenia molecular de *Asemeia*, na qual foram amostradas 32 das 36 espécies do gênero, muitas dessas com multiacesso. O estudo filogenético foi baseado nos *loci* plastidiais *trnK–matK* (parcial) e *trnL–F* e nos espaçadores nucleares ribossomal a) ITS 1 e ITS 2 (Internal Transcribed Spacer), incluindo a região codificante 5.8S, e b) uma porção do ETS (External Transcribed Spacer). O capítulo IV apresenta uma revisão do nome *Polygala ovata*, onde é apresentada uma reinterpretação deste que conduz a uma combinação nova, *Hebecarpa ovata*, com uma nova tipificação. O capítulo V, é uma ampla revisão taxonômica do gênero *Asemeia*, incluindo a descrição de dois novos subgêneros: *Longipedicelata* e *Wurdackia* (além dos já conhecidos *Asemeia* e *Apopetala*) e duas novas seções no subgênero *Asemeia*: *Striata* e *Purpurea*, e também no subgênero *Asemeia*, a seção *Hebeclada* e a seção típica, *Asemeia*. A revisão de *Asemeia* inclui revisão nomenclatural, com tipificação de todos os nomes envolvidos e eventuais notas nomenclaturais e históricas, e taxonômica. Para a revisão taxonômica foram conduzidos extensos estudos morfológicos, os quais resultaram em pranchas fotográficas detalhadas para todas as espécies. Além disso, foram apresentadas chaves taxonômicas e eventuais notas sobre a morfologia, distribuição, ecologia e taxonomia para as espécies estudadas, além de uma nova espécie, *Asemeia cipoensis*, e duas novas combinações em *Asemeia*, *A. decumbens* e *A. impensa*. Acompanha a revisão mapas de distribuição para todas as espécies de *Asemeia*. Por fim, o capítulo VI apresenta uma proposta de alteração do código internacional de nomenclatura botânica.

Palavras-chave: Cerrado; filogenia; *Hebeclada*; neotrópicos; Polygalaceae.

ABSTRACT

The family Polygalaceae (order Fabales) comprises 30 genera and around 1,260 species distributed worldwide, with exception of the polar and desert regions of the planet. Polygaleae, the most numerous tribe within Polygalaceae, is considered monophyletic and characterized by its trimerous corollas, which sometimes exhibit two rudimentary petals. Polygaleae includes 22 genera and has undergone a profound generic redelimitation in recent decades, as *Polygala*, previously polyphyletic, was segregated into various genera, including *Asemeia*. This thesis includes systematic studies on *Asemeia*, involving phylogenetic approaches, taxonomic revision, and a meticulous morphological study, as well as nomenclatural revision of taxa and names related to the genus. The results of these studies are presented in six chapters. The first two chapters (I and II) describe seven new species of *Asemeia* found in the Brazilian Cerrado. Chapter III presents a molecular phylogeny of *Asemeia*, with 32 of the 35 species in the genus sampled, many with multiple accessions. The phylogenetic study was based on the plastidial loci *trnK–matK* (partial) and *trnL–F*, as well as on the nuclear ribosomal spacers ITS1 and ITS2 (Internal Transcribed Spacer), including the coding region 5.8S and a portion of the ETS (External Transcribed Spacer). Chapter IV provides a revision of the name *Polygala ovata*, introducing a new interpretation leading to a new combination, *Hebecarpa ovata*, and a new typification of this name. Chapter V is a comprehensive taxonomic revision of the genus *Asemeia*, including the description of two new subgenera: *Longipedicelata* and *Wurdackia* (in addition to the known *Asemeia* and *Apopetala*) and two new sections in the subgenus *Asemeia*: *Striata* and *Purpurea*. In this section, *Hebeclada* and the typical section, *Asemeia*, are also discussed. The *Asemeia* revision encompasses nomenclatural review, with typification of all the involved names and occasional nomenclatural and historical notes, as well as taxonomic considerations. Extensive morphological studies were conducted for the taxonomic revision, resulting in detailed photographic plates for all species. Additionally, taxonomic keys and occasional notes on morphology, distribution, ecology, and taxonomy for the studied species are provided, including a new species, *Asemeia cipoensis*, and two new combinations for *Asemeia*, *A. decumbens* and *A. impensa*. Distribution maps for all *Asemeia* species accompany the revision. Finally, Chapter VI presents a proposal to amend the International Code of Botanical Nomenclature.

Keywords: Cerrado; *Hebeclada*; neotropic; Polygalaceae; phylogeny.

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1 INTRODUÇÃO GERAL

A família Polygalaceae possui 30 gêneros e cerca de 1.260 espécies (Pastore et al. 2017, Mota et al. 2019, Pastore et al. 2023), distribuídas por quase toda a superfície terrestre, exceto por certas regiões desérticas ou gélidas do planeta. A família é considerada monofilética e pertence à ordem Fabales (APG IV 2016). Esta família está dividida em quatro tribos, Carpolobieae B.Eriksen, Diclidanthereae Reveal, Xanthophylleae Baill. e Polygaleae Chodat (Eriksen & Persson 2007, Reveal et al. 2012). A tribo Polygaleae é monofilética e apresenta flores que lembram as flores papilionáceas das leguminosas. Entretanto, em Polygalaceae a carena é formada por uma única pétala e as alas são sépalas petaloides, enquanto em Fabaceae a carena é formada pela fusão de 2 pétalas e as alas são pétalas laterais (Judd et al. 1999, Persson 2001). Além disso, pode ser caracterizada pelas corolas trímeras (eventualmente apresentando 2 pétalas rudimentares).

A tribo Polygaleae compreende 22 gêneros e, dentre os mais relevantes em número de espécies, encontra-se *Polygala* L., que na sua circunscrição mais conhecida era polifilético, e do qual diversos gêneros foram recentemente segregados, tais como: *Acanthocladus* Klotzsch ex Hassk. (Pastore & al. 2010), *Caamembeca* J.F.B.Pastore (Pastore 2012), *Gymnospora* (Chodat) J.F.B.Pastore (Pastore & Moraes 2013), *Hebecarpa* (Chodat) J.R.Abbott (Abbott & Pastore 2015), *Senega* Spach (Pastore et al. 2023), e dentre estes, o gênero *Asemeia* Raf. emend. Small (Pastore & Abbott 2012).

1.2. Contexto histórico

O nome *Asemeia* possui uma longa história até sua consolidação como nome correto. O nome que deu origem a *Asemeia*, *Polygala senega* var. *rosea* Michx. (= *Asemeia grandiflora* (Walter) Small), foi publicado por Michaux (1803) como uma variedade de *Polygala senega*. Historicamente, *Polygala senega* L. (= *Senega officinalis* Spach) eventualmente foi associado a *Asemeia grandiflora* devido ao tamanho relativamente grandes das flores. No entanto, considerando que ambas as espécies possuem pouca afinidade morfológica, é possível que essa associação tenha surgido de uma interpretação equivocada de Michaux sobre a identidade de *Polygala senega* L. Desta forma, não é surpreendente que a variedade *rosea* de Michaux, para *Polygala senega*, tenha sido reconhecida como espécie independente por Muhlenberg (1813), sob o nome de *P. pubescens* Muhl., uma vez que o epíteto “*rosea*” já estava ocupado (por *Polygala rosea* Desf., 1798). Entretanto, devido à maneira como Muhlenberg (1813) organizou sua obra, o epíteto “*pubescens*” foi apresentado de forma enigmática na expressão

‘*Polygala pubescens rosea* Mx’. Enquanto que, na segunda edição de sua obra, a intenção de Muhlenberg (1818) sobre sua “*Polygala pubescens*” fica mais clara quando o gênero e epíteto específico, i.e. “*Polygala pubescens*”, são apresentados em uma linha acima de “*rosea* Mx”. Assim, a validade de *Polygala pubescens* Muhl. foi defendida por Pastore & Mota (2018) (Este tema foi revisitado no capítulo VI, resultando em uma proposta de mudança no código Internacional de Algas Plantas e Fungos com base na instabilidade acerca da validade de *Polygala pubescens* Muhl.). Apesar deste histórico já conturbado, Rafinesque (1833), em uma aparente tentativa de esclarecer a situação, inclui alguns nomes de Polygalaceae em seus controversos tratamentos, ampliando consideravelmente os problemas taxonômicos e nomenclaturais envolvendo de *Polygala pubescens*/*P. senega* var. *rosea*. Rafinesque (1833, 1836) descreveu o gênero *Asemeia*, incluindo *Asemeia rosea* Raf. (= *Asemeia grandiflora* (Walter) Small), mas a delimitação genérica é confusa e inclui dois nomes enigmáticos: *A. carnea* Raf. e *A. alba* Raf., os quais, até o momento não foi possível identificar a identidade (a complexidade em interpretar *Asemeia* de Rafinesque é discutido em detalhes no capítulo V, na revisão de *Asemeia*). Assim, o nome genérico, *Asemeia*, foi relegado por quase 100 anos. Desta maneira, o nome *Asemeia* é ignorado por Chodat (1891, 1893) no tratamento mais completo e abrangente já feito dentro da família Polygalaceae. Nesta obra, *Monographia Polygalacearum*, Chodat (1893) delimitou *Polygala* L. seção *Hebeclada* Chodat, que posteriormente foi elevada a subgênero por Blake (1916). Apenas um século após a sua publicação original, *Asemeia* é finalmente delimitado por Small de forma a coincidir com sua delimitação atual. Isso justifica a atribuição de autoria a Rafinesque *emendavit* Small nas obras contemporâneas. No entanto, a obra de Small (1933) incluiu apenas os nomes de espécies dos Estados Unidos, enquanto a maioria das espécies, atualmente em *Asemeia* permaneceram em *Polygala* (seção/subgênero *Hebeclada*) e a delimitação genérica proposta por Small (1933), amplamente ignorada (Aguiar et al. 2008). Após estudos filogenéticos iniciados por Persson (2001), revelando *Polygala* s.l. (sensu Chodat 1893) com sendo formada por várias linhagens independentes, ou seja, polifilético, a revisão na delimitação tradicional do gênero *Polygala* volta a ser questionada. Assim, Pastore & Abbott (2012), dentro de um esforço de apresentar uma delimitação genérica para as diferentes linhagens *Polygala*, ‘ressucitam’ o nome genérico *Asemeia* e apresentam as combinações de todas as espécies então reconhecidas por eles, para este gênero.

1.3. Justificativa

Apesar dos relativamente recentes estudos de Bernardi (2000), Aguiar et al. (2008) e Pastore & Abbott (2012) em *Asemeia* (antes *Polygala* subg./seção *Hebeclada*), é notável a ausência de estudos revisionais e morfológicos, considerando que este grupo historicamente já apresentava problemas de circunscrição específica e questões nomenclaturais. Entre os problemas taxonômicos, o mais desafiador ‘*Asemeia ovata* (Poir.) J.F.B.Pastore & J.R.Abbott’ (sensu Pastore & Abbott 2012) (Este nome é revisado no capítulo IV desta tese), o qual não apenas envolve problemas nomenclaturais como delimitação elusiva, com diversos morfotipos (discussão presente no capítulo V, revisão de *Asemeia*). Além desse caso, a delimitação específica de *Asemeia hebeclada* (DC.) J.F.B.Pastore & J.R.Abbott foi motivo de disputa histórica entre autores, os quais reconheceram *A. rhodoptera* (Mart. ex A.W.Benn.) J.F.B.Pastore & J.R.Abbott como sinônimo de *A. hebeclada* (Chodat 1893, Marques 1980, Bernardi 2000) ou aqueles que as consideram como espécies distintas (Bennett 1874, Wurdack 1971, Pastore 2014, Aguiar et al. 2008, Pastore & Abbott 2012). De fato, além dos morfotipos típicos dos nomes de *A. hebeclada* e *A. rhodoptera*, diversos morfotipos regionais que representavam espécies inéditas (Formalmente descritas, veja os capítulos I e II desta tese). Por fim, *Asemeia violacea* (Aubl.) J.F.B.Pastore & J.R.Abbott teve várias delimitações ao longo do tempo, a mais ampla incluindo desde *A. grandiflora*, dos Estados Unidos da América, até diversos nomes da América do Sul, como *A. hebeclada*, em contraste a delimitações mais restritas, como aquela apresentada por Pastore & Abbott (2012).

Em relação aos estudos filogenéticos, as relações filogenéticas em *Asemeia* eram majoritariamente desconhecidas, sendo que das 36 espécies atualmente aceitas, apenas quatro foram incluídas em estudos filogenéticos: *A. acuminata* (Willd.) J.F.B.Pastore & J.R.Abbott, *A. floribunda* (Benth.) J.F.B.Pastore & J.R.Abbott, *A. hebeclada* e *A. violacea* (Persson 2001, Pastore et al. 2017, Forest 2007 e Abbott 2009). Além dos estudos emblemáticos de Chodat (1893), chamado informalmente de ‘pai das Polygalaceae’, e da revisão de Aguiar et al. (2008), e a *sinopses* apresentada por Pastore & Abbott (2012) para apresentar as combinações em *Asemeia*, as espécies de *Asemeia* foram estudadas apenas no contexto de estudos florísticos (Coelho et al. 2008, Lima et al. 2018, Marques & Gil 2006, Pastore 2006). Assim esta tese constitui o primeiro estudo filogenético densamente amostrado de espécies, muitas delas com multiacesso, para o gênero *Asemeia* (estudo filogenético, apresentado no Capítulo III). Além disso, aspectos morfológicos dos membros de *Asemeia* eram apenas pobremente conhecidos, quando ilustrados, conhecidos apenas por ilustrações artísticas à naquim. Neste sentido esta tese ampliou consideravelmente o detalhamento morfológico conhecido das espécies de

Asemeia, por meio de pranchas fotográficas de alta resolução, coloridas e montadas sob um fundo preto (as primeiras deste tipo para o gênero *Asemeia*) para (quase) todas as espécies do gênero (apresentadas no capítulo V, para revisão do gênero). Além disso, a distribuição das espécies de *Asemeia* também eram apenas pobremente conhecidas, uma vez que a própria delimitação em grande parte, ambígua, como também a classificação infragenérica, em subgêneros como apresentada por Pastore & Abbott (2012), não era satisfatória e não contemplava a variação observada nos grupos de espécies, principalmente para subgênero *Asemeia* (senso Pastore & Abbott 2012) (este temas foram apresentados na revisão do gênero, capítulo V).

1.4. Objetivo geral

O objetivo geral desta tese foi realizar estudos sistemáticos no gênero *Asemeia* (Polygalaceae), incluindo filogenia molecular, revisão nomenclatural e taxonômica, com uma nova classificação infragenérica fundamentada nas relações filogenética e estudos morfológicos.

1.5 Objetivos específicos

- Apresentar uma hipótese robusta para as relações filogenéticas dos *taxa* do gênero *Asemeia* (Polygalaceae), por meio do sequenciamento de *loci* nucleares e plastídias, e amostragem multiacesso para as espécies, incluindo morfotipos e suas categorias infraespecíficas.
- Revisar os aspectos nomenclaturais de todos os nomes relacionados ao gênero *Asemeia*, incluindo as tipificações, com as eventuais decisões amparadas pelo contexto histórico e pelo vigente Código Internacional de Algas, Fungos e Plantas.
- Apresentar novidades nomenclaturais decorrentes das revisões dos nomes de *Asemeia*, incluindo novas combinações e, eventualmente, sugestões de mudanças no próprio Código Internacional de Algas, Fungos e Plantas.
- Inventariar o máximo de espécimes de *Asemeia* possível em herbários nacionais e internacionais atribuindo-lhe identificações consistentes com a classificação defendida nesta tese.
- Ampliar o conhecimento das espécies *in vivo*, com registros fotográficos, eventuais observações *in loco* sobre *habitat*, fenologia, estado de conservação, entre outros, os

quais estarão vinculados aos espécimes coletados, e assim aos outros estudos desta tese.

- Apresentar um minucioso estudo morfológico com descrições amplas acompanhadas de pranchas fotográficas de alta resolução coloridas de fundo escuro para todas as espécies de *Asemeia*.
- Produzir uma chave de identificação para os subgêneros e espécies de *Asemeia*.
- Compilar a distribuição geográfica do gênero, subgêneros e espécies, incluindo mapas detalhados para cada espécie e com notas sobre a distribuição geográfica e eventuais *insights* sobre a biogeografia da espécie.
- Apresentar novidades taxonômicas decorrentes dos estudos propostos, como novas espécies, seções, e subgêneros para *Asemeia*.

2. DESENVOLVIMENTO

2.1 Organização da tese

Esta tese é apresentada em seis capítulos, os quais foram delimitados em forma de artigos científicos publicados em revistas de prestígio internacional na área da botânica sistemática. Alguns capítulos, aqueles que tratam de temas mais restritos, foram publicados durante o período da tese, são estes os capítulos I, II e VI (manuscrito do capítulo IV está submetido). Os principais produtos desta tese, ou seja, a filogenia molecular e a revisão taxonômica, estrategicamente, aguardam a apreciação pela banca examinadora, antes de serem submetidos. A ordem dos capítulos desta tese foi escolhida de forma a dar consistência em relação à disponibilização de informações ao longo da leitura sequencial dos capítulos desta tese.

Os capítulos que compõe esta tese são: Capítulos I (publicado na revista *Systematic Botany*) e II (publicado na revista *Kew Bulletin*) descrição de sete novas espécies do gênero *Asemeia*, reconhecidas ao longo do período de elaboração desta tese. O Capítulo III inclui o manuscrito resultante do estudo filogenético-molecular de *Asemeia* Raf. emend Small. (Polygalaceae) (provisoriamente atribuído à revista *Systematic Botany*). O Capítulo IV revisita a taxonomia de *Polygala ovata* Poir. e propõe uma nova interpretação, identificando-a como o nome mais antigo para *Hebecarpa costaricensis* (Chodat) J.R.Abbott & J.F.B.Pastore. (Submetido à revista *Phytotaxa*). A revisão taxonômica do gênero *Asemeia* é apresentada no capítulo V, e inclui os resultados dos estudos morfológico, taxonômico, filogenético e nomenclatural em *Asemeia*. Nesta revisão são reconhecidos dois novos subgêneros (além de

Asemeia e *Apopetala*), e duas novas seções no subgênero *Asemeia*: seção *Purpurea* e seção *Striata* (Além das seções *Asemeia* e *Hebeclada*) e uma nova espécie *A. cipoensis* M.Mota & J.F.B.Pastore. E por fim, o capítulo VI (publicação na revista *Taxon*) apresenta uma proposta de alteração do Código Internacional de Nomenclatura Botânica, a qual surgiu com o impasse nomenclatural acerca da validade do nome *Asemeia pubescens* Muhl.

Esta tese não é reconhecida pela sua autora com fins nomenclaturais, ou seja, os nomes novos aqui apresentados permanecem inéditos (não validamente publicados).

2.2. CAPÍTULO I. Four New Species of *Asemeia* (Polygalaceae) from Goiás State, Brazil

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Four New Species of *Asemeia* (Polygalaceae) from Goiás State, Brazil

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Abstract—Four new species of *Asemeia* (Polygalaceae) are here described, *Asemeia aguiariana*, *A. campestris*, *A. eglandulosa*, and *A. subaphylla*, which are endemic to savannas in central Brazil, in Goiás State. Detailed descriptions, photographic plates illustrating the new species and comparing the floral morphology of allied species, a distribution map, the conservation status of each species, and an identification key are provided.

Keywords—Cerrado, endemic, taxonomy, savanna.

Resumo—Quatro novas espécies de *Asemeia* (Polygalaceae) são descritas aqui: *Asemeia aguiariana*, *A. campestris*, *A. eglandulosa*, e *A. subaphylla*, todas endêmicas do Brasil. São fornecidas descrições detalhadas, pranchas fotográficas para ilustrar as novas espécies, além de pranchas comparativas da morfologia floral de espécies morfologicamente próximas. Também são apresentados mapas de distribuição, o status de conservação de cada espécie, e uma chave de identificação para espécies relacionadas.

Asemeia Raf. emend Small (Polygalaceae) currently comprises 28 species that occur from the United States to Argentina, mostly in savanna areas in central Brazil. These taxa were treated as *Polygala* L. sect. *Hebeclada* Chodat (or subgen. *Hebeclada* (Chodat) S.F.Blake) until Pastore and Abbott (2012) reestablished *Asemeia*. This genus was recognized while a number of other genera were segregated from *Polygala* over the last decade (Abbott 2009, Pastore et al. 2010, Pastore 2012, Pastore & Moraes 2013, Abbott and Pastore 2015). *Polygala* s.l. (i.e., before 2009) was widely polyphyletic.

Species of *Asemeia* are herbs, subshrubs, or rarely lianas and are characterized by two lower, external, connate sepals and an uncrested keel (Pastore and Abbott 2012). Two subgenera are recognized in *Asemeia*, subgen. *Asemeia* and subgen. *Apopetala* (S.F.Blake) J.F.B.Pastore and J.R.Abbott, which are distinguished by the shape of the capsule (cordate in *Apopetala* vs elliptic in *Asemeia*), style (apically uncinata, curved medially or not in *Apopetala* vs not apically uncinata, bent medially at an angle of c. 90° in *Asemeia*), and pedicel length (pedicels longer than the wings in *Apopetala* vs shorter than wings in *Asemeia*) (Pastore and Abbott 2012).

Asemeia (formerly *Polygala* sect. *Hebeclada*) was poorly studied. The last species described for the genus were *Polygala marquesiana* J.F.B.Pastore & T.B.Cavalc., which is now *A. marquesiana* (J.F.B.Pastore & T.B.Cavalc.) J.F.B.Pastore & J.R.Abbott (Pastore & Cavalcanti 2008), and *Polygala pauciramosa* J.F.B.Pastore & T.B.Cavalc. (Pastore & Cavalcanti 2009), which is currently a synonym of *Asemeia lindmaniana* (Chodat) J.F.B.Pastore & J.R.Abbott.

The present paper includes four new species of *Asemeia*, photographic plates showing floral morphology of the new species and comparing with allies, a distribution map, conservation status of the new species, and an identification key to the new and allied species.

MATERIALS AND METHODS

Geographic Distribution and Conservation Status—We built a database containing all specimens studied and their respective geographic coordinates, which were taken from the original herbarium specimen labels or, when not available, estimated from the municipality. The map was produced using the software Qgis 2.18.13 (2016) and edited in Corel® PHOTO-PAINT™ X7.

The informal conservation status of each species was calculated using GeoCAT (Bachman et al. 2011) and classified according to IUCN (2012) parameters, taking into account the number of occurrence locations, the area of occupancy (AOO), and the extent of occurrence (EOO). The categories are the following: Extinct (EX), Extinct in the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Concern (LC), and Data Deficient (DD).

Access to Specimens—During the last two decades several expeditions were carried out in northeastern Goiás (Chapada dos Veadeiros) by JFBP et al., and more recently in collaboration with MM. All species here described were seen in field, collected, and archived in the CEN, CTBS, and HUEFS herbaria (Thiers 2020).

Morphological Analyses—Descriptions and measurements were made with a binocular stereoscope (Tecnival) with a camera, and floral parts were photographed using the software Toup View®. The original images were edited in Corel® PHOTO-PAINT™ X7, which was also used to make the photographic plates. The terminology used to describe the species follows Bennet (1874), Chodat (1893), and Pastore (2006). We used measurements, shape, and indumenta of vegetative and floral parts to delimit the new species.

TAXONOMIC TREATMENT

Asemeia aguiariana J.F.B.Pastore & M.Mota sp. nov. TYPE: BRAZIL. Goiás: Colinas do Sul, entorno da cidade, 14°13'16"S, 47°53'26"W, [-14.221111°, -47.890556°] 15 Mar. 2017, J. F. B. Pastore & R. M. Harley 1875 (holotype: HUEFS-117692; isotypes: CEN-64894, UB-157114).

Asemeia aguiariana morphologically resembles *A. rhodoptera* due to its elliptic leaves and curved pedicels. However, these species can be distinguished by the size of the flowers (6 mm long in *A. aguiariana* vs 4 mm long in *A. rhodoptera*), internal sepals (orbicular in *A. aguiariana* vs suborbicular in *A. rhodoptera*) (Fig. 1), and habit (subshrub in *A. aguiariana* vs herb in *A. rhodoptera*).

Subshrub, 50 cm tall, branches pubescent. **Leaves** chartaceous; petiole 2–2.5 mm long, pubescent; blade 2.2–4.2 × 0.3–0.7 mm, elliptic, apex rounded, acute or acuminate, base acute, margin entire, adaxial surface glabrescent, abaxial surface pubescent on the main surface and margin. **Racemes** 5.5–7 cm long, pubescent, bracts 1.4 × 0.8 mm, ovate, acuminate, pubescent on both surfaces; pedicels 3–4 mm long, glabrous, curved. **Flowers** 6 mm long, pink; external sepals ovate, apex obtuse, adaxial sepal 2.8 × 1.9 mm, glabrous on both surfaces, margin with glands, not ciliate, abaxial sepals 2.3 × 2 mm; internal sepals 6.5 × 5.9 mm, orbicular, glabrous on both surfaces, margin ciliate; keel cucullus 3 × 3.5 mm, glabrous, except for the basal margin of the cucullus; claw 2 mm long, ciliate; lateral petals 4.1 mm long, pubescent on the basal portion of both surfaces, ciliate at the base; staminal sheath 2 mm long, pubescent on the basal portion of both surfaces, free filaments 2.1 mm long, glabrous; style 6.3 mm long, bent in middle at ca. 90° angle, pubescent around the stigma; ovary 2 × 1.8 mm, oblong, glabrous, with a disc at the ovary base. **Capsules** 5 × 3.5 mm, oblong, glabrous. Seeds 4 × 1.5 mm, oblong, pubescent. Figure 2.

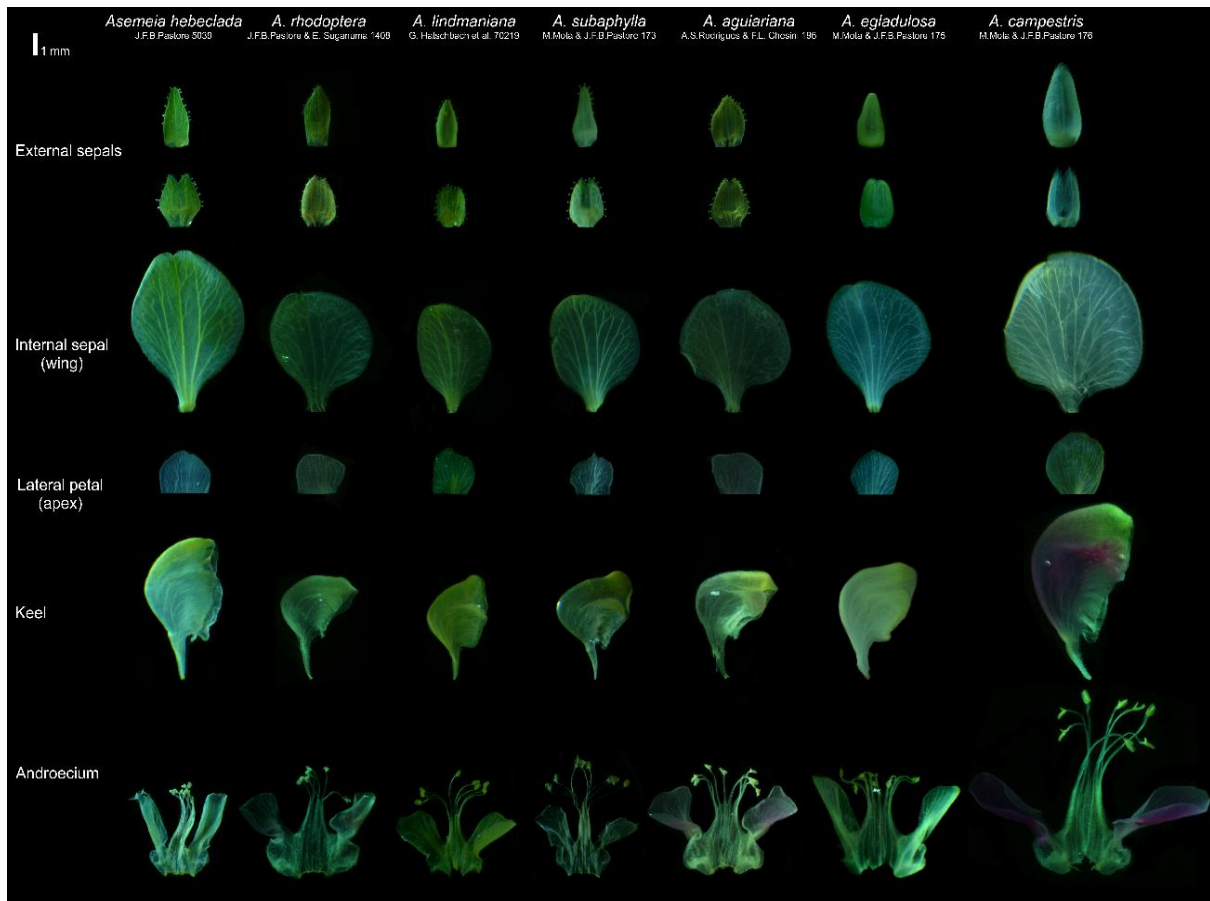


Fig. 1. Comparative plate of floral details of *A. aguiariana*, *A. campestris*, *A. egladulosa*, *A. subaphylla*, and allies. Scale bar = 1 mm. Photos by M. Mota.

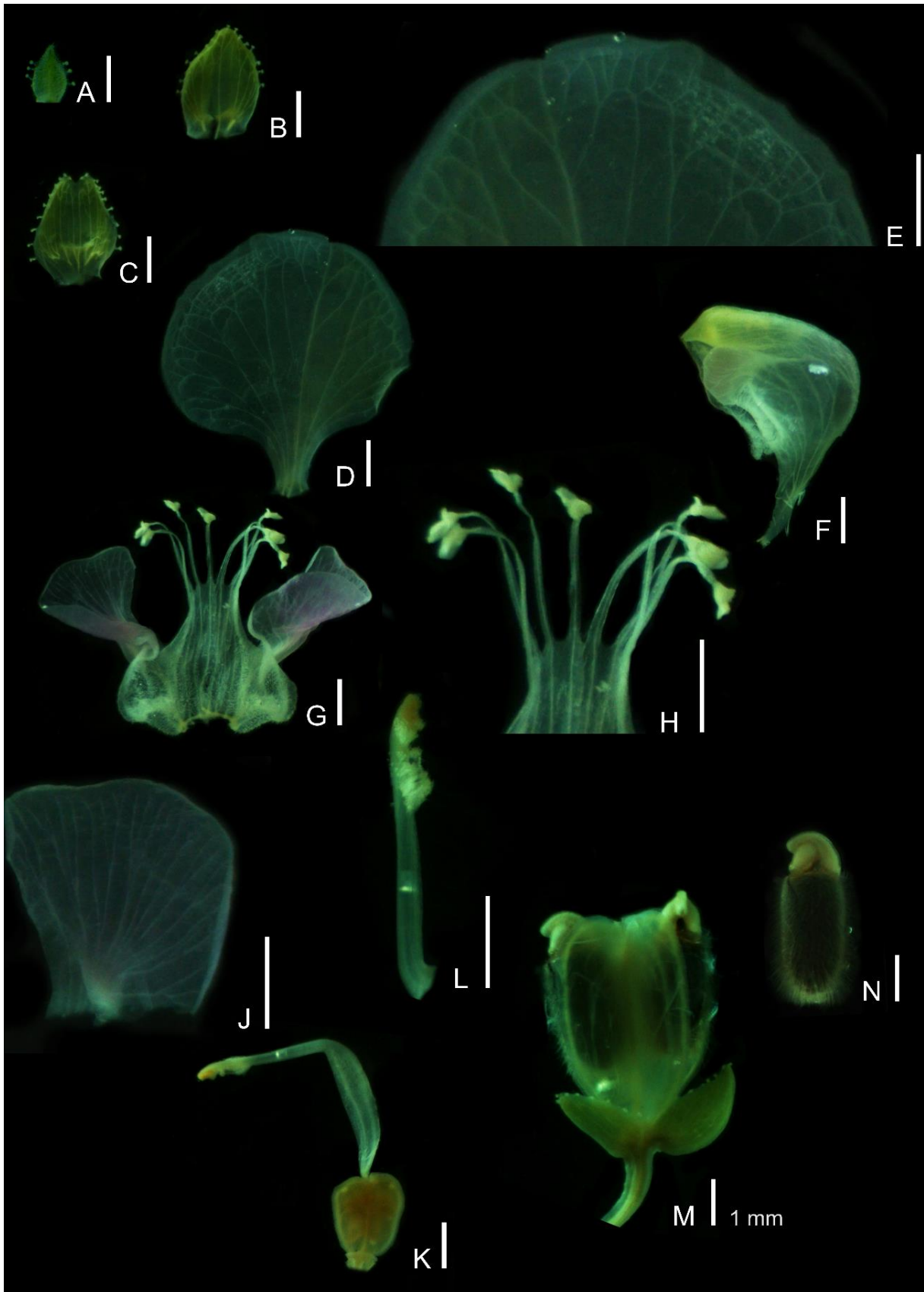


Fig. 2. *Asemeia aguiariana* J.F.B.Pastore & M.Mota. A. Bract. B. Adaxial external sepal. C. Abaxial external sepal. D. One of the two inner sepals (wings). E. Margin of inner sepal (detail). F. Keel. G. Androecium and lateral petals. H. Free stamens (detail). J. Apex of a lateral petal

(detail). K. Gynoecium. L. Stigma. M. Capsule. N. Seed. Scale bar = 1 mm. Photos by M. Mota. A–N. *A. S. Rodrigues & F. L. Chesini 196* (CTBS).

Distribution and Habitat—*Asemeia aguiariana* is known only from Alto Paraíso de Goiás in Goiás State (Fig. 3).

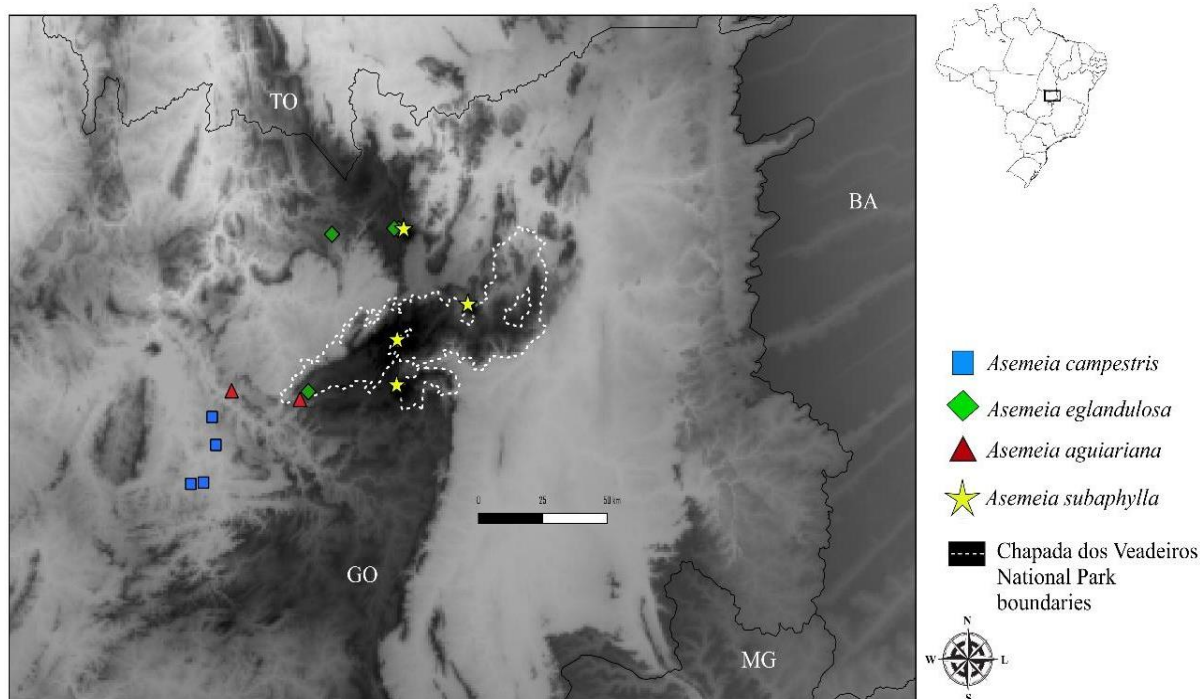


Fig. 3. Distribution map of *Asemeia campestris* J.F.B.Pastore & M.Mota, *A. eglandulosa* J.F.B.Pastore & M.Mota, *A. aguiariana* J.F.B.Pastore & M.Mota, and *A. subaphylla* J.F.B.Pastore & M.Mota in Brazil.

Etymology—The epithet is in honor of the plant anatomist and Polygalaceae specialist Dr. Ana Cristina Aguiar.

Additional Specimens Examined—**Brazil**.—GOIÁS: Alto Paraíso de Goiás, Chapada dos Veadeiros, São Jorge caminho para Mirante—GO, 11 Apr. 2004, *A. S. Rodrigues & F. S. Chesini 196* (CEN, CTBS); Alto Paraíso de Goiás, estrada de São Jorge para Colinas do Sul, 14°13'16"S, 47°53'26"W [-14.221111°, -47.890556°], 14 Mar. 2007, *J. F. B. Pastore et al. 1853* (CEN, HUEFS).

Asemeia campestris J.F.B.Pastore & M.Mota *sp. nov.* TYPE: BRAZIL. Goiás: Niquelândia,

Próxima a plantação de soja, 14°20'15"S, 48°7'33"W [-14.33750, -48.125833], 21 Feb.

2019, *M. Mota & J. F. B. Pastore 176* (holotype: CTBS-4205).

Asemeia campestris and *A. marquesiana* have similar sized flowers (6–8 mm), however, these species can be distinguished by the leaves 7–20 × 0.6–1, persistent and petiolate in *A. campestris* (vs. 1–4 × 1–3 mm, deciduous and sessile in *A. marquesiana*) and the indument of the branches puberulous to pubescent in *A. campestris* (vs. glabrous in *A. marquesiana*).

Herb, 60 cm tall, branches puberulous to pubescent. **Leaves** chartaceous; petiole ca. 1.5 mm long, pubescent; blade 7–20 × 0.6–1 mm, linear, apex acute to acuminate, base acute, margin entire, pubescent on both surfaces. **Racemes** 6–9 cm long, puberulous to pubescent, bracts 1.5 × 0.5 mm, deltoid, acute, pubescent on the external surface, pubescent on the apical half of the internal surface, caducous; pedicel 3–5 mm long, glabrous, curved. **Flowers** 6–8 mm long, pink; external sepals ovate, apex rounded, adaxial sepal 3.3–3.7 × 1.5–1.8 mm, glabrous on both surfaces, margin with glands, not ciliate, abaxial sepals 2.3–2.8 × 1.5–1.6 mm, glabrous on both surfaces, sparsely ciliate at the apex; internal sepals 7.1–7.6 × 6.2–6.6 mm, orbicular, glabrous on both surfaces, margin not ciliate; keel cucullus 6.1–6.9 × 4.5–5.1 mm, glabrous on both surfaces; claw ca. 2 mm long, ciliate; lateral petals 6–6.5 mm long, pubescent on the basal portion of both surfaces, ciliate at the base; staminal sheath 3.2 mm long, pubescent on the basal portion of both surfaces, free filaments 4.5–4.7 mm long, glabrous; style 8.5–8.6 mm long, arched, pubescent around the stigma; ovary 1–1.2 × 1 mm, globose, glabrous, with a disc at the ovary base. **Capsules** 5 × 3.5 mm, oblong, glabrous. Seeds 3.5 × 1.5 mm, oblong, pubescent. Figures 4, and 5 A–B.

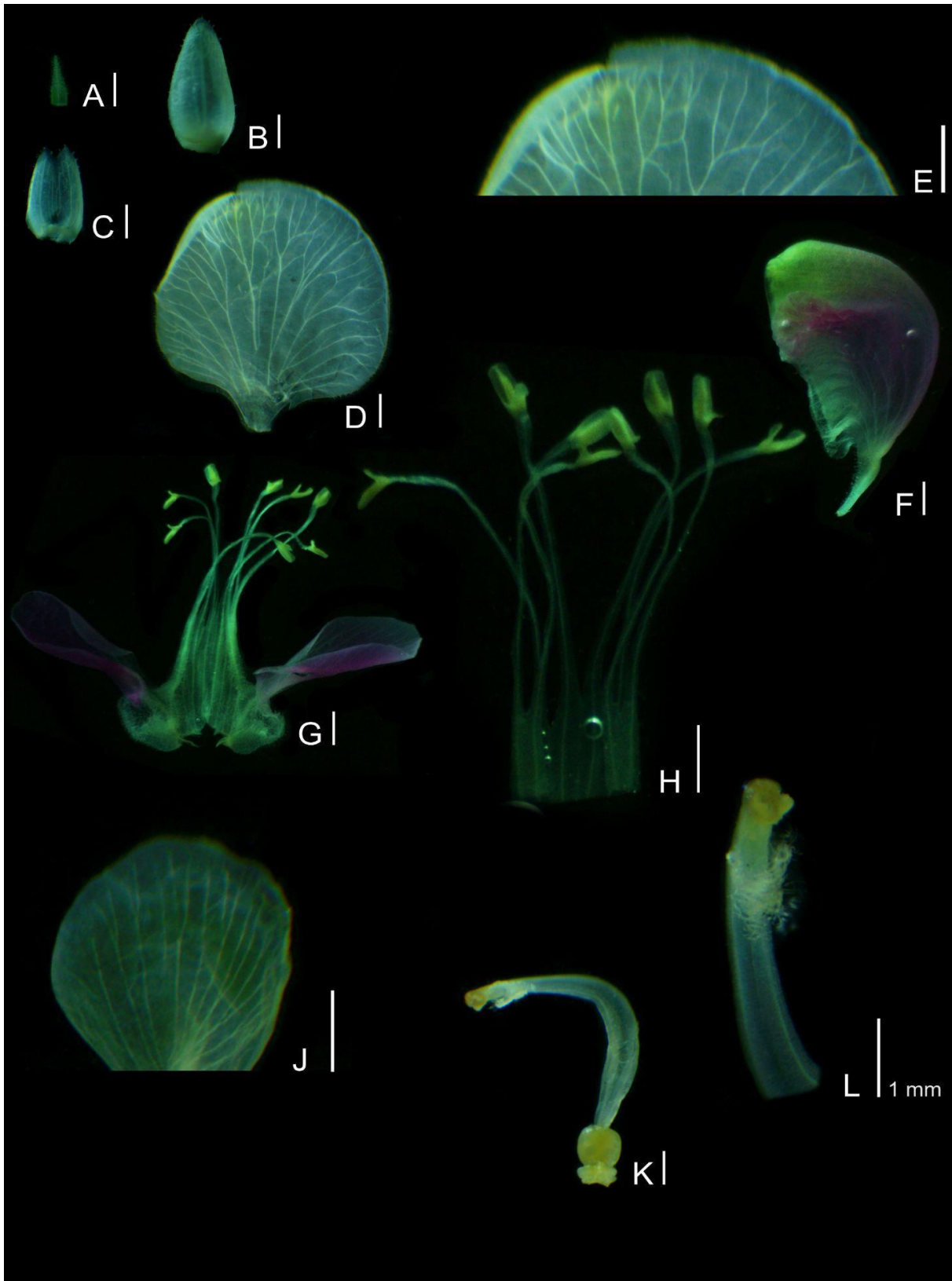


Fig. 4. *Asemeia campestris* J.F.B.Pastore & M.Mota. A. Bract. B. Adaxial external sepal. C. Abaxial external sepals. D. One of the two inner sepals (wings). E. Margin of inner sepal (detail). F. Keel. G. Androecium and lateral petals. H. Free stamens (detail). J. Apex of a lateral petal (detail). K. Gynoecium. L. Stigma. M. Capsule. N. Seed. Scale bar = 1 mm. Photos by

M. Mota. A–C, F–H. M. Mota 176 (CTBS); D, E, J–L. J. B. A. Bringel Jr. & H. J. C. Moreira 946 (CTBS).

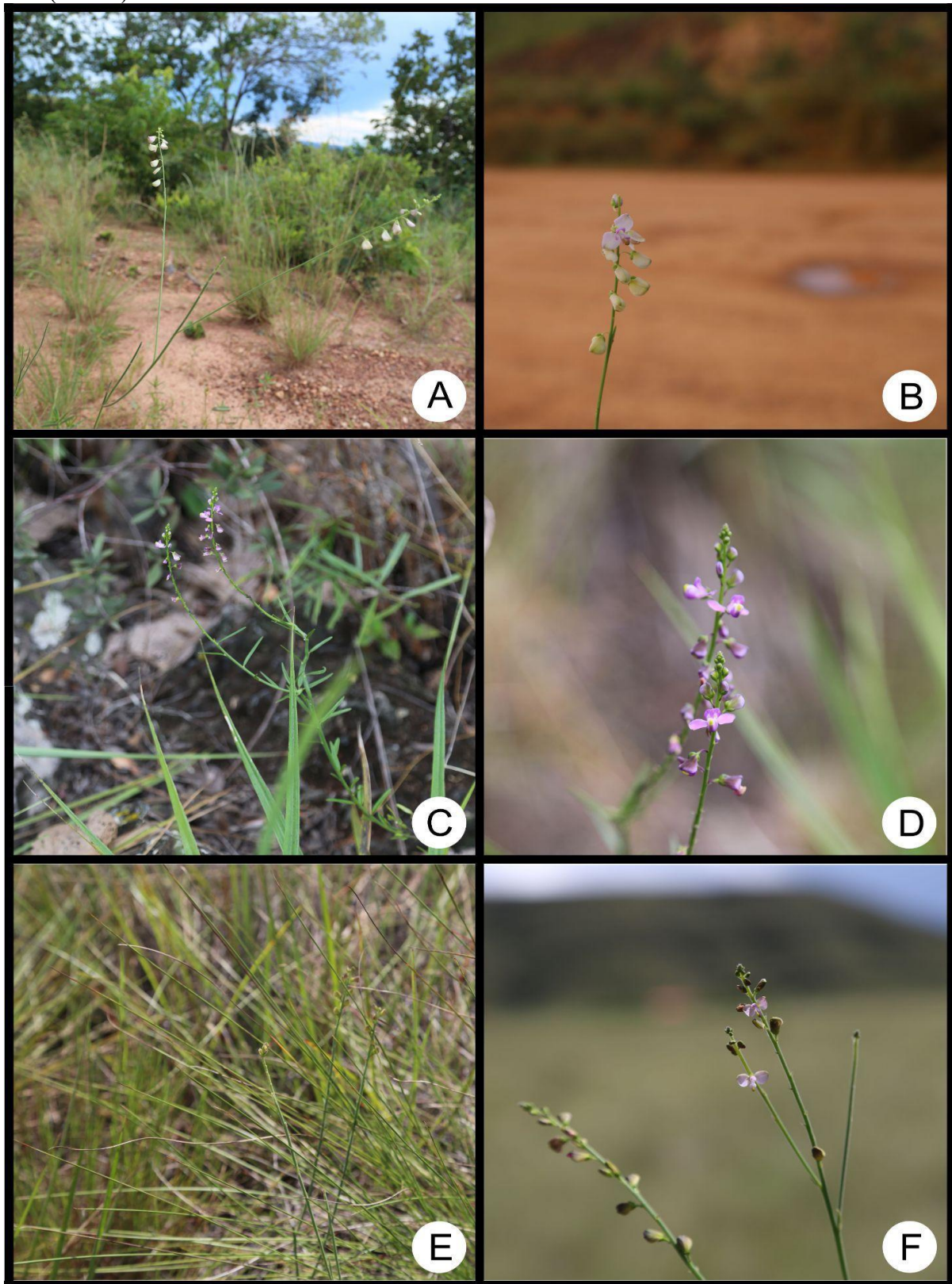


Fig. 5. A–B. *Asemeia campestris* J.F.B.Pastore & M.Mota. C–D. *Asemeia eglandulosa* J.F.B.Pastore & M.Mota. E–F. *Asemeia subaphylla* J.F.B.Pastore & M.Mota. Photos by J. F. B. Pastore and M. Mota.

Distribution—This species is only known to occur between Niquelândia and Colinas do Sul in Goiás State (Fig. 3).

Etymology—The species occurs in open areas of savanna and the name is in reference to this grassland habitat (Fig. 5A–B).

Additional Specimens Examined—Brazil.—GOIÁS: Colinas do Sul, Rodovia Colinas do Sul a Niquelândia, km 20, 18 Feb. 2000, *G. Hatschbach et al.* 70377 (CTBS, MBM); Niquelândia, estrada de terra entre Niquelândia e Colinas do Sul, 14°19'41"S, 48°07'59"W [-14.328056°, -48.133056°], 5 Jan. 2006, *J. F. B. Pastore & E. Sukanuma* 1400 (CEN, CTBS); Niquelândia, GO-237, entroncamento Muquém-Colinas do Sul. 5 km, 14°26'18"S, 48°09'54"W [-14.438333°, -48.165000°], 5 Apr. 2006, *T. B. Cavalcanti & G. Pereira-Silva* 3735 (CEN, CTBS); Niquelândia, Rodovia Go-237 de Niquelândia a Colinas do Sul, ca. de 70 km de Niquelândia, 16 Mar. 2012, *J. B. A. Bringel Jr. & H. J. C. Moreira* 946 (CEN, CTBS, UB).

Asemeia eglandulosa J.F.B.Pastore & M.Mota *sp. nov.* TYPE: BRAZIL. Goiás: Cavalcante, Estrada de terra para RPPN Serra do Tombador, 47°29'02"W, 13°37'31"S [-13.625278°, -47.483889°], 23 Feb. 2019, *M. Mota & J. F. B. Pastore* 175 (holotype: CTBS-4204).

Asemeia eglandulosa can be distinguished from other species in the genus by set of characters: persistent bracts in fruits, absence of glands on the margin of the external sepals, and pubescent linear leaves.

Herb, 80 cm tall, branches pubescent. **Leaves** membranaceous; petiole 1–1.5 mm long, pubescent; blade 1.3–2.7 × 1.5–2 mm, linear, apex acute, base acute, margin entire, adaxial surface pubescent, abaxial surface sparsely pubescent. **Racemes** 7–15 cm long, pubescent, bracts 1 × 0.5 mm, deltoid, pubescent on the external surface, sparsely pubescent on the internal surface, persistent; pedicel 2.5 mm long, glabrous, curved. **Flowers** 4 mm long, lilac; external

sepals ovate, apex obtuse, adaxial sepal 1.1×6 mm, glabrous on both surfaces, margin without glands, sparsely ciliate, abaxial sepals 2×2 mm; internal sepals 6 mm long, suborbicular, glabrous on both surfaces, margin ciliate; keel cucullus 3×3.8 mm, glabrous on both surfaces, ciliate at the base; claw 1.7 mm long, sparsely ciliate; lateral petals 5×2.5 mm, pubescent on the basal portion of both surfaces, ciliate at the base; staminal sheath 3 mm long, pubescent on the basal portion of both surfaces, free filaments 2 mm long, glabrous; style 6 mm long, bent in middle at ca. 90° angle, pubescent around the stigma; ovary 1.5×1.2 mm, oblong, glabrous, with a disc at the ovary base. **Capsules** not observed. Figures 5 E–F, and 6.

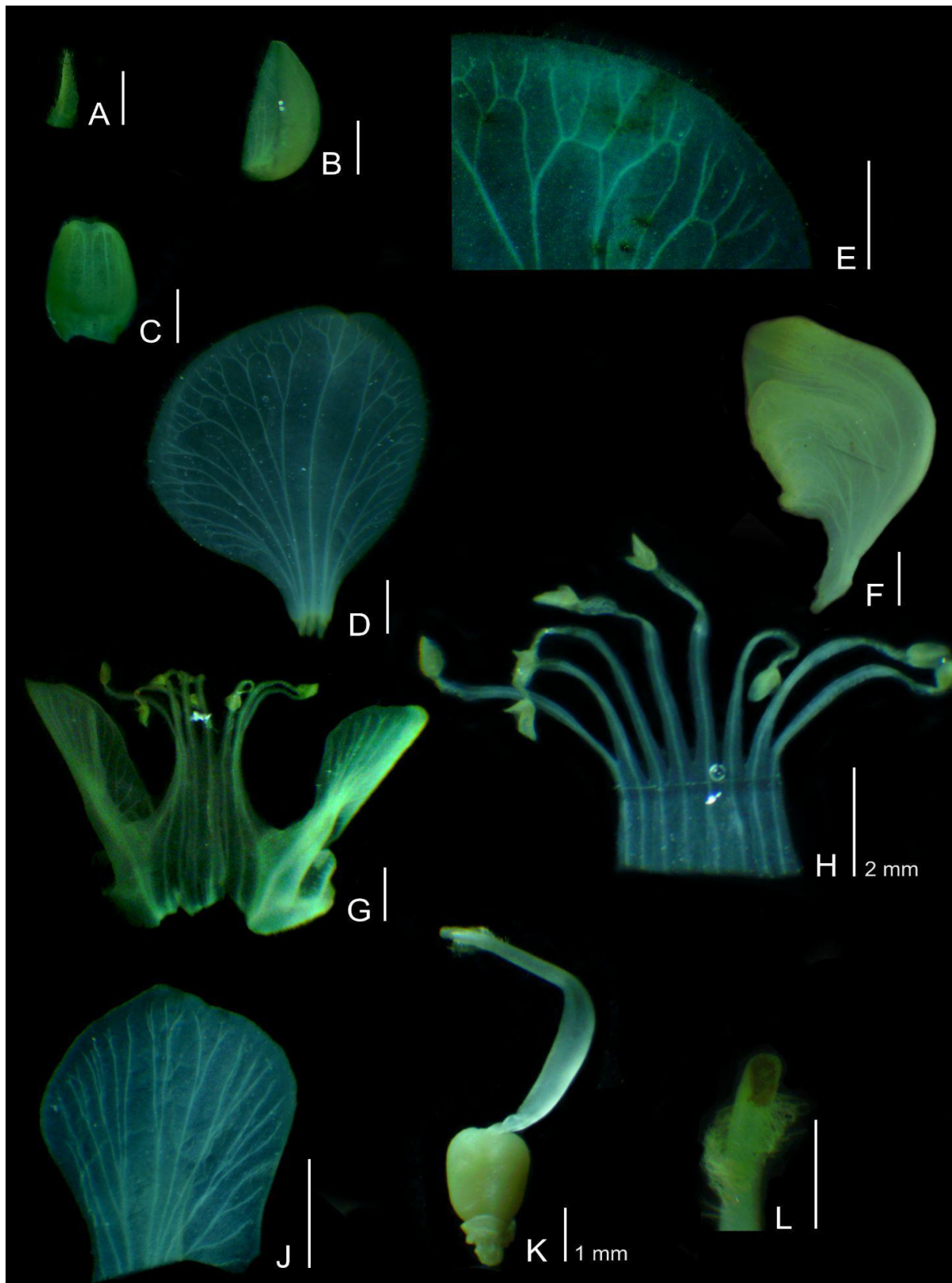


Fig. 6. *Asemeia eglandulosa* J.F.B.Pastore & M.Mota. A. Bract. B. Adaxial external sepal. C. Abaxial external sepals. D. One of the two inner sepals (wings). E. Margin of inner sepal (detail). F. Keel. G. Androecium and lateral petals. H. Free stamens (detail). J. Apex of a lateral petal (detail). K. Gynoecium. L. Stigma. Scale bar = 1 mm. Photos by M. Mota. A–L. M. Mota 169 (CTBS).

Distribution—The species is known only from Cavalcante in Goiás State (Fig. 3).

Etymology—The epithet refers to the absence of glands on the margin of the external sepals, a common feature in other species of *Asemeia*.

Additional Specimens Examined—Brazil.—GOIÁS: Cavalcante, Fazenda Renascer, Ponte de pedra, 7 Mar. 2003, *J. F. B. Pastore 489* (UEC); Cavalcante, 06 May 2002, *J. F. B. Pastore 19* (CEN, UEC); Cavalcante, 06 May 2002, *J. F. B. Pastore 21* (CEN, UEC); entrada para a comunidade Kalunga do engenho, Vão do Moleque, -13.62572° S, -47.48519° W, 26 Feb. 2017, *J. F. B. Pastore & M. Mota 5314* (CTBS); Parque Nacional da Chapada dos Veadeiros, ca. 1 km da sede do Parque Nacional da Chapada dos Veadeiros, 7 Nov. 1987, *J. R. Pirani et al. 1739* (K, SPF, UEC)

Asemeia subaphylla J.F.B.Pastore & M.Mota *sp. nov.* TYPE: BRAZIL. Goiás: Alto Paraíso de Goiás, beira da Go-118, 14°1'23"S, 47°27'40"W[-14.023056°, -47.461111°], 22 Feb. 2019, *M. Mota & J. F. B. Pastore 173* (holotype: CTBS-4202).

Asemeia subaphylla shares similarities with *A. lindmaniana*, such as leaf shape, size of floral parts, and indumenta in general, but can be distinguished by the deciduous, sessile leaves and shape of the internal sepals (suborbicular in *A. subaphylla* vs oblong in *A. lindmaniana*) (Fig. 3).

Herb, 30 cm tall, branches pubescent. **Leaves** chartaceous, deciduous, sessile; blade 2.5–8 × 0.5–1 mm, linear, apex acute to acuminate, base acute, margin entire, pubescent on both surfaces. **Racemes** 7–11 cm long, pubescent, bracts 1–1.6 × 0.5–0.6 mm, ovate, acute, pubescent on both surfaces; pedicel 2.2–2.3 mm long, puberulous, straight. **Flowers** 5 mm long, pink, external sepals ovate, apex obtuse, adaxial sepal 2.7–3 × 1.1–1.3 mm, glabrous on both surfaces, margin with glands (except on the basal portion), not ciliate, abaxial sepals 2–

2.5 × 1.6–1.7 mm; internal sepals 5–5.7 × 4–4.4 mm, suborbicular, glabrous on both surfaces, margin not ciliate; keel cucullus 3.4–4 × 3.3–4 mm, glabrous on both surfaces, ciliate at the base, claw 1.8 mm long, ciliate, lateral petals 3–3.7 mm, pubescent on the basal portion of both surfaces, ciliate at the base, staminal sheath 3 mm long, pubescent on the basal portion of both surfaces, free filaments 2.5–3 mm long, glabrous, style 6.2 mm long, bent in the middle at ca. 90° angle, pubescent around the stigma, ovary 0.8–1 × 1 mm, orbicular, glabrous, with a disc at the ovary base. **Capsules** 4.2–5.5 × 3.4–3.5 mm, oblong, glabrous. Seeds 4 × 1.2–1.5 mm, oblong, pubescent. Figures 5 C–D, and 7.

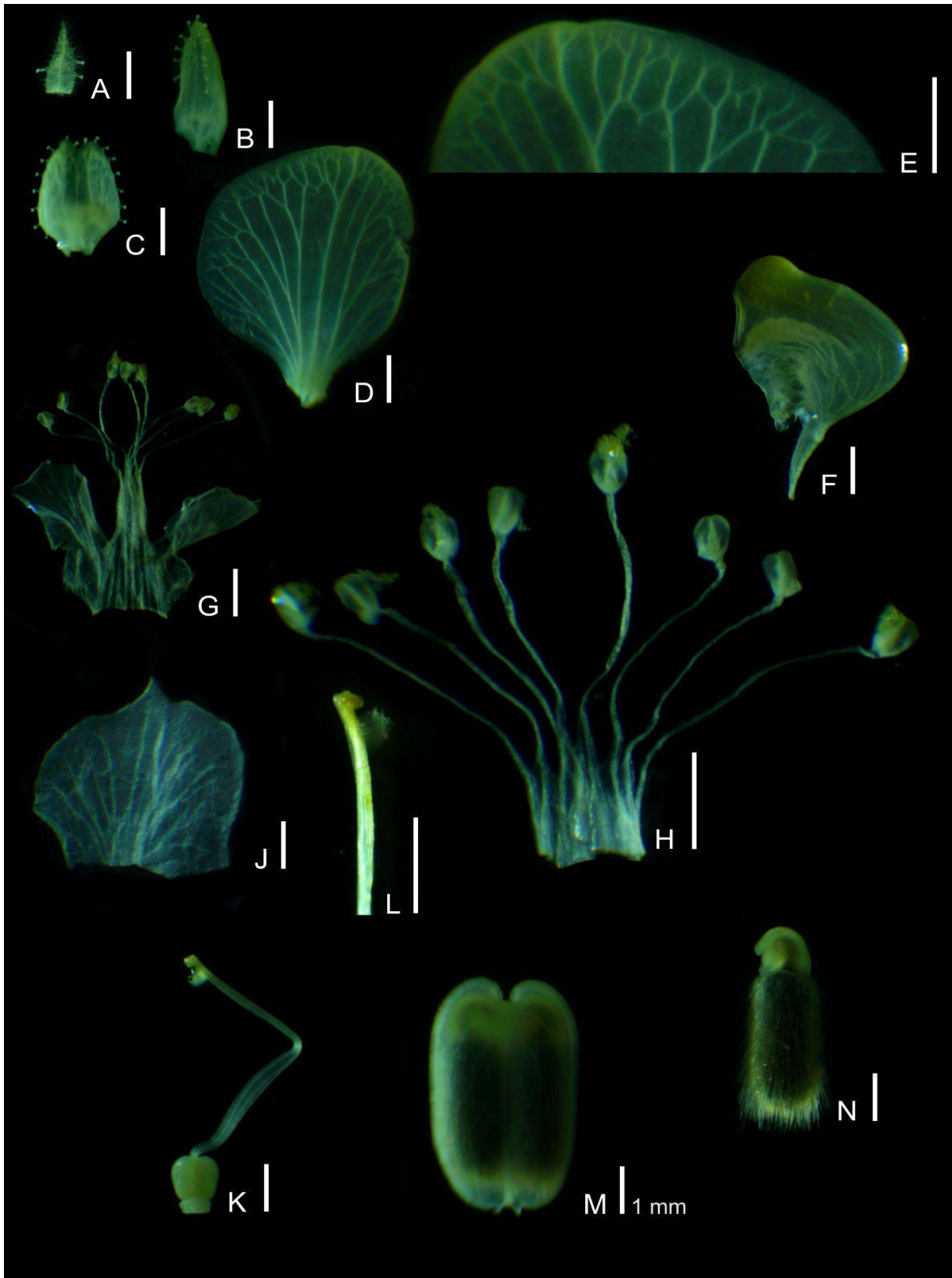


Fig. 7. *Asemeia subaphylla* J.F.B.Pastore &M.Mota. A. Bract. B. Adaxial external sepal. C. Abaxial external sepals. D. One of the two inner sepals (wings). E. Margin of inner sepal (detail). F. Keel. G. Androecium and lateral petals. H. Free stamens (detail). J. Apex of a lateral petal (detail). K. Gynoecium. L. Stigma. M. Capsule. N. Seed. Scale bar = 1 mm. Photos by M. Mota. A–N. M. Mota 173 (CTBS).

Distribution—*Asemeia subaphylla* is known only from the municipalities of Cavalcante and Alto Paraíso de Goiás (Fig. 3).

Etymology—The epithet of *A. subaphylla* refers to the deciduous small leaves, so that the plant is leafless at flowering.

Additional Specimens Examined—**Brazil.**—GOIÁS: Cavalcante, estrada para Cavalcante, 6 Mar. 2003, *J. F. B. Pastore & E. Sukanuma 433* (CEN, CTBS); estrada para Cavalcante, 6 Mar. 2003, *J. F. B. Pastore & E. Sukanuma 437* (CEN, CTBS); estrada para Santa Teresina, -13.98577° S, -47.50778° W, 25 Feb. 2017, *J. F. B. Pastore & M. Mota 5310* (CTBS).

IDENTIFICATION KEY TO THE FOUR NEW *ASEMEIA* AND ALLIED SPECIES

1. Glands at the margin of external sepals absent.....*A. eglandulosa*
1. Glands at the margin of external sepals present.....2
2. Bracts deciduous.....*A. campestris*
2. Bracts persistent.....3
3. Leaves sessile and deciduous.....*A. subaphylla*
3. Leaves petiolate and persistent.....4
4. Leaves linear 6–10 × 0.5–1 mm, pedicels sparsely puberulous.....*A. lindmaniana*
4. Leaves elliptic 20–31 × 2.5–4 mm, pedicels glabrous.....5
5. Pedicels straight, internal sepals elliptic.....*A. hebeclada*
- 5'. Pedicels curved, internal sepals orbicular or suborbicular...6
6. Flowers 4 mm long, internal sepals suborbicular and not ciliate.....*A. rhodoptera*

6'. Flowers 6 mm long, internal sepals orbicular
and ciliate.....*A. aguiariana*

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AUTHOR CONTRIBUTIONS

JFBP and MM, conducted field work for this study and wrote the article; MM produced the
figures and map.

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2.3. CAPÍTULO II. Three new species of *Asemeia* (Polygalaceae) from the Brazilian Cerrado

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Three new species of *Asemeia* (Polygalaceae) from the Brazilian Cerrado

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Abstract. *Asemeia* (Polygalaceae) is a neotropical genus recently segregated from *Polygala* that comprises 32 species. This study is part of the ongoing project to revise the genus *Asemeia* and its current generic delimitation. We conducted morphological analyses on newly collected specimens from field expeditions to Minas Gerais and Goiás states, Brazil, such as herbarium collections from that area. Our results reveal three new species: *Asemeia coracoralinae*, *A. minensis*, and *A. nana*, all occurring in Cerrado vegetation. Analysis of the herbarium specimens showed that *Asemeia nana* has been often misidentified as *A. glabra*. We provide a detailed morphological description for each species, photographic plates including a comparative analysis of floral morphology, and a distribution map. This study increases the knowledge on the genus *Asemeia* and on the biodiversity of the Cerrado. The three new species here described have small distributional range, and hence are potentially endemic and threatened.

Key Words. Biodiversity, Cerrado, savannah, *Polygala*, *Taxonomy*

Introduction

Polygalaceae is a widely distributed family, comprising ca. 1,200 species in 30 genera (Mota et al., 2019). Polygalaceae includes four tribes: Carpolobieae B.Eriksen, Diclidanthereae Reveal, Xanthophylleae Baill., and Polygaleae Chodat (Eriksen & Persson 2007, Reveal et al. 2012). Polygaleae has papilionaceous flowers (with the keel formed by one petal and the wings are internal sepals), with trimerous corolla, and eventually with a pair of rudimentary petals. *Asemeia* Raf. emend Small. belongs to the tribe Polygaleae.

The genus currently comprises 32 species occurring in the Cerrado, rupestrian fields, and restinga, all with Neotropical distribution. *Asemeia* species are characterized by connate inferior external sepals and non-crested keel (Aguiar-Dias et al. 2008, Pastore 2006). The genus has two subgenera: the typical one, *Asemeia*, and *Apopetala* (S.F.Blake) J.F.B.Pastore & J.R.Abbott, which can be distinguished by the pedicel length (much longer pedicel, longer than the wings, in *A.* subgen. *Apopetala* vs short pedicel, shorter than the wings, in *A.* subgen. *Asemeia*), style shape (apically uncinata, curved medially or not in *A.* subgen. *Apopetala* vs not apically uncinata, bent medially at an angle of ca. 90° in *A.* subgen. *Asemeia*), and by the shape of the capsule (cordate in *A.* subgen. *Apopetala* vs elliptic in *A.* subgen. *Asemeia*).

Recently, Mota & Pastore (2021) presented four new species of *Asemeia* from Goiás state: *Asemeia aguiariana* J.F.B.Pastore & M.Mota, *A. campestris* J.F.B.Pastore & M.Mota, *A. eglandulosa* J.F.B.Pastore & M.Mota, and *A. subaphylla* J.F.B.Pastore & M.Mota, all of them from the *A. hebeclada* – *A. rhodoptera* complex. In the Brazilian Cerrado, 13 species of *Asemeia* occur (BFG 2018, Mota & Pastore 2020), 9 of which are endemic to this biome.

During an ongoing revision of *Asemeia*, along with recent expeditions to Brazil's southwest and central-west regions in Cerrado areas, three new *Asemeia* species from subgen.

Asemeia were found. This study describes these three new species and provides detailed morphological descriptions, photographic illustrations, and a distribution map.

Material and methods

The field expedition visited Goiás and Minas Gerais states. The specimens were analyzed *in situ*, photographed, and georeferenced. The collected specimens were deposited at CTBS (Thiers, 2021). Additional specimens were analyzed from the following herbaria: CEN, CTBS, HUEFS, HUFU, K, MO, NY, and US. The floral and vegetative structures were analyzed under a stereomicroscope (Tecnival). The floral parts were photographed using the software Toup View®.

Photographic plates were produced with the software Corel® PHOTO–PAINT™ X7. The terminology used to describe the structures followed Bennett (1874), Pastore (2006), and Aguiar et al. (2008). All the geographic coordinates obtained in the field and from herbarium labels were included in a data matrix. The map was produced using the software Qgis 3.18.1 “Zürich” (QGIS Team 2021) and later edited with the software Corel® PHOTO–PAINT™ X7. Conservation Status assessment was made using GeoCAT (<http://geocat.kew.org>, Bachman et al., 2011) with default parameters and IUCN criteria (IUCN 2012).

Taxonomic treatment

Asemeia coracoralinae M.Mota & J.F.B.Pastore, *sp. nov.* Type: Brazil. Goiás: Goiás, Serra Dourada, 16°04'57"S, 50°11'14"W, 983 m alt., 20 Feb. 2021, *M. Mota et al.* 237 (Holotype: CTBS6000).

Roots lignified. *Subshrub* 1 m tall, branches tomentose. *Leaves*: membranaceous; petiole 2.5 mm long., pubescent; blade 32–42 × 3 mm, linear to elliptic, apex acute, base obtuse,

margin entire, ciliated, adaxial surface tomentose, abaxial surface tomentose. *Racemes* 7.5–12 cm long., lax, tomentose bracts 1.6×1 mm, ovate, apex acuminate, pubescent in both surfaces, without glands, ciliated, persistent; pedicel 4.4 mm long., glabrous, straight. *Flowers* 5.9 mm long., purple, with yellow spots in the keel apex and lateral petals apex; external sepals ovate, concave, apex round to obtuse, adaxial sepal 2.8×3.8 mm, glabrous on both surfaces, margin with glands, except at the base, not ciliated, abaxial sepals 2.5×2 mm, glabrous on both surfaces, margin with glands, not ciliated; internal sepals 5.6×5 mm, glabrous on both surfaces margin ciliated in the lateral margins; keel cuculus 3.8×4.2 mm, external surface pubescent near the base, claw 2 mm long., ciliated; lateral petals 4.5 mm, external surface pubescent near the base, internal surface pubescent at the basal half; staminal sheath 3.4 mm long., external surface sparsely pubescent at the base, internal surface pubescent at the basal half, free filaments 3.4 mm long., glabrous; rudimentary petals present 1×0.3 mm, glabrous, ciliated. *Ovary* 0.8×0.9 mm, globose, glabrous, with a disc at the ovary base; style 6.4 mm long., bent in the middle at ca. 90° angle, glabrous, pubescent around stigma. *Capsule* 5.4×3.2 mm, oblong glabrous; *seeds* 3.5×1.9 mm caruncle 0.9 mm long., sparsely puberulous. Figs. 1, 2A, B, 3.

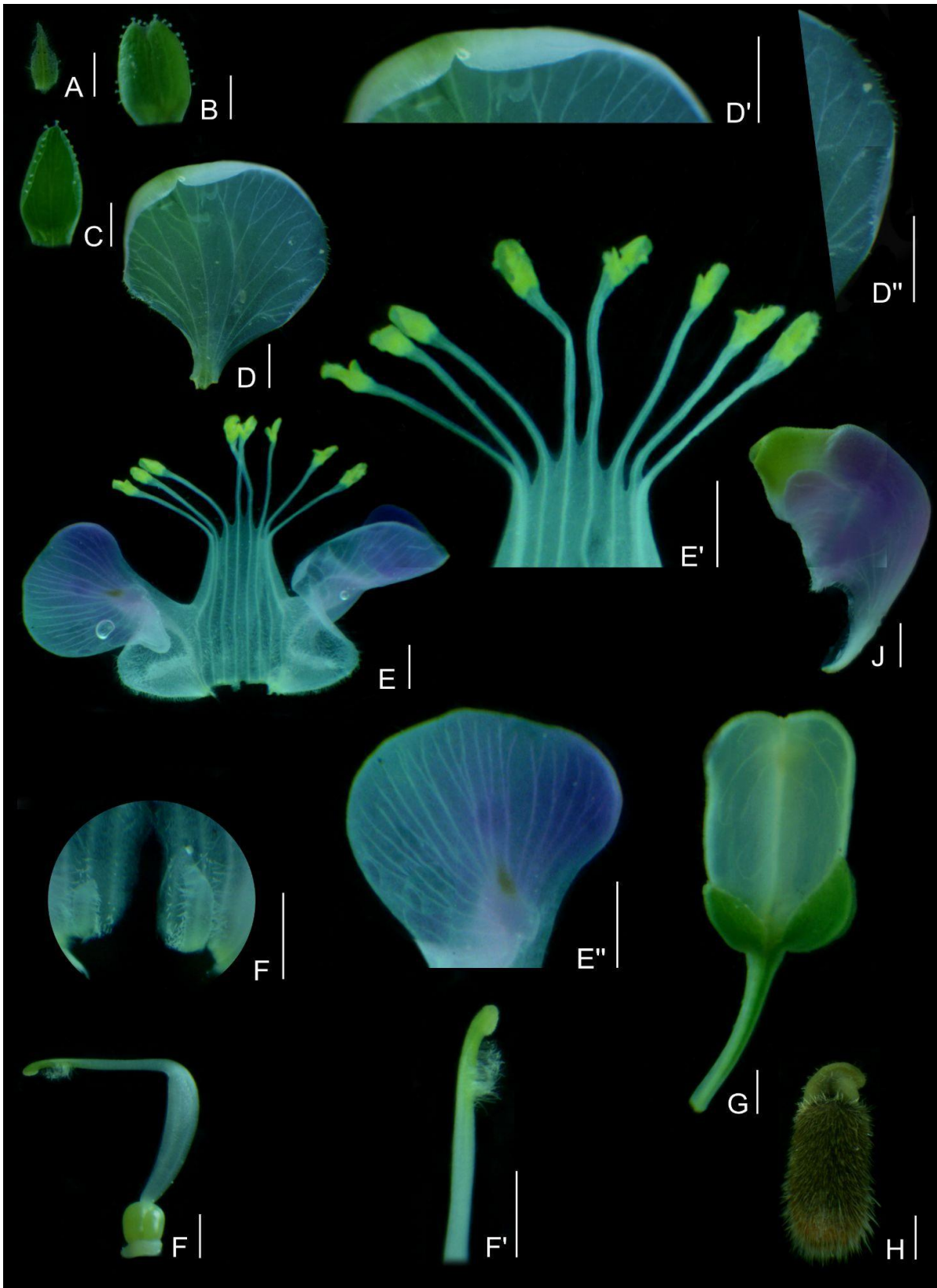


Figure 1. *Asemeia coracoralinae* M.Mota & J.F.B.Pastore. A Bract; B Abaxial external sepals; C Adaxial external sepal; D One of the two inner sepals (wings); D' Apex margin of internal

sepal (detail); D'' Lateral margin of internal sepal (detail); E Androecium and lateral petals; E' Free stamens (detail); E'' Apex of a lateral petal (detail); F Rudimentary petals; G Keel; H Gynoecium; H' Stigma; J Capsule; K Seed. A–K *M. Mota & J.F.B. Pastore 237* (CTBS). Scale bar = 1 mm. Photos by M. Mota.

RECOGNITION. *Asemeia coracoralinae* differs from *A. rhodoptera* in height (ca. 1 m in *A. coracoralinae* vs up to 40 cm in *A. rhodoptera*), bracts (ovate, apex acuminate in *A. coracoralinae* vs deltoid, apex acute in *A. rhodoptera*), and size of flowers (ca. 5.9 mm in *A. coracoralinae* vs 4 mm in *A. rhodoptera*) (Fig. 3).

Figure 2. A–B *Asemeia coracoralinae* M.Mota & J.F.B.Pastore; C–D *Asemeia minensis* M.Mota & J.F.B.Pastore; E–F *Asemeia nana* M.Mota & J.F.B.Pastore. Photos by J.F.B. Pastore and M. Mota.

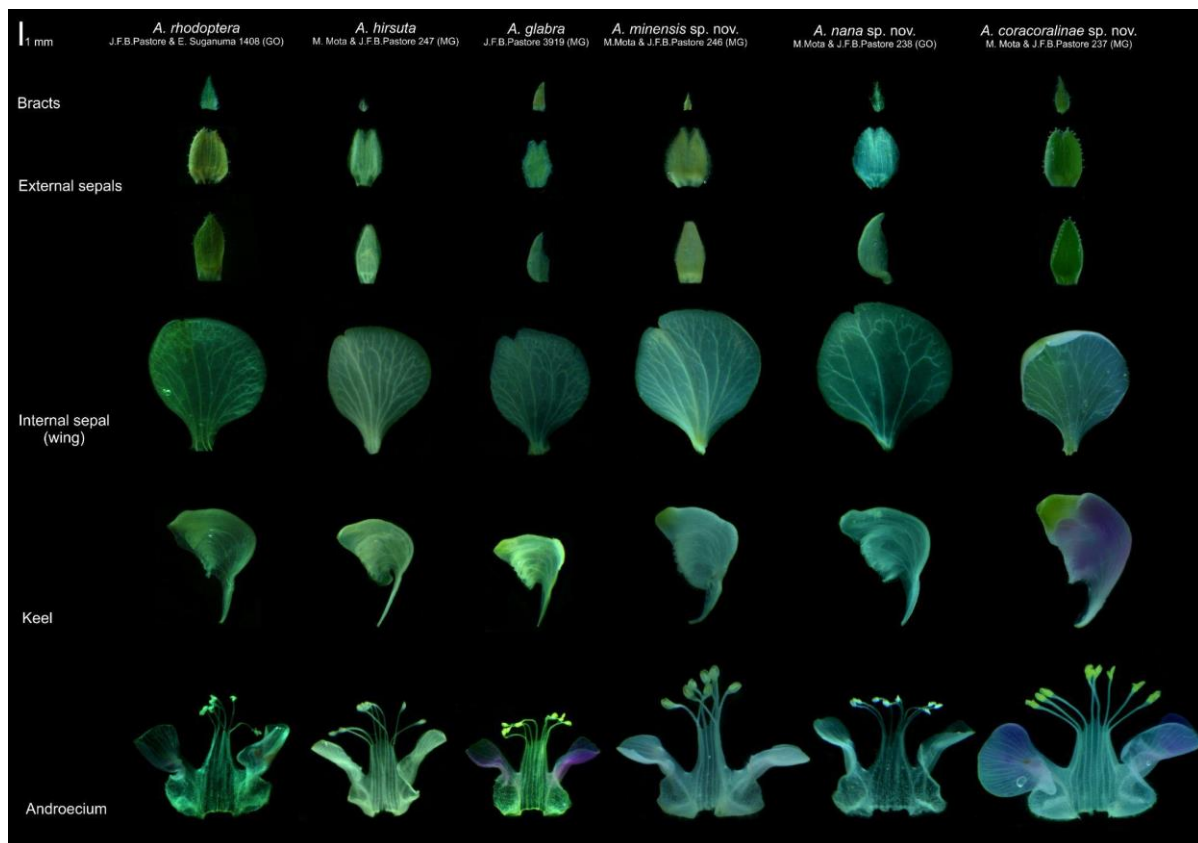
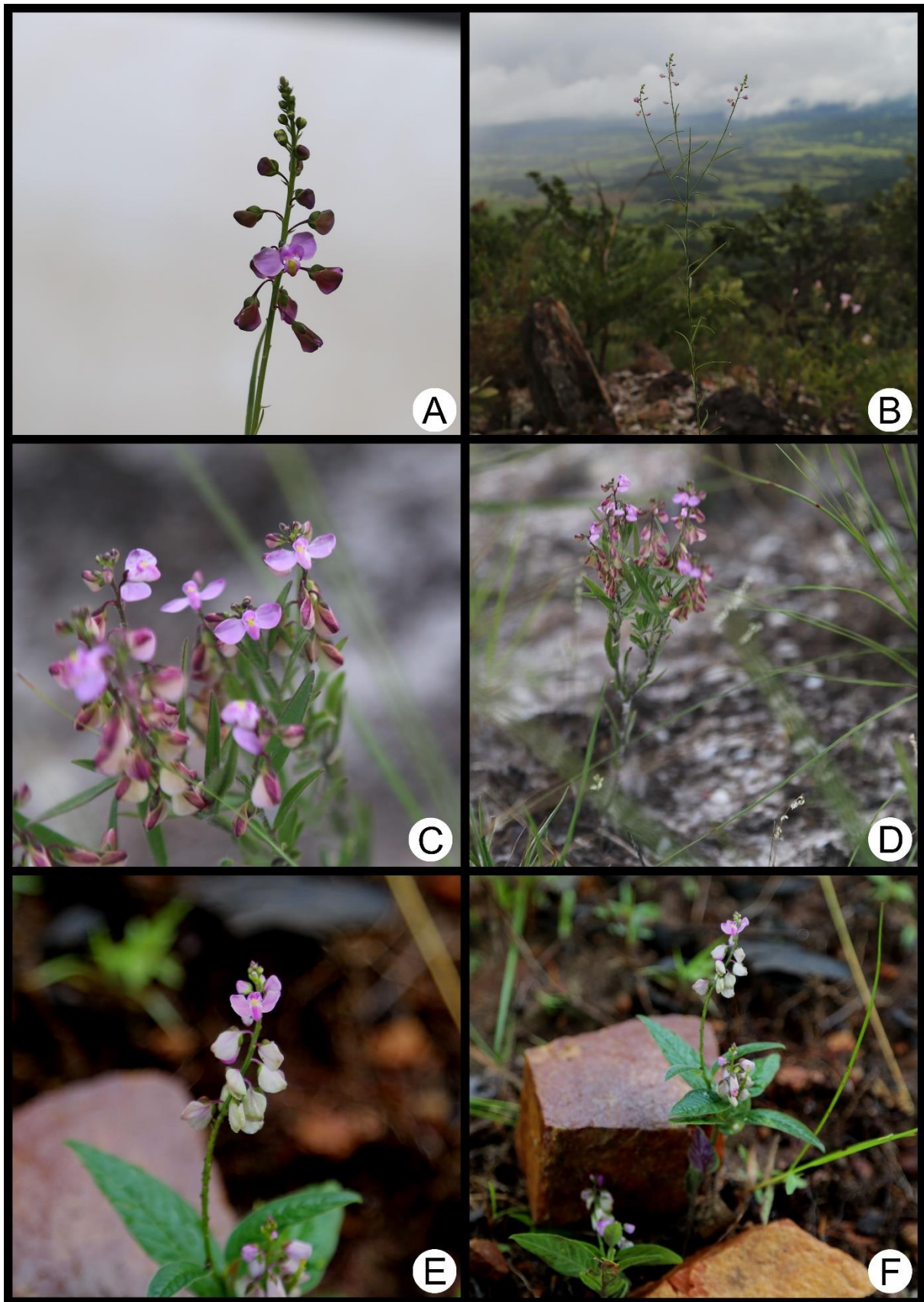
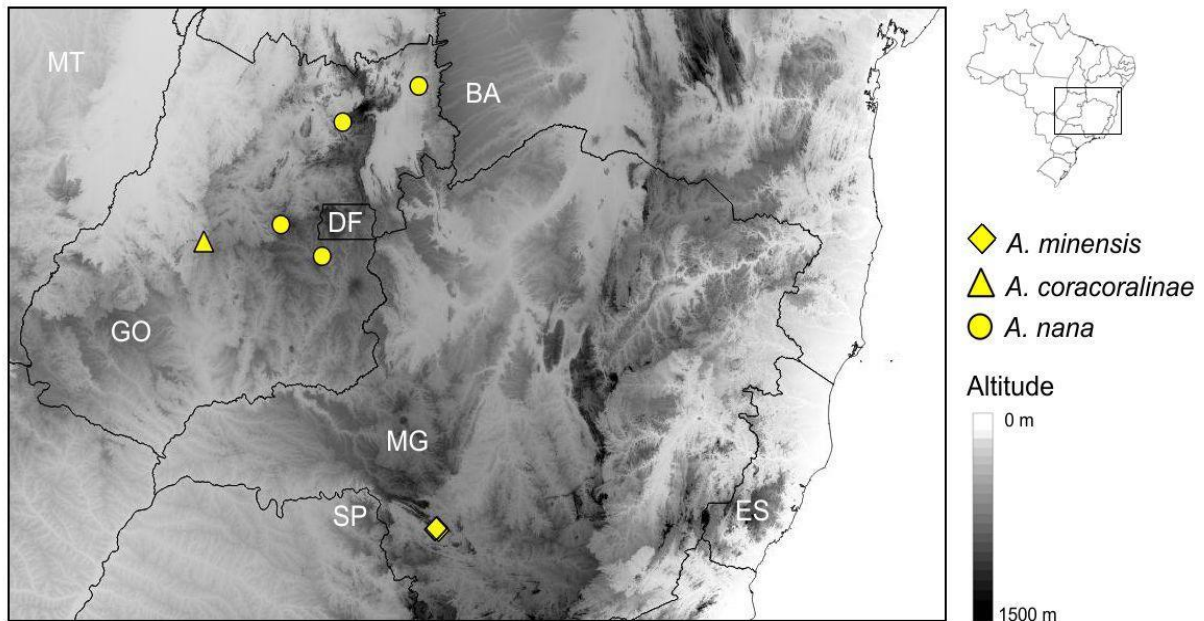


Figure 3. Comparative plate of floral parts of *A. coracoralinae* M.Mota & J.F.B.Pastore, *A. minensis* M.Mota & J.F.B.Pastore, and *A. nana* M.Mota & J.F.B.Pastore, and allies. Scale bar: 1 mm. Photos by M. Mota.



DISTRIBUTION. *Asemeia coracoralinae* occurs in sandstone in Cerrado areas, between 800–1000 m alt. The species is endemic to Serra Dourada range, Goiás city, Goiás state (Map 1).



Map 1. Distribution map of *A. coracoralinae* M.Mota & J.F.B.Pastore, *A. minensis* M.Mota & J.F.B.Pastore, and *A. nana* M.Mota & J.F.B.Pastore.

ADICIONAL SPECIMENS EXAMINED - BRAZIL. Goiás: Goiás Velho, Serra Dourada, ca. 20 km, SE of Goiás Velho - GO 18 Jan. 1966 *H.S. Irwin et al. 11729* (K, MO, NY, US); Goiás, above Serra Dourada, ca 6 km NE of Mossâmedes, 16°04'S, 50°11'W, 7 Feb., 1980, *J.H. Kirkbride Jr. 3315* (US); Goiás Velho, Parque Estadual de Serra Dourada 26 July 2004 *J.F.B. Pastore et al. 1060* (CEN, CTBS); Goiás Velho, Serra Dourada, ca. 20 km, SE of Goiás Velho, 18 Jan., 1966, *H.S. Irwin et al. 11729* (MO, NY, US).

CONSERVATION STATUS ESTIMATION. *Asemeia coracoralinae* is currently known only from four collections, all of them in Serra Dourada. Considering geographic range, GeoCAT (Bachman et al. 2011) estimated an extent of occurrence (EOO) of 13,149 km² and an area of occupancy (AOO) of 16 km², which would classify the species as Critically Endangered [CR B1a] or at least Endangered [EN B2a]. However, the status could not be confirmed at the moment because information on geographic range decline or fluctuation (subcriteria B2b and B2c, respectively) and on population size is missing. In spite of the single

known location, at least two recent collections were made inside a natural reserve (Parque Estadual da Serra Dourada) which should protect the species for some time.

ETYMOLOGY. The epithet honours a Brazilian poetess who was born in Goiás' 'Velho' City, Cora Coralina.

Asemeia minensis M.Mota & J.F.B.Pastore, *sp. nov.*

Type: Brazil, Minas Gerais: São João Batista do Glória, acesso pela estrada do Tista, caminho da Pedreira Lagoa Azul, 20°36'23"S, 46°18'08"W, 1168 m alt., 25 Feb. 2021, *M. Mota & J.F.B. Pastore 246* (Holotype: CTBS6001)

Roots fleshy. *Herb* 20–30 cm tall, branches pubescent. *Leaves* membranaceous; petiole 2–3 mm long., pubescent; blade 15–39 × 2–3.5 mm, linear to elliptic, apex acute, margin entire, not ciliated, base acute, sparsely puberulous in both surfaces. *Racemes* 1.5–8 cm long., sublax to lax, pubescent bracts 1.2–2.4 × 0.4–0.8 mm ovate, apex acute, external surface puberulous, internal surface glabrous, no glands, margin ciliated, caducous in fruitification; pedicel 1.5–3 mm long., sparsely puberulous, curved. *Flowers* 4.5–6.3 mm long., pink with dark vertical stripes in the wings; external sepals ovate, concave, apex rounded, adaxial sepal 2.1–3 × 1–1.3 mm, glabrous in both surfaces, margin without glands, ciliated, abaxial sepals 2–2.5 × 1–2 mm, glabrous in both surfaces, margin without glands, ciliated; internal sepals 5.7–7 × 5.1–5.5 mm, apex, glabrous in both surfaces, margin not ciliated; keel cuculus 2.5–3.5 × 3.5–4.2 mm, external surface glabrous, internal surface pubescent at the base near the margin, claw 2–3 mm long., ciliated; lateral petals 4.1–4.5 mm, external surface glabrous, internal surface pubescent at the basal half; staminal sheath 2–3.4 mm long., external surface glabrous, internal surface pubescent at the basal half, free filaments 2.1–2.9 mm long., glabrous; rudimentary petals present 0.3 × 0.2 mm, glabrous. *Ovary* 1–1.1 × 1 mm, globose, glabrous,

with a disc at the ovary base; style 5.3–7.2 mm long., bent in the middle at ca. 90° angle, glabrous, pubescent around stigma. *Capsule* 4.4–4.5 × 3–3.6 mm, obovate, glabrous; seeds 2.5–3.3 × 1.2–1.6 mm, caruncule 0.8–1 mm long., sparsely puberulous (Figs. 2C, D, 3, 4).

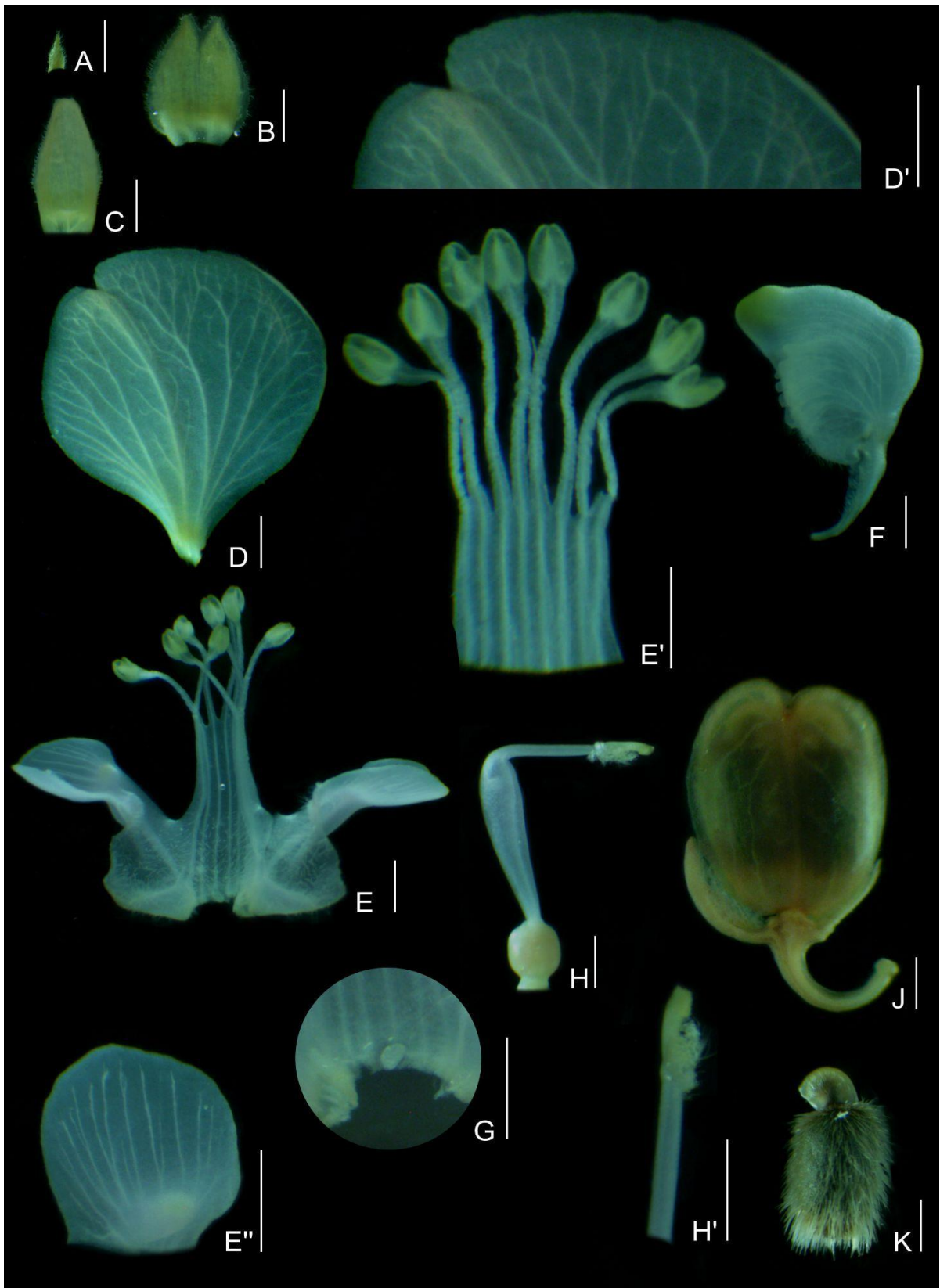


Figure 4. *Asemeia minensis* M.Mota & J.F.B.Pastore. A Bract; B Abaxial external sepals; C Adaxial external sepal; D One of the two inner sepals (wings); D' Apex margin of internal sepal (detail); E Androecium and lateral petals; E' Free stamens (detail); E'' Apex of a lateral petal (detail); F Keel; G Rudimentary petal; H Gynoecium; H' Stigma; J Capsule; K Seed; A–K *M.Mota & J.F.B.Pastore 246* (CTBS). Scale bar = 1 mm. Photos by M. Mota.

RECOGNITION. *Asemeia minensis* differs from *A. hirsuta* in height (20–30 cm in *A. minensis* vs 10–15 cm in *A. hirsuta*), racemes (sublax in *A. minensis* vs congested in *A. hirsuta*), margin of external sepals (ciliated in *A. minensis* vs not ciliated in *A. hirsuta*) and the distribution (Minas Gerais state vs Goiás and Mato Grosso state) (Fig. 3).

DISTRIBUTION. *Asemeia minensis* is endemic to the municipality of São João Batista do Glória, Minas Gerais state, and occurs in Cerrado and rocky fields, between 800–1000 m alt. (Map 1).

ADICIONAL SPECIMENS EXAMINED. BRAZIL. Minas Gerais: São João Batista do Glória, Paraíso Perdido, Córrego Quebra Anzol, 4.5 km from rodovia MG 050, Região da Represa de Furnas, 20°37'28"S, 46°19'24"W 29 Sep. 2005 *J.N. Nakajima et al. 3921* (CTBS, HUFU); São João Batista do Glória, Trilha Paraiso Perdido, ca. 5 km from Rodovia MG 050, Região da Represa de Furnas, 8 Dec. 2005, *J.N. Nakajima et al. 4081* (CTBS, HUFU); São João Batista da Glória, Região da Represa de Furnas, Estrada para Pedreira Souza, ca. de 2 km da Rodovia MG 050, 20°38'02"S, 46°15'53"W, 17 Feb. 2006 *R. Romero et al. 7687* (CTBS, HUFU); São João Batista do Glória, Estrada para Mineradora Gabi Extrações, depois do terceiro córrego, Região da Represa de Furnas, 20°35'55"S, 46°17'33"W, 26 Oct. 2006, *J.N. Nakajima et al. 4357* (CTBS, HUFU).

CONSERVATION STATUS ESTIMATION. *Asemeia minensis* is currently known only from five collections, all of them in a small area south of Serra da Canastra. Considering

geographic range, GeoCAT (Bachman et al. 2011) estimated an extent of occurrence (EOO) of 12,805 km² and an area of occupancy (AOO) of 20 km², which would classify the species as Critically Endangered [CR B1a] or at least Endangered [EN B2a]. However, the status could not be confirmed at the moment because information on geographic range decline or fluctuation (subcriteria B2b and B2c, respectively) and on population size is missing. In spite of the single known location, the population occurs inside a natural reserve (Parque Nacional da Serra da Canastra), which should protect the species for some time.

ETYMOLOGY. The epithet “minensis” refers to the type locality, Minas Gerais state.

Asemeia nana M.Mota & J.F.B.Pastore, *sp. nov.*

Type: Brazil, Goiás: Pirenópolis, Serra dos Pireneus, 15°49'06"S, 48°53'57"W, 1141 m alt., 21 Feb. 2021, *M. Mota & J.F.B. Pastore 238* (Holotype: CTBS6002)

Roots fleshy. *Herb* 20–30 cm tall, branches densely pubescent. *Leaves* membranaceous; petiole 2.5 mm long., densely pubescent; blade 3–47 × 14–15 mm, ovate, apex cuneate, base obtuse, margin entire, ciliated, adaxial surface estrigose, abaxial surface pubescent. *Racemes* 3–5 cm long., subax, pubescent, bracts 1.3 × 0.5 mm, deltoid, apex acute, external surface pubescent, internal surface glabrous, no glands, ciliated, margin, caducous; pedicel 2 mm long., glabrous, straight. *Flowers* 4 mm long., pink; external sepals ovate, strongly concave, falcate at the apex, apex rounded, adaxial sepal 2 × 2 mm, glabrous in both surfaces, margin erose, without glands, not ciliated, abaxial sepals 2 × 2 mm, glabrous in both surfaces, margin erose, without glands, not ciliated; internal sepals 5.3 × 4.9 mm, glabrous in both surfaces, margin erose, not ciliated; keel cuculus 2.5 × 3.5 mm, external surface glabrous, internal surface pubescent at the base, ciliated, claw 1.8 mm long., sparsely ciliated; lateral petals 3.7 mm, external surface glabrous, internal surface pubescent at the basal half; staminal

sheath 2.8 mm long., external surface sparsely pubescent at the base, internal surface pubescent at the basal half, free filaments 2 mm long., glabrous; rudimentary petals absent. *Ovary* 0.8 × 0.8 mm, globose, glabrous, with a disc in the ovary base; style 4.2 mm long., bent in the middle at ca. 90° angle, glabrous, pubescent around stigma. *Capsule* not observed (Figs. 2E, F, 3, 5).

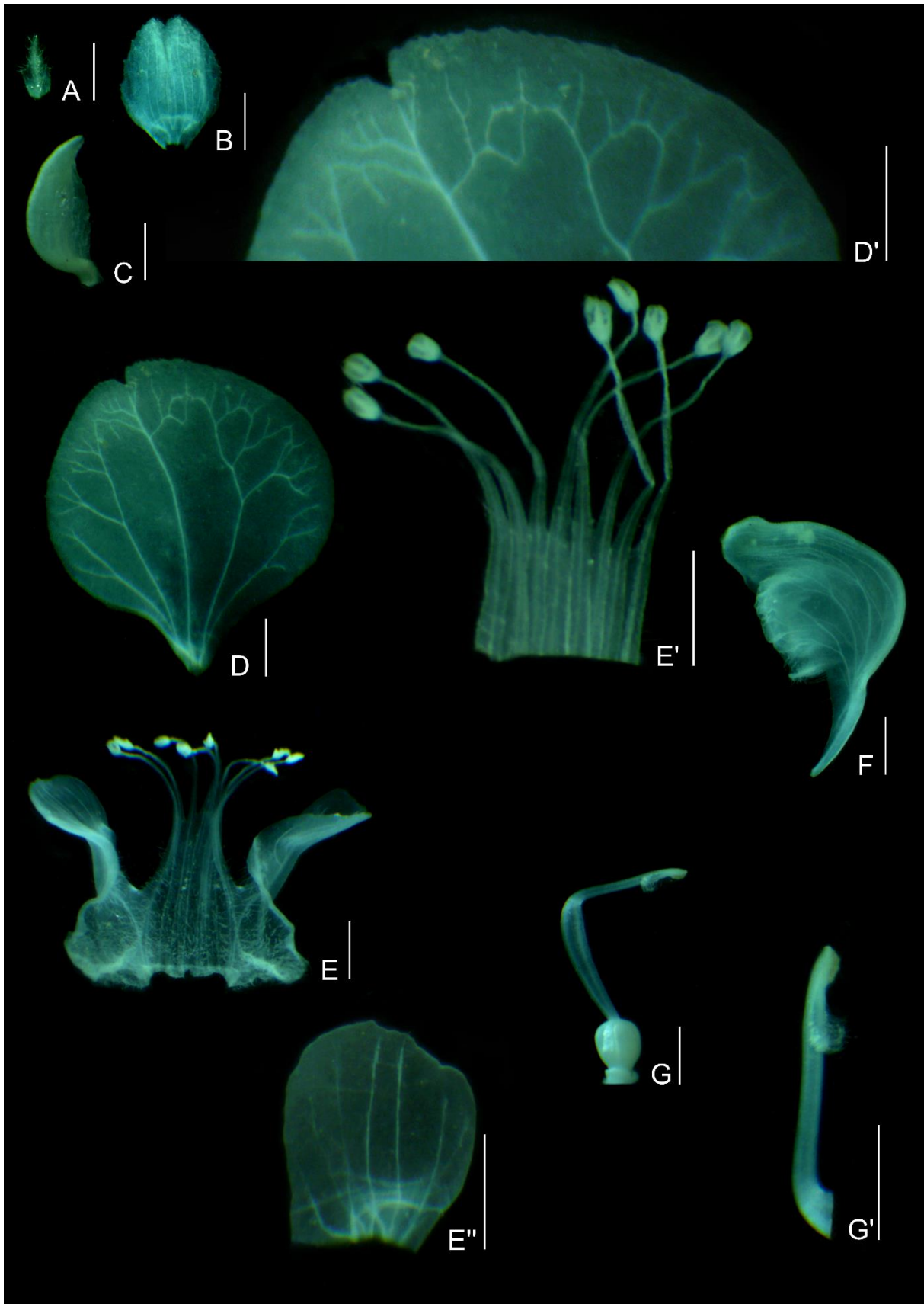


Figure 5. *Asemeia nana* M.Mota & J.F.B.Pastore. A Bract; B Abaxial external sepals; C Adaxial external sepal; D One of the two inner sepals (wings); D' Apex margin of internal sepal (detail); E Androecium and lateral petals; E' Free stamens (detail); E'' Apex of a lateral petal (detail); F Keel; G Gynoecium; G' Stigma. *M.Mota & J.F.B.Pastore 238* (CTBS). Scale bar = 1 mm. Photos by M. Mota. A–K.

RECOGNITION. *Asemeia nana* specimens have often been misidentified in collections as *A. glabra* and *A. hirsuta*, probably because of the small size of individuals (20–30 cm with flowers 4 mm long.) and the curved pedicel. However, it can be distinguished from those species because of the adaxial sepal apex (falcate in *A. nana* vs straight in *A. glabra*), branches, petiole indument (densely pubescent in *A. nana* vs puberulous in *A. glabra*), petiole size (2.5 mm in *A. nana* vs 1 mm in *A. glabra*), and distribution (*A. nana* is endemic to Goiás state whereas *A. glabra* is endemic to Minas Gerais state) (Fig. 3).

DISTRIBUTION. *Asemeia nana* occurs in Cerrado areas, west of Goiás state, between 800–900 m (Map 1).

ADICIONAL SPECIMENS EXAMINED - BRAZIL. Goiás: Alto Paraíso de Goiás, Rodovia GO-239 towards Colinas do Sul, 14°12'12"S, 47°52'1"W, 12 Apr. 2017, *J.F. Carrión & G.A. Reis-Silva* 1814 (HUEFS); Cavalcante, Fazenda Renascer, 6 May 2002, *J.F.B. Pastore et al.* 16 (CEN); Cristalina, 30 km North of Cristalina, BR 040, 20 Nov. 76, *A.C. Allem* 499 (CEN); Cristalina, Rodovia Cristalina-Brasília, 15 Dec. 2004, *J.F.B. Pastore et al.* 1162 (CEN); Luziânia, Fazenda Engexplo, right margem of Rio Corumbá, 16°19'01"S, 48°12'42"W, 877 m alt., 10 Dec. 2002, *J.M. Rezende et al.* 725 (CEN); São Domingos exit from Fazenda dos Alagoanos, towards Estiva, 13°38'53", 46°35'46"W, 12 Mar. 04, *A.A. Santos et al.* 2335 (CEN).

CONSERVATION STATUS ESTIMATION. *Asemeia nana* is currently known only from seven collections from four different locations. Considering geographic range, GeoCAT (Bachman et al. 2011) estimated an extent of occurrence (EOO) of 36,413.632 km² and an area of occupancy (AOO) of 28 km², which would classify the species as Near Threatened [NT] or at least Endangered [EN B2a]. However, the status could not be confirmed at the moment because information on geographic range decline or fluctuation (subcriteria B2b and B2c, respectively) and on population size is missing. In spite of the four known locations (two of them close to natural reserves), none of the known populations are inside a protected area.

ETYMOLOGY. The epithet refers to the overall small size of the plants.

KEY TO THE SPECIES OF ASEMEIA FROM GOIÁS AND MINAS GERAIS STATE, BRAZIL (ADAPTED FROM MOTA ET AL. (2021).

1. Glands at the margin of external sepals absent..... 2
 2. Root lignified; pedicel curved.....3
 3. Caruncle rugose.....*A. acuminata*
 - 3'. Caruncle corneous.....4
 4. Height 40–80 cm, bracts persistent, branches pubescent..... *A. eglandulosa*
 - 4'. Height 10–30 cm, Bracts deciduous, branches hirsute.....5
 5. Leaves linear to elliptic, height 20–30 cm tall, flower 4.5–6.3 mm long, pedicel glabrous.....*A. minensis*
 - 5'. Leaves ovate, height 10–15 cm tall, flower 4 mm long, pedicel sparsely puberulous.....*A. hirsuta*
 - 2'. Root fleshy; pedicel straight.....6
 6. Bracts persistent; petiole 1 mm long..... *A. glabra*
 - 6'. Bracts caducous; petiole 1.6–2.5 mm long..... *A. nana*

- 1'. Glands at the margin of external sepals present..... 7
7. Bracts deciduous at the flowers..... 8
8. Leaves linear, persistent or briefly deciduous..... 9
9. Leaves briefly deciduous, subsessile, 1–4 × 3 1–3 mm.....*A. marquesiana*
- 9'. Leaves persistent, petiolate, 7–20 × 3 0.6–1 mm. *A. campestris*
- 8'. Leaves lanceolate to ovate, persistent..... 10
10. Bracts deltoid, external sepal not ciliated..... *A. ovata*
- 10'. Bracts ovate, external sepals ciliated..... 118
11. Internal sepal obovate, leaves lanceolate..... *A. violacea*
- 11'. Internal sepal oblong or ovate, leaves ovate..... 12
12. Leaves chartaceous, apex acute, internal sepal ovate.....*A. monninoidea*
- 12'. Leaves membranaceous, apex acuminate, internal sepal oblong.....*A. parietaria*
- 7'. Bracts persistent at the flowers..... 13
13. Leaves sessile and deciduous.....*A. subaphylla*
- 13'. Leaves petiolate and persistent..... 14
14. Apex of cuculus (the yellowish part) 1/2 of the cuculus.....*A. coracoralinae*
- 14'. Apex of cuculus (the yellowish part) 1/3 of the cuculus.....15
15. Leaves linear 6–10 × 3 0.5–1 mm, pedicel sparsely puberulous.....
.....*A. lindmaniana*
- 15'. Leaves elliptic 20–31 × 3 2.5–4 mm, pedicel glabrous..... 16
16. Pedicels straight, internal sepals elliptic..... *A. hebeclada*
- 16'. Pedicels curved, internal sepals orbicular or suborbicular..... 17
17. Flowers 4 mm long., internal sepals suborbicular, not ciliate.....*A. rhodoptera*

17'. Flowers 6 mm long., internal sepals orbicular,
 ciliate.....*A. aguiariana*

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2.4. CAPÍTULO III. Phylogeny of *Asemeia* Raf. emend Small. (Polygalaceae)

O presente capítulo será submetido à revista *Systematic Botany*.

Phylogeny of *Asemeia* Raf. *emend* Small. (Polygalaceae)

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ABSTRACT

The family Polygalaceae is distributed worldwide and comprises approximately 1,260 species in 30 genera. Among the four tribes within the family, the tribe Polygaleae is characterized by unique flower structures resembling those of the Leguminosae-papilionoideae. *Asemeia* Raf. *emend.* Small. is a genus within the Polygaleae tribe, consisting of 38 species and 1 variety found in Neotropical regions such as the Cerrado, Rupestrian fields, and Restinga. Phylogenetic studies on *Asemeia* have been limited, with only four species sampled in previous studies. In this study, we present the first comprehensive phylogeny of *Asemeia*, including nuclear (ITS and ETS) and plastid (*trnK-matK* and *trnL-F*) markers, to infer internal relationships and compare the plastid and nuclear phylogenetic trees. Bayesian and maximum likelihood analyses were performed, and well-resolved phylogenetic trees with high support were obtained for both nuclear and plastid markers. *Asemeia* was found to be monophyletic in both analyses, while the subgenus *Apopetala* was recovered as paraphyletic. The study identified, seven lineages, and five major clades within genus *Asemeia*, named 'Apopetala', 'Asemeia', 'Hebeclada', 'Purpurea', and 'Striata'. The findings also suggest that the diagnostic features previously used to define *Asemeia* may be homoplastic characters. Overall, this study provides valuable insights into the phylogenetic relationships within *Asemeia* and offers new insights to enable a revised classification within the genus.

INTRODUCTION

The family Polygalaceae is worldwide distributed, including about 1,200 species in 30 genera (Mota et al., 2019). The family is divided in four tribes: Carpolobieae B.Eriksen, Diclidanthereae Reveal, Xanthophylleae Baill., and Polygaleae Chodat (Eriksen & Persson, 2007; Reveal et al., 2012). The tribe Polygaleae is recognized by characteristic flowers (with the keel formed by one petal and the wings by internal sepals), with trimerous corolla, and eventually with a pair of rudimentary petals which superficially resembles the Leguminosae-papilionoideae flowers (Bello-Gutierrez & al., 2010). The genus *Asemeia* Raf. *emend.* Small. belongs to the tribe Polygaleae currently comprising 36 species occurring in the Cerrado, campo rupestre, and restinga, all with Neotropical distribution (Mota & al. in prep.). The genus was segregated from *Polygala* by Pastore & Abbott (2012) based on phylogenetic and morphologic features, being a sister group of the genus *Caamembeca* J.F.B.Pastore, also segregated from *Polygala* (Pastore, 2012). Members of *Asemeia* have very characteristic flowers with green external sepals, purple to violet corolla and wings (petaloid internal sepals)

with retuse apex, and the keel with yellow apex, being diagnostic features the connate inferior external sepals, and non-crested keel (Aguiar-Dias & al., 2008; Pastore 2006). The genus includes currently two subgenera: the typical one, *Asemeia*, and *Apopetala* (S.F.Blake) J.F.B.Pastore & J.R.Abbott, which can be recognized by the pedicel length (longer than the wings, in the subgen. *Apopetala* vs shorter than the wings, in subgen. *Asemeia*), style shape (apically uncinata, curved medially or not in *A.* subgen. *Apopetala* vs not apically uncinata, bent medially at an angle of ca. 90° in *A.* subgen. *Asemeia*), and by the shape of the capsule (cordate in *A.* subgen. *Apopetala* vs elliptic in *A.* subgen. *Asemeia*). Although phylogenetic studies were used to recognize *Asemeia*, members of this genus were poorly sampled in these studies: only eight species were sampled in previous phylogenetic studies: *A. acuminata* (Willd.) J.F.B.Pastore & J.R.Abbott, *A. floribunda* (Benth.) J.F.B.Pastore & J.R.Abbott, *A. grandiflora* (Walter) Small., *A. hebeclada* (DC.) J.F.B.Pastore & J.R.Abbott, *A. ilheotica* (Wawra) J.F.B.Pastore & J.R.Abbott, *A. monticola* (Kunth) J.F.B.Pastore & J.R.Abbott, *A. sphaerospora* (Chodat) J. F. B. Pastore & J. R. Abbott and *A. violacea* (Aubl.) J.F.B.Pastore & J.R.Abbott (Pastore & al., 2017; Persson, 2001; Forest, 2007; Abbott, 2009). Here is presented the first comprehensive phylogeny of *Asemeia*, including ribosomal nuclear and plastid markers to infer internal relationships.

MATERIAL AND METHODS

Taxon sampling— Field expeditions were conducted by MM and JFBP between March 2019 and October 2021. Leaf material (except for leafless species, so the stems were kept) was dried in silica-gel or sodium-chloride/CTAB *in loco*. The voucher specimens collected were listed and held at CTBS (acronym following Thiers, 2023). The taxa of *Asemeia* not found through the field expeditions were sampled from herbarium specimens: BM, CEN, CTBS (mainly), G, HUEFS, L, K, MO, NY, and P herbaria (acronyms following Thiers, 2023) or from Genbank. A total of 111 specimens were sampled, representing 33 of the 36 species that conform the genus.

Extraction— The lab work was conducted at the Jodrell laboratories at Royal Botanic Gardens, Kew. Total genomic DNA was extracted from fertile specimens fresh, silica-gel-dried or sodium-chloride/CTAB-preserved material (Chase & Hills, 1991; Rogstad, 1992), or from herbarium specimens using the methodology described in Pastore & al. (2017) and Mota & al. (2019). Total genomic DNA was extracted according to the 2× CTAB protocol (Doyle & Doyle, 1987).

DNA amplification and sequencing— We sequenced the plastid regions 3' *trnK*–*matK* (including the partial *trnK* intron and the *matK* coding region), and *trnL*–F, and nuclear ribosomal nuclear nrITS (ITS1-5.8S-ITS2) and partial nrETS. The *trnK*–*matK* region was amplified in two separate reactions, using the overlapping primer pairs designed to this study based on 4La/1932R and 1100L/*trnK*2R b (Wojciechowski & al., 2004) (Table 1). The *trnL*-F region was amplified using the primers C and F (Taberlet & al., 1991). The nuclear ITS region was amplified with either the primers ITS 17SE and ITS 26SE (Sun & al., 1994) or ITS2 and ITS3 (White & al., 1990). The ETS was amplified and sequenced using the primers ETS 18S R (Lyskov, 2019) and ETS F-Asemeia, specially designed for this study. The primers used in this study are shown in Table 1.

Polymerase chain reactions (PCRs) were performed in 25 µL reaction mixtures containing 2× PCR Premix 'Dream Taq' (4.0mM MgCl₂), TBT (5×), DMSO (2%) (dimethyl sulfoxide) added to relax secondary structure formation, 0.2 µM of each primer and 1 µL genomic DNA. All PCR products were cleaned using QIA Quick silica columns. The sequences were amplified using the following parameters: 28 (ITS and ETS) or 34 (plastid loci) cycles, with initial denaturation at 94°C for 5 min, denaturation at 94°C for 1 min, annealing at 52°C (ITS and ETS) or 55°C (plastid loci) for 1 min, elongation at 72°C for 2 min, and final elongation at 72°C for 5 min. The PCR products were examined using 1% agarose gel electrophoresis with ethidium bromide and visualized using an ultraviolet transilluminator. To purify the amplified products, the samples were subjected to column-based purification. The PCR products were mixed with an equal volume of Buffer PB (125 ml), and the mixture was applied to a column and centrifuged at 13,000 rpm × for 1 minute. The column was then washed twice with Buffer PE, and the purified products were eluted in 35 µL of Buffer EB. The eluted products were quantified using a NanoDrop spectrophotometer (Thermo Fisher Scientific) to assess their concentration and purity.

Cycle sequencing reactions were performed using the same primers used for PCR amplification in 2 µl reaction volumes. Except for ITS, which was sequenced with internal set of primers ITS4 (White & al., 1990) and ITS92 (Desfeux & Lejeune, 1996).

The purified sequencing products were run mainly in Jodrell laboratories at Kew Royal Botanic Garden (RBG – Kew), using a ABI3130XL sequencer (Applied Biosystems/Life

Technologies, Carlsbad, California, U.S.A.) or alternatively at State University of Feira de Santana (Bahia, Brazil), following the manufacturer's protocol.

Data analyses— Geneious v.6.1.6 (Drummond & al., 2012a) was used to edit and assemble the electropherograms. The sequences were aligned using MUSCLE v.3.8 with default settings (Edgar, 2004) and then manually adjusted in Geneious.

The nuclear (nrITS and nrETS) and plastid (*trnK–matK* and *trnL–F*) sequences were combined in two datasets. The best molecular evolution model was selected for each dataset using the Akaike information criterion implemented in jModelTest 2 (Darriba & al., 2012).

Maximum likelihood (ML) analyses were performed using RAxML v.8.1.18 (Stamatakis & al., 2008; Stamatakis, 2014) for each dataset, and bootstrap support values were calculated under the 3

\BB232 0with 1000 replicates.

Bayesian analyses were conducted using MrBayes v.3.1.2 (Huelsenbeck & Ronquist, 2001; Ronquist & al., 2012) through the Cyberinfrastructure for Phylogenetic Research (Cipres Science Gateway; Miller & al., 2010) for each dataset. Two separate runs of a Markov Chain Monte Carlo (MCMC) permutation of parameters, initiated with a random tree and eight simultaneous chains set at default temperatures (Huelsenbeck & Ronquist, 2001), were performed in parallel. Two runs of four MCMC for 2×10^6 generations, with trees sampled every 1,000th generation. The convergence of four MCMC chains were assessed through Tracer (Rambaut & al., 2018), checking if the standard deviation of split frequencies was <0.01 , thus the first 25% of the generated trees were discarded as burn-in. Posterior probabilities were assessed by calculating a 50% majority-rule consensus in MrBayes. All Bayesian majority-rule consensus trees were visualized and partially edited in FigTree v.1.4 (Rambaut, 2012). The trees generated by nuclear and plastid datasets were inspected visually for hard incongruences (with thresholds defined here: $PP \geq 0.95$ and/or $BS \geq 80\%$, following Pelsler & al. (2010)). As some species emerged in contrasting places of the tree, the datasets were not combined, and were analysed separately.

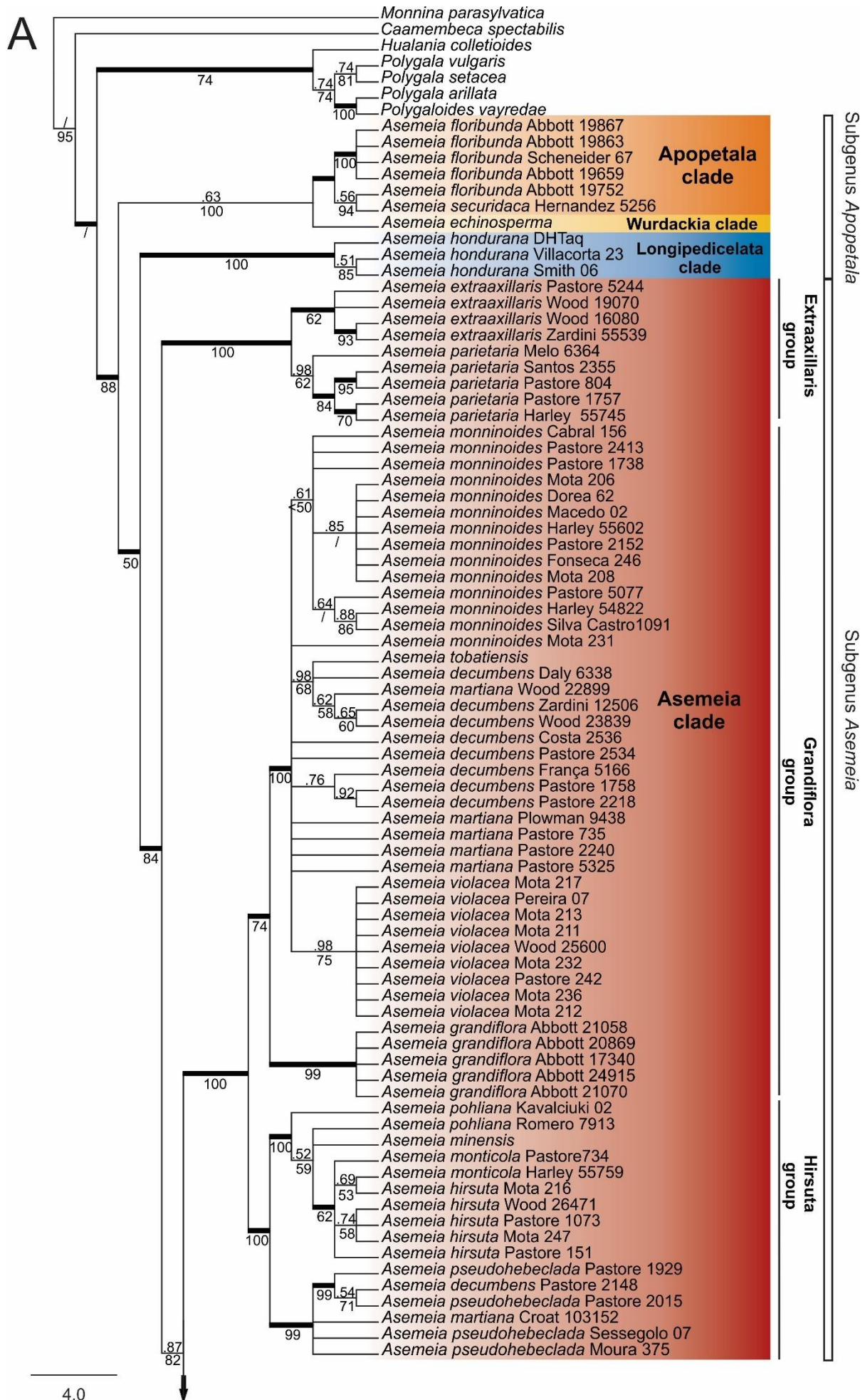
RESULTS

The best-match models were GTR + I + Γ for nuclear, and GTR + Γ for plastid loci. The phylogenies included 149 accessions: 111 from *Asemeia* (33 species), and *Monnina*

parasylyvatica as outgroup. *Asemeia* was divided here in clades and subclades for better discussion. All species of *Asemeia* were sampled except by *A. apopetala*, *A. gollmeri* and *A. ignatii*. The clades were informally named for convenience and discussion. We recognized seven clades, Apopetala, Asemeia (with the subclades: Extraaxillaris, Asemeia, and Hirsuta), Hebeclada (with subclades Rhodoptera, and Hebeclada), Longipedicelata, Purpurea, Striata, and Wurdackia (Table 2).

The nuclear and plastid phylogenies— *Asemeia* was recovered as monophyletic in both nuclear (PP 1.0, BS 80%) (fig. 1), and plastid (PP 1.0, BS 100%) (fig. 2) analyses.

The subgenus *Asemeia*, as delimited by Pastore & Abbott (2012) formed a clade in both Bayesian and ML analyses for both dataset (nuclear PP 1.0, BS 84%, plastid PP 1.0, BS 100%). However, the subgenus *Apopetala*, as delimited by Pastore & Abbott (2012), was recovered as paraphyletic. *Asemeia echinosperma*, emerged as sister of other members sampled of the subgen. *Apopetala* in the nuclear tree, except by *A. hondurana* (nuclear PP 1.0, BS 100, plastid -) which emerged as sister of the subgenus *Asemeia*. In the plastid tree, *A. echinosperma* emerged in a polytomy with *A. floribunda* and the subgenus *Asemeia* + *A. hondurana*.



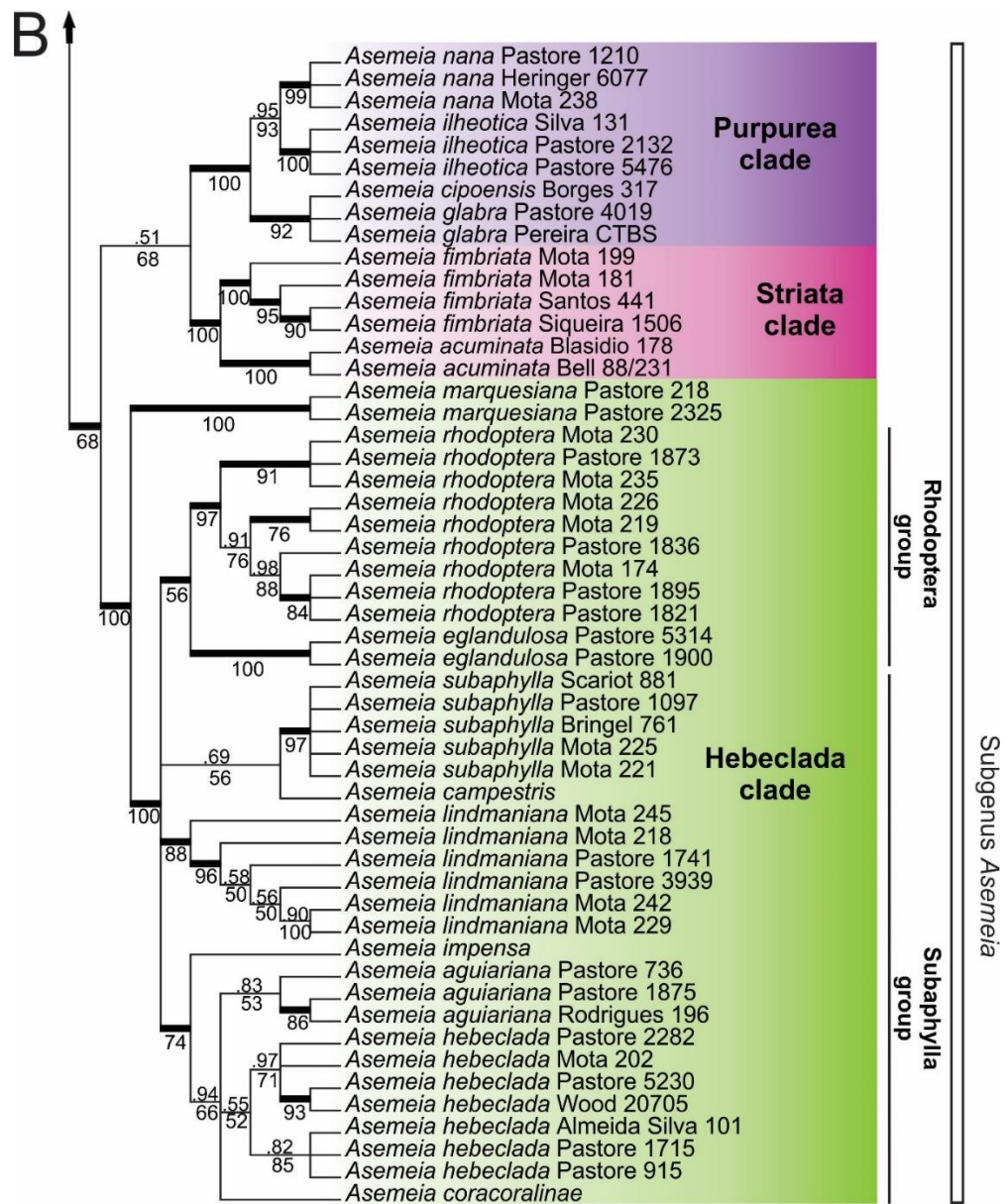
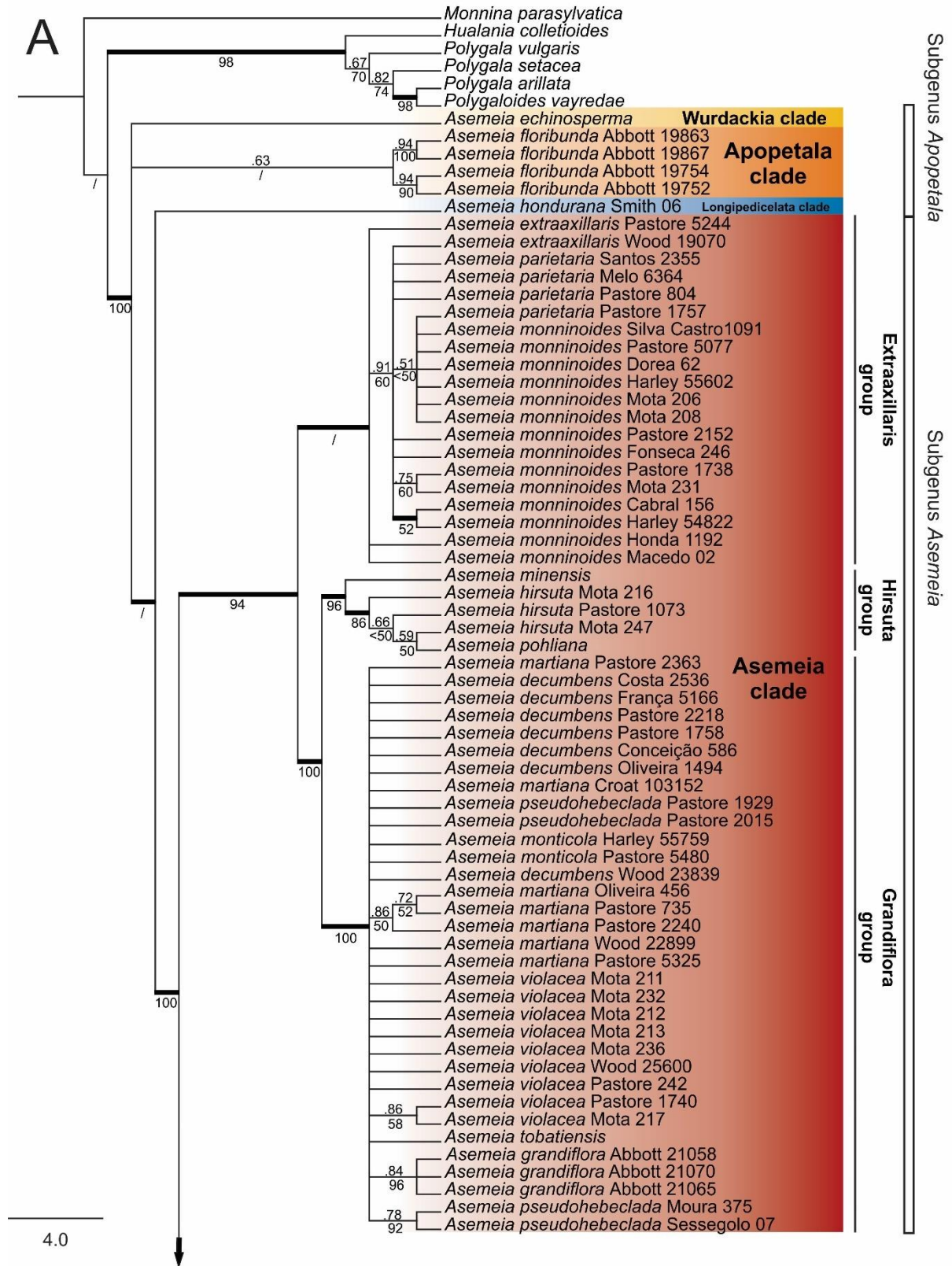


Figure 1. A–B. A majority-rule consensus tree from the Bayesian analysis of nuclear (ITS + ETS) dataset. Numbers above branches are posterior probabilities, with PP = 1.0 for branches in bold. Numbers below branches are bootstrap support (ML).



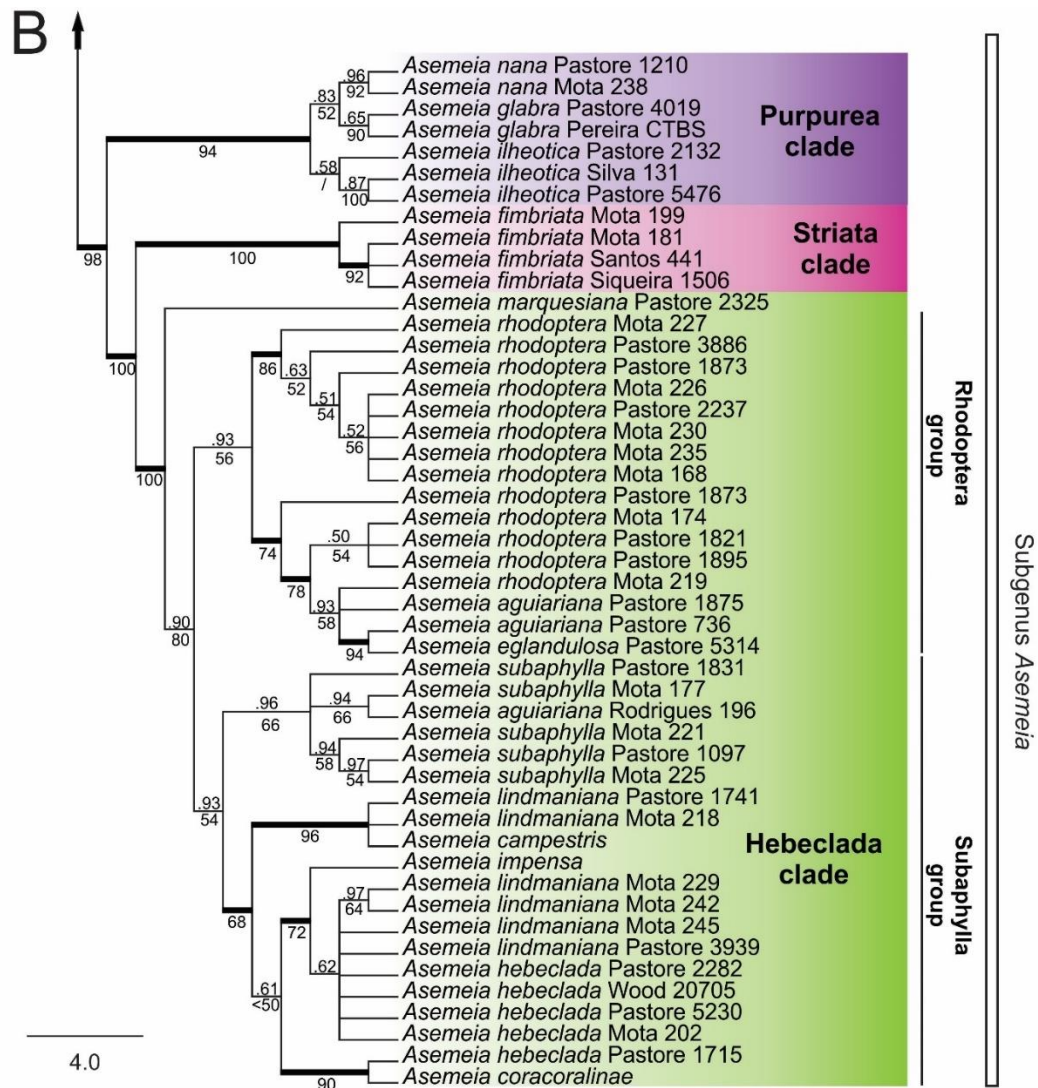


Figure 2. A–B. A majority-rule consensus tree from the Bayesian analysis of plastid (*trnK*–*matK* + *trnL*–*F*) dataset. Numbers above branches are posterior probabilities, with PP = 1.0 for branches in bold. Numbers below branches are bootstrap support (ML). Support bootstrap below 50% - ‘/’;

Incongruent species— Analysis of both nuclear and plastidial molecular phylogenies revealed that some species were assigned to different clades when the two topologies are compared. Samples identified as *A. monninooides* were grouped both in the *Asemeia* subclade (nuclear) and *Extraaxillaris* subclade (plastid) (Fig. 3). Also, *A. monticola* emerged in *Asemeia* subclade (plastid) as in *Hirsuta* subclade (nuclear). Finally, *A. aguiariana*, appears in *Rhodoptera* and *Hebeclada* subclades (plastid) but only in subclade *Hebeclada* (nuclear).

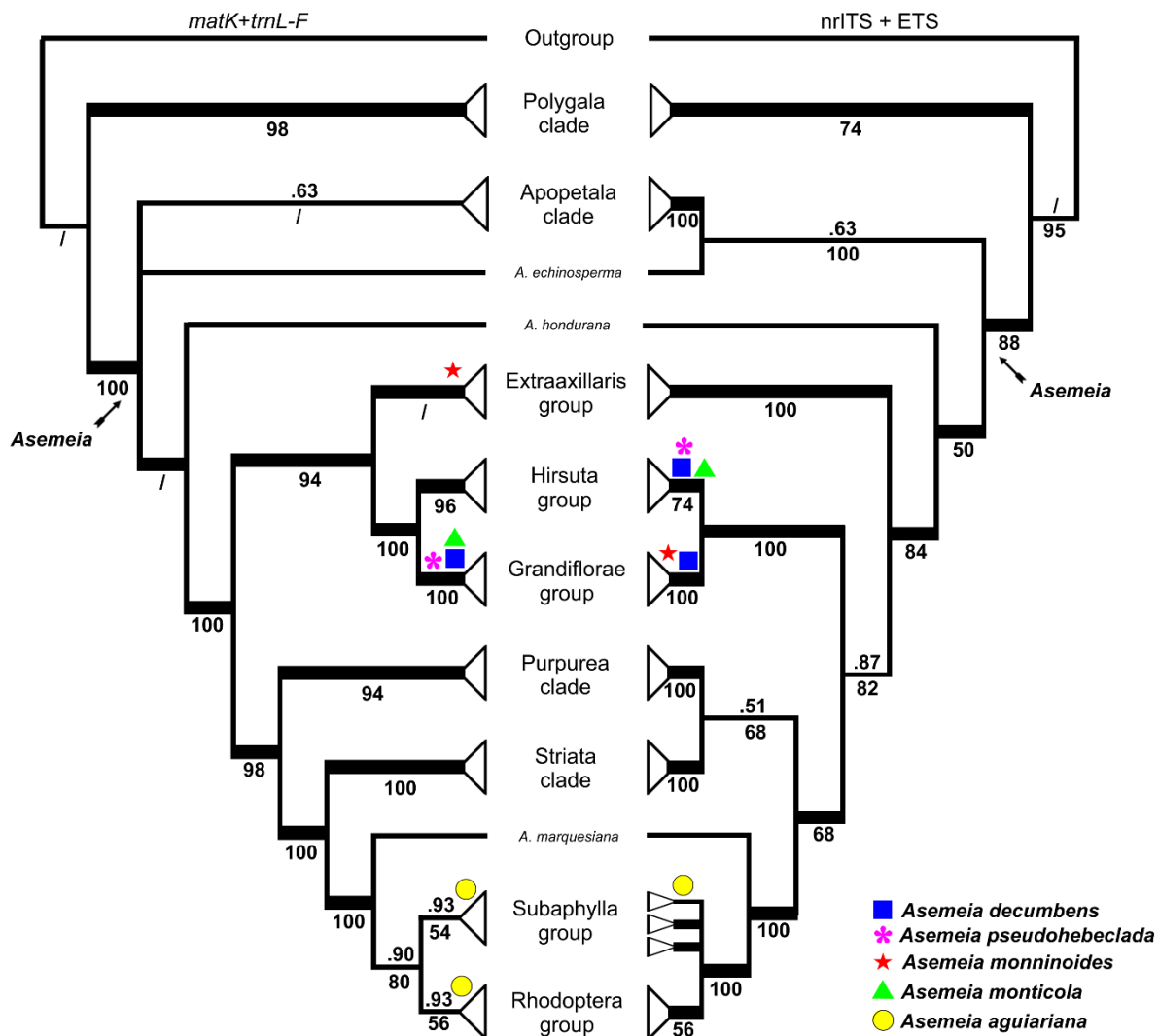


Fig 3. Summary of the relationships among main clades and subclades of *Asemeia* in plastid (*matK* + *trnL-F*) (left) and nuclear (ETS + ITS) (right) phylogenetic analysis for Polygalaceae. Numbers above branches are posterior probabilities (PP), with PP = 0.99–1.0 for branches in bold. Numbers below branches are bootstrap support (BS) values from the Maximum Likelihood analysis. Symbols highlighting incongruent species.

Discussion

In this study, *Asemeia* was recovered as monophyletic, corroborating the results previously found (Mota & al. 2019; Pastore & al. 2023). The genus has been recognized for its connate external sepals and a style curved in 90° (in *A.* subgenus *Asemeia*) (Aguilar, 2008; Pastore & Abbott, 2012). However, the connate external sepals are also present in *Rhamphopetalum* J.F.B.Pastore & M.Mota, *Senega spinescens* (Subg. *Clinclinia*) and *Polygala* section *Tetrasepalae*, which are not sister groups of *Asemeia* (Pastore & al., 2019). This

suggests that these potential synapomorphies of *Asemeia* is a homoplastic character, arising independently in different lineages of Polygalaceae.

The clade Apopetala (nuclear PP 1.0, BS 100%, plastid PP.63, BS -) is sister of *Asemeia echinosperma* (nuclear PP.63, BS 100%, plastid is ambiguous (not resolved)) and includes all members of *Asemeia* subgenus *Apopetala*, except *A. hondurana*, which is recovered as sister of subgenus *Asemeia*. Historically, *A. echinosperma* was included in the subgenus *Apopetala* (Pastore & Abbott, 2012), despite its enigmatic morphology as the globose structure at the base of the ovary resembling a nectary and the presence of yellow glands forming spots on the outer and inner sepals, as well as capsules with hardly lobed apex (Mota & al., in prep.). However, because of its restricted distribution in Suriname and French Guiana and difficulty to access specimens for a comprehensive analysis (Pastore comm. pers.), it was included in subgenus *Apopetala*. The distinctive morphology of this species strongly supports its classification as a distinct clade.

The clade *Asemeia* was not recovered in the nuclear tree but was strongly supported in plastid analysis (PP 1.0, BS 94%). On nuclear analysis, the internal clade Extraaxillaris appears weakly supported (PP 1.0, BS 84%) as sister group of the clade comprising the remaining species of subgenus *Asemeia*. The monophyly of *A. extraaxillaris* was not supported in the plastid and combined tree analyses (S1 file: Fig. S1). *Asemeia decumbens* exhibited complex phylogenetic relationships. In the plastid tree analysis, *A. decumbens* emerged collapsed with several species in the subclade Grandiflorae, whereas on the nuclear analysis, *A. decumbens* appears segregated in the subclades Grandiflorae and Hirsutae. *Asemeia decumbens*, a species known for its presence of morphotypes and the difficulty of identification, exhibited complex phylogenetic patterns in our analysis. We suspect that *A. decumbens* may have undergone hybridization events with other *Asemeia* species, leading to a potential mixture of genetic material. This could explain the observed variation and challenges in accurately identifying many specimens labeled as *A. decumbens*. Further investigations into the genetic composition and hybridization dynamics of *A. decumbens* and related species would be valuable for elucidating this complex.

The well-supported clade Purpurea consists of four species: *A. cipoensis*, *A. glabra*, *A. ilheotica*, and *A. nana*. The latter was recently described (Mota & al., 2023) and was historically misidentified as *A. glabra*, likely due to its small size and the purple coloration on the abaxial surface of its leaves (a feature also found in *A. ilheotica*). This purple coloration on the abaxial leaf surface could be one of the synapomorphies of the Purpurea clade.

The Striata clade is sister group of the Hebeclada clade and comprises *Asemeia acuminata* and *A. fimbriata*, both species exhibiting seeds with conspicuous longitudinal stripes.

The Hebeclada clade was recovered as a monophyletic group strongly supported (PP 1.0, BS 100%) in both analyzes and can be characterized by the presence of glands in the margin of the external sepals, except for *A. eglandulosa*, a recently described species found in the Cerrado region (Mota and Pastore, 2021). *Asemeia coracoralinae*, another recently described species (Mota & al., 2023), shares morphological similarities with *A. rhodoptera*. However, in the analysis, *A. coracoralinae* was recovered as grouped together with *A. hebeclada* (give support values). Additionally, *Asemeia marquesiana*, a species well-adapted to fire in the Cerrado, is the sister group to all other species within the Hebeclada clade.

Taxonomic treatment

Asemeia subgenus **Apopetala** (S. F. Blake) J. F. B. Pastore & J. R. Abbott. *Polygala* section *Apopetala* S. F. Blake, Contr. Gray Herb. 2: 59. 1916. (type, designated here, *Polygala apopetala* S. F. Blake [= *Asemeia apopetala* (S. F. Blake) J. F. B. Pastore & J. R. Abbott] (Species 1–3).

Coriaceous flowers, absence of glands on the margin of the outer sepals, distributed from Mexico to Costa Rica.

Asemeia subgenus **Asemeia** (Species 4–34)

Polygala subgenus *Hebeclada* section *Adenotricha* S. F. Blake, Contr. Gray Herb. 47: 63. 1916. TYPE: *Polygala grandiflora* Walter [= *Asemeia grandiflora* (Walter) Small].

Asemeia subgenus **Asemeia** section **Asemeia** (Species 4–18)

IDENTIFICATION KEY TO *ASEMEIA* SUBGEN. *ASEMEIA* SECTION *ASEMEIA*

Conclusion

This phylogenetic study of the genus *Asemeia* provides insights into its relationships and highlights the need for a reevaluation of certain morphological characters traditionally

considered diagnostic for infrageneric groups. While the *A.* subgen. *Asemeia* appears as monophyletic in both nuclear and plastid analyses, the subgenus *Apopetala* is revealed as paraphyletic, challenging previous classifications. Notably, *A. hondurana*, traditionally placed in subgenus *Apopetala*, emerges as a distinct clade, suggesting a need for taxonomic reconsideration.

The well-supported clades identified, called here *Apopetala*, *Asemeia*, *Hebeclada*, *Purpurea*, *Striata*, and *Wurdackia*, provide a framework for future taxonomic revisions and morphological studies.

The incongruences observed in the placement of some species, such as *A. aguiariana*, *A. decumbens?*, *A. monninoidea*, *A. monticola*, and *A. pseudohebeclada* between nuclear and plastid phylogenies underscore the complex evolutionary history within the genus. Further investigations into the hybridization dynamics, especially of *A. decumbens* and related species are warranted to unravel these intricate patterns.

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Table 1. Primers sequences used in this study.

ETS 18S R1	GAGCCATTCGCAGTTTCACAG	Lyskov & al. (2019)
ETS F Asemeia	TGTCGGTGGCAGGCTCCATGC	Designed for the present study
ITS 17SE	ACGAATTCATGGTCCGGTGAAGTGTTTCG	Sun & al. (1994)
ITS 26SE	TAGAATTCCTCCGGTTCGCTCGCCGTTAC	Sun & al. (1994)
ITS 92	AAGGTTTCCGTAGGTGAA	Desfeux & al. (1996)
ITS2	GCTGCGTTCATCGATGC	White & al. (1990)
ITS3	GCATCGATGAAGAACGCAGC	White & al. (1990)
ITS4	TCCTCCGCTTATTGATATGC	White & al. (1990)
<i>matK</i> -Poly3F	CGAAGTMAAATGYTAGAMAATTC	unpub., adapted from 1100L Wojciechowski (2004)
<i>matK</i> -Poly4F	GAAYTCTTRGTTCAAAMCCTTCG	unpub., adapted from matK4La Wojciechowski (2004)
<i>matK</i> -Poly5R	ATTGGRAMTGTTGTATCAARC	unpub., adapted from matK-1932R Wojciechowski (2004)
<i>trnK2R*</i> (<i>matK</i>)	CCCGGAACTAGTCGGATGG	Wojciechowski & al. (2004)
<i>TrnL</i> -F C	CGAAATCGGTAGACGCTACG	Taberlet & al. (1991)
<i>TrnL</i> -F F	ATTTGAACTGGTGACACGAG	Taberlet & al. (1991)

Table 2. Clades, subclades and species samples in this study.

Clade	subclade	species
Apopetala		<i>Asemeia floribunda</i> (Benth.) J.F.B.Pastore & J.R.Abbott
Apopetala		<i>Asemeia securidaca</i> (Chodat) J.F.B.Pastore & J.R.Abbott
Asemeia	Extraaxillaris	<i>Asemeia extraaxilaris</i> (Chodat) J.F.B.Pastore & J.R.Abbott
Asemeia	Extraaxillaris	<i>Asemeia parietaria</i> (Chodat) J.F.B.Pastore & J.R.Abbott
Asemeia	Extraaxillaris / Asemeia	<i>Asemeia monninooides</i> (Kunth) J.F.B.Pastore & J.R.Abbott
Asemeia	Asemeia	<i>Asemeia grandiflora</i> (Walter) Small
Asemeia	Asemeia	<i>Asemeia martiana</i> (A.W.Benn.) J.F.B.Pastore
Asemeia	Asemeia	<i>Asemeia tobatiensis</i> (Chodat) J.F.B.Pastore & J.R.Abbott
Asemeia	Asemeia	<i>Asemeia violacea</i> (Aubl.) J.F.B.Pastore & J.R.Abbott
Asemeia	Hirsuta	<i>Asemeia hirsuta</i> (A.St.-Hil. & Moq.) J.F.B.Pastore & J.R.Abbott
Asemeia	Hirsuta	<i>Asemeia minensis</i> M.Mota & J.F.B.Pastore
Asemeia	Hirsuta	<i>Asemeia monticola</i> (Kunth) J.F.B.Pastore & J.R.Abbott
Asemeia	Hirsuta	<i>Asemeia pohliana</i> (A.St.-Hil. & Moq.) J.F.B.Pastore & J.R.Abbott
Asemeia	Hirsuta	<i>Asemeia pseudohebeclada</i> (Chodat) J.F.B.Pastore & J.R.Abbott
Asemeia	Hirsuta / Asemeia	<i>Asemeia decumbens</i> (A.W.Benn.) M.Mota & J.F.B.Pastore
Hebeclada	Hebeclada / Rhodoptera	<i>Asemeia aguiariana</i> J.F.B.Pastore & M.Mota
Hebeclada	Hebeclada	<i>Asemeia campestris</i> J.F.B.Pastore & M.Mota
Hebeclada	Hebeclada	<i>Asemeia coracoralinae</i> M.Mota & J.F.B.Pastore
Hebeclada	Hebeclada	<i>Asemeia hebeclada</i> (DC.) J.F.B.Pastore & J.R.Abbott
Hebeclada	Hebeclada	<i>Asemeia impensa</i> (Wurdack) M.Mota & J.F.B.Pastore
Hebeclada	Hebeclada	<i>Asemeia lindmanniana</i> (Chodat) J.F.B.Pastore & J.R.Abbott
Hebeclada	Hebeclada	<i>Asemeia subaphylla</i> J.F.B.Pastore & M.Mota
Hebeclada	Rhodoptera	<i>Asemeia eglandulosa</i> J.F.B.Pastore & M.Mota
Hebeclada	Rhodoptera	<i>Asemeia rhodoptera</i> (Mart. ex A.W.Benn.) J.F.B.Pastore & J.R.Abbott
Hebeclada	Rhodoptera?	<i>Asemeia marquesiana</i> (J.F.B.Pastore & T.B.Cavalc.) J.F.B.Pastore & J.R.Abbott
Longipedicelata		<i>Asemeia hondurana</i> (Chodat) J.F.B.Pastore & J.R.Abbott
Purpurea		<i>Asemeia cipoensis</i> M.Mota & J.F.B.Pastore
Purpurea		<i>Asemeia glabra</i> (A.W.Benn.) J.F.B.Pastore & J.R.Abbott
Purpurea		<i>Asemeia ilheotica</i> (Wawra) J.F.B.Pastore & J.R.Abbott
Purpurea		<i>Asemeia nana</i> M.Mota & J.F.B.Pastore
Striata		<i>Asemeia acuminata</i> (Willd.) J.F.B.Pastore & J.R.Abbott
Striata		<i>Asemeia fimbriata</i> (A.W.Benn.) M.Mota & J.F.B.Pastore
Wurdackia		<i>Asemeia echinosperma</i> (AUTHORS)

S1. Supplementary material

The nuclear and plastid phylogenies analysis can be considered congruent when putative problematic samples are excluded from the analysis. Therefore, a combined analysis of nuclear and plastid datasets was performed excluding these incongruent samples (see S1), which groups in different clades when comparing the nuclear and plastid phylogenetic topologies, these samples were tentatively treated as natural hybrids, or/and species with reticulated origin.

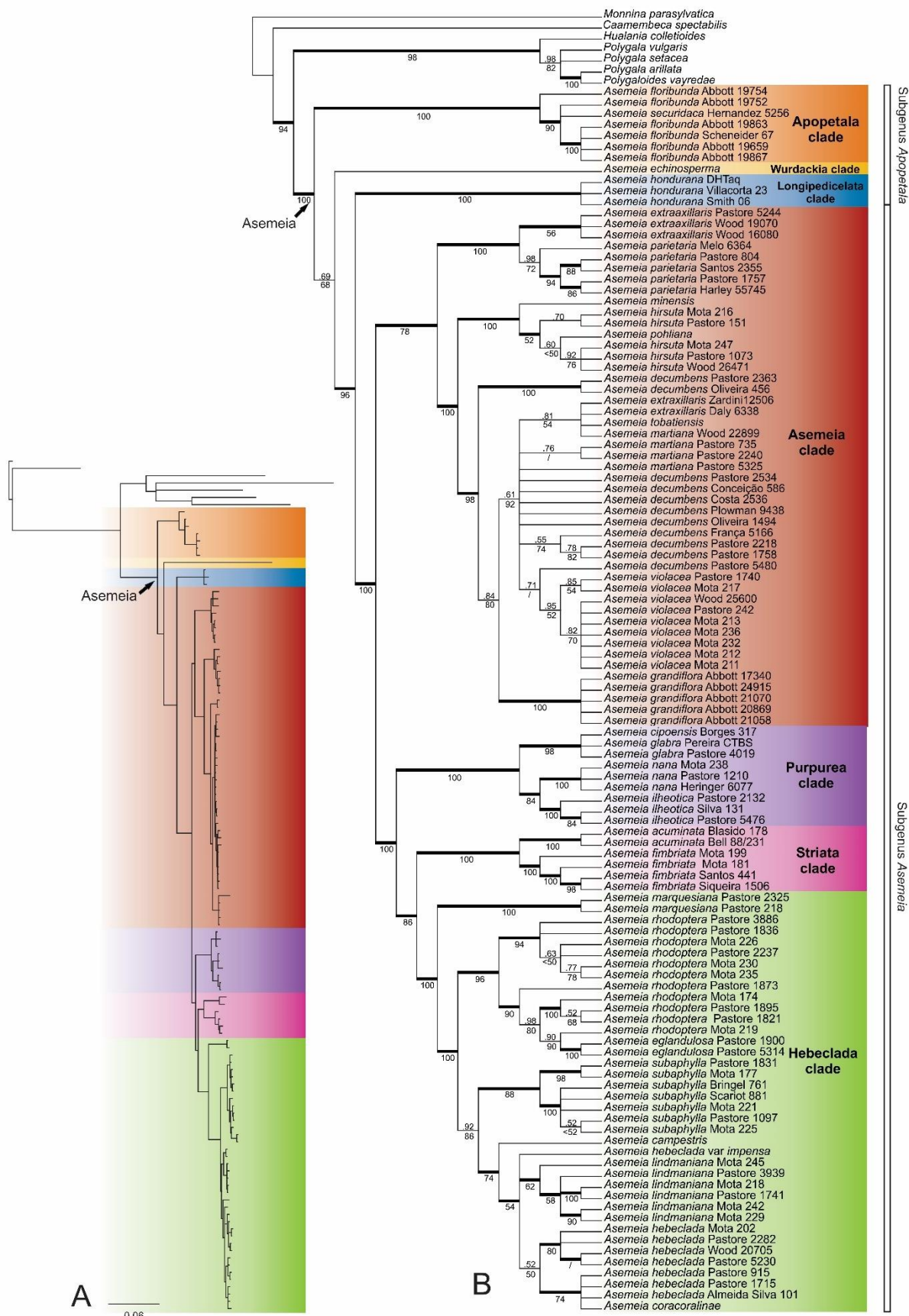


Fig. S1. A. Phylogram of branch lengths. B. Majority-rule consensus tree from the Bayesian analysis of the combined nuclear (ETS + ITS) and plastid (matK+trnL-F) datasets for Polygalaceae. Numbers above branches are posterior probabilities (PP), with PP = 1.0 for branches in bold. Numbers below branches are bootstrap support (BS) values.

2.3 CAPÍTULO IV. Candolle was wrong, but finally right: *Polygala ovata* belongs to *Hebecarpa* (Polygalaceae)

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Candolle was wrong, but finally right: *Polygala ovata* belongs to *Hebecarpa* (Polygalaceae)

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Summary A comprehensive review of the name *Polygala ovata* Poiret (1804), basionym of the widely used *Asemeia ovata*, revealed strong evidence to an alternative interpretation of this name as used by Pastore and Abbott in their *Asemeia* treatment in 2012. Issues arise from discrepancies between Poiret's identification in specimens kept in P herbarium as *P. ovata*, and the original specimen of Nectoux from the Dominican Republic. De Candolle promoted the first attempted to resolve the application of *Polygala ovata*, however he had different approaches, when included this name in Prodrômus, and later in the specimen identification as *P. ovata*. The present study reevaluates *P. ovata* identity based on original herbarium specimens, protologue information and original morphological description. The evidence found supports reclassifying *P. ovata* as a member of genus *Hebecarpa* instead, and therefore a new combination is proposed here, along with a morphological plate and taxonomic and distribution notes.

Key-words: *Asemeia*; *Hebecarpa*, Poiret.

Introduction

Polygala ovata Poir. (1804) was described in volume five of the *Encyclopedie Methodique* which was edited by Lamarck and Poiret. However, the authority of the scientific names from volume five onwards of the *Encyclopedie* are attributed only to Poiret, who was responsible for the taxonomic treatment. The Poiret's herbarium is currently kept in the general collection of Paris, although the types of the *Encyclopedie* includes specimens from other herbaria, mainly of Lamarck and Desfontaines, includes a set of specimens, which once compound the Desfontaines' herbarium, which major parts are maintained in Webb-FI herbarium (acronyms following Thiers 2023), but the *Flora Atlantica* herbarium and a few other specimens were kept in P. During recent reviews on *Polygala* delimitations, several former subgenera turned to a generic status. Consequently, *Polygala* subgenus *Hebeclada* (Chodat) S.F.Blake was elevated to *Asemeia* Raf. ex Small (Pastore & Abbott, 2012), and the name *Polygala ovata* Poir. interpreted as a member of that genus (see discussion); therefore the name was combined as *Asemeia ovata* (Poir.) J.F.B.Pastore & J.R.Abbott. Since that, this name has been widely used in herbaria. However, during an ongoing taxonomic treatment of *Asemeia*, the name *Polygala ovata* was revised and evidences suggest an alternative interpretation for the name, which coincides with de Candolle notes in Paris herbarium, leading to a new combination for the genus *Hebecarpa* (Chodat) J.R.Abbott.

Material and Methods

Specimens were analysed from the following herbaria: BR, CTBS, FI, G, K, M, and P. The floral and vegetative structures were analysed under a stereomicroscope (Tecnival). The floral parts were photographed using the software Toup View®. The leaf, dissected flower, fruit and seed photos were taken either rehydrated or underwater. Photographic plates were produced with the software Corel® PHOTO-PAINT™ X7.

Discussion

Although *Asemeia ovata* is nowadays widely used in herbarium specimens, there is a problematic around this name which stems from the Poiret's identification on two specimens of *A. martiana* (A.W.Benn.) J.F.B.Pastore & J.R.Abbott from French Guiana as *P. ovata*: FI016149 p.p. [herbarium number] and P02576921 [barcode]. In fact, these are the only two specimens known that have Poiret's original notes linked to the name *Polygala ovata*. In addition, the specimen at FI is annotated as if it was from the 'Desfontaines Herbarium', a information that was cited in the original protologue. These circumstances led Pastore &

Abbott (2012) to recognize *P. ovata* as a member of *Asemeia*. However, in the original description of *P. ovata*, Poiret (1804) mentioned pubescent capsules (Fig. 1) and these features do not match with the above cited specimens. Also, the protologue of *P. ovata* indicated that it was collected by Nectoux in Santo Domingo, Dominican Republic, but both specimens mentioned above came from French Guiana. Searches at P and FI herbaria did not result in any specimen which perfectly match the original protologue of *Polygala ovata*, i.e.: collected by Nectoux; from Santo Domingo; labeled originally from ‘Desfontaine herbarium’; and eventually identified by Poiret as “*Polygala ovata*”, which could be considered irrefutably the type of *P. ovata*. Consequently, the original description, specimen cited in protologue, and the Poiret’s identification of specimens in P does not converge to any specimen. However, there is one specimen, P00733335 [barcode] from the genus *Hebecarpa*, collected by Nectoux, from Santo Domingo that morphologically agrees with the original description of *P. ovata* and was annotated (probably before 1824) as *P. ovata* by de Candolle (identified by his characteristic handwriting). This specimen has a likely duplicate at G [G00210848] which has immature fruits, absent in the P specimen. The later specimen is the holotype of *P. hebecarpa* DC. (1824) which was described mentioning *P. ovata* as its possible synonym (“*An P. ovata. Poir. Dict. 5. P. 498?*”). Finally, the specimen at P [P00733335] was also annotated as ‘*Polygala hebecarpa* DC.’ by de Candolle (but posteriorly strikethrough), besides his above mentioned note of ‘*Polygala ovata* Poir.’. This suggested that de Candolle eventually came to the conclusion that *P. hebecarpa* had the same identity (sharing the same original collection) of *P. ovata*. Considering all the presented evidences, we agreed with that and, thus, *Polygala ovata* is interpreted here as the older name of the holotype of *P. hebecarpa*, type species of *P.* subg. *Hebecarpa*, what implies its combination to the currently accepted genus *Hebecarpa* (Chodat) J.R.Abbott.

The origin of the type collection

The *Polygala ovata* protologue says “Cette plante a été rapportée de Saint-Domingue par M. Neeton. (V.S. in herb. Desfontaines.)”. “M. Neeton” is a reference to Hippolyte Nectoux, (1759-1836), who accompanied his uncle Jean Baptiste Leblond (1747-1815) on an expedition to French Guiana in 1787. They sent their specimens and seeds to André Thouin (1747-1824), chief gardener at the Jardin du Roi (McClellan, 1992). This is the likely origin of the specimens which were identified as ‘*Polygala ovata*’ by Poiret housed at P. There are also possible duplicates of them at G-DC [G00210847] and P-LAM [P00287027], annotated as

from “Cayenne”. This later specimen is identified as “*Polygala violacea* Vahl.”, a name currently treated as synonym of *Asemeia martiana* (A.W.Benn.) J.F.B.Pastore & J.R.Abbott. In 1788, Nectoux was appointed director of the botanical garden at Saint-Domingue and sent several specimens which were eventually included in the Desfontaines’ herbarium. These specimens were noted as “St. Domingue” “Beauvois” (strikethrough), and “Nectoux”. The Ambroise Marie François Joseph Palisot, baron de Beauvois (1752-1820) arrived in Santo Domingo in 1788 presumably contemporary to the shipment of Nectoux’s specimens from Santo Domingo to Thouin (Jacob & McClellan 1993). Which justify the authority confusing in label of the type.

Taxonomic treatment

***Hebecarpa ovata* (Poir.) M.Mota & J.F.B.Pastore comb. nov.**

= *Polygala ovata* Encycl. [J. Lamarck & al.] 5: 498. 1804. *Asemeia ovata* (Poir.) J.F.B.Pastore & J.R.Abbott Kew Bull. 67: 809. 2012. Type: Dominican Republic, Santo Domingo, *Nectoux s.n.* (lectotype, designated here, P [P00733335]!, probable isolectotype G [G00210848]!).

= *Polygala hebecarpa* DC. Prodr. [A. P. de Candolle] 1: 330. 1824. Type: Antilles [Dominican Republic, Santo Domingo ?], *Anonymous s.n.* (lectotype, designated here, G [G00210848]!, probable isolectotype P [P00733335]!).

= *Hebecarpa costaricensis* (Chodat) J.R.Abbott & J.F.B.Pastore = *Polygala costaricensis* Chodat in T. Durand & Pittier, Bull. Soc. Bot. Belgique 30: 298. 1892. Type: Costa Rica, Llanos d’Alajuelita, 1 Dec. 1889, *Tonduz 1464* (lectotype, designated here, G [G00413733]!; isolectotypes BR!, G [G00413643]!).

= *Polygala sanctae-luciae* Chodat Mém. Soc. Phys. Genève 31 (2, 2): 36 1893. Type: Saint Lucia, *Schwaegrichen s.n.* (lectotype, designated here, M! [M00103105]).

= *Polygala antillensis* Chodat Mém. Soc. Phys. Genève 31 (2, 2): 33 1893. Martinica, “Morner à l’Est de Saint Pierre”, Sep. 1853, *Berlanger 621*. (syntype, P [P00733322]. *syn nov.* [not found in G]).

= *Polygala guatemalensis* A. W. Benn. J. Bot. 33: 108. 1895. Type: Guatemala, Coban, *Kurtz 298* (lectotype, designated here, K [K000591018]!; isolectotype G [G00413648]!).

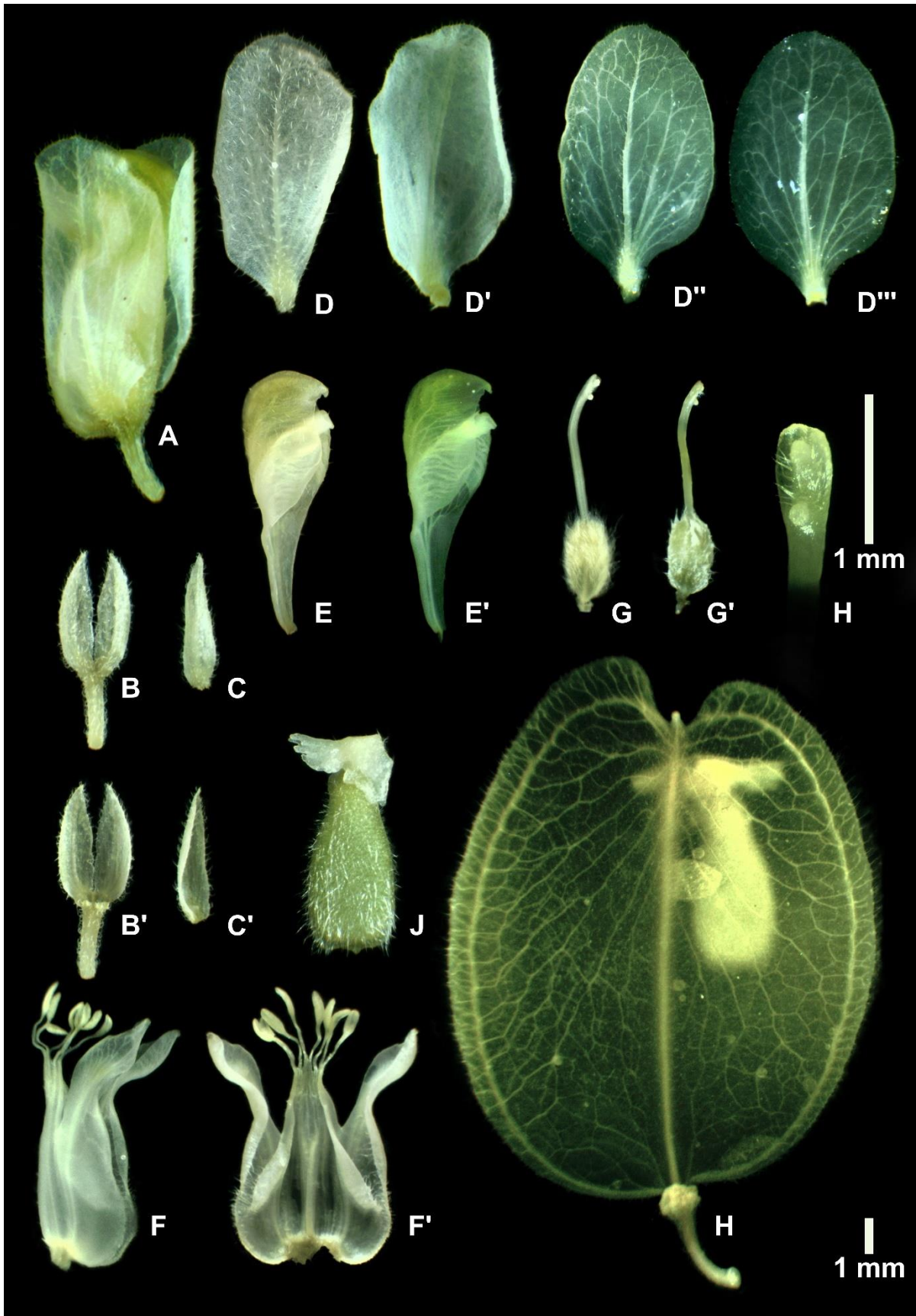


Figure 1. Morphological plate of *Hebecarpa ovata* (Poir.) Mota & J.F.B.Pastore. (R = rehydrated; UW = underwater) **A**. Flower (R); **B**'s and **C**'s (R) Outer sepals [**B** and **B'**, two abaxial, **C** and **C'** one adaxial

(**B** and **C** outer surface, and **B'** and **C'** inner surface); **D** One of the Inner sepals **D** (R) and **D''** (UW) outer surface and **D'** (R) and **D'''** (UW) inner surface); **E** and **E'** Keel (**E** (R), **E'** (UW)); **F** and **F'** androecium and stamens; **F** frontal view (R), **F'** lateral view (UW); **G** and **G'** gynoeceium (**G** (R), **G'** (UW)); **H** stigma and pre-stigmatic detail (R); **J**. Capsule (UW); **K**. Seed and caruncle (R). Photos: J.F.B. Pastore; voucher *B. Ferlay 1764* (CTBS).

Distribution

Hebecarpa ovata occurs in the Caribbean islands, Hispaniola (Dominican Republic and Haiti), Martinique, Santa Lucia, Central America continental, Guatemala, and Costa Rica. Perhaps the distribution of *H. ovata* extends from the south of Mexico, in Chiapas state, to Venezuela, if considered *Hebecarpa caracasana* (Kunth) J.R.Abbott & J.F.B.Pastore as a synonym.

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2.4 CAPÍTULO V. Taxonomic Revision of *Asemeia* (Polygalaceae)

O presente capítulo será submetido à revista *Annals of the Missouri Botanical Garden* (Online ISSN: 2162-4372)

Taxonomic Revision of *Asemeia* Raf. emend Small. (Polygalaceae)

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Abstract

The genus *Asemeia* (Polygalaceae) is endemic to the Americas, distributed from United States to Argentina. The genus was segregated from *Polygala* section *Hebeclada* in 2012 by Pastore & Abbott and this group was never entirely and comprehensively revised since Chodat in 1893. *Asemeia decumbens* (A. W. Benn.) M. Mota & J. F. B. Pastore, *A. hebeclada* (DC.) J. F. B. Pastore & J. R. Abbott, *A. violacea* (Aubl.) J. F. B. Pastore & J. R. Abbott, *A. grandiflora* (Walter) Small have faced disputes regarding species delimitation over time. This study aims to address these taxonomic challenges with a taxonomic revision, with evaluation of the nomenclature, morphological delimitation of the species and typification of names. As result, we recognized 36 species, one newly described: *Asemeia cipoensis* M. Mota & J. F. B. Pastore, and two new combinations. Two new subgenera: *Longipedicelata* M. Mota & J. F. B. Pastore and *Wurdackia* M. Mota & J. F. B. Pastore, two new sections in *Asemeia* subgenus *Asemeia*: *Purpurea* M. Mota & J. F. B. Pastore, *Striata* M. Mota & J. F. B. Pastore are proposed. All 150 names involved were revised and typified, the species were described and presented through descriptions and photographic plates of reproductive structures dissected, field photographs, as well as we provided distribution maps for all species with a taxonomic key for all the infrageneric taxa.

Polygalaceae includes 30 genera and about 1,260 species (Pastore et al. 2017, Mota et al. 2019, Pastore et al. 2023), distributed over almost the entire earth's surface, except for certain desert or polar regions of the planet. The family is considered monophyletic and belongs to the order Fabales (APG IV 2016). Polygalaceae is divided into four tribes, Carpolobieae B. Eriksen, Diclidanthereae Reveal, Xanthophylleae Baill. and Polygaleae Fr. (Eriksen & Persson 2007, Reveal et al. 2012). The most species-rich tribe, Polygaleae is considered monophyletic, and is characterized by zigomorph flowers that resemble the papilionaceous flowers of legumes. However, while in Polygalaceae the carina is formed by a single petal and the wings are petaloid sepals, in Fabaceae the carina is formed by the fusion of 2 petals and the wings are lateral petals (Judd et al. 1999, Persson 2001). In addition, it can be characterized by the trimerous corollas (sometimes presenting 2 additional rudimentary petals). The tribe currently comprises 22 genera, among them, the genus *Asemeia* Raf. emend. Small. (Pastore et al. 2023).

As delimited here, *Asemeia* comprises 36 species, distributed throughout the Americas, from the United States to Argentina. The species of *Asemeia* are herbs, subshrubs, shrubs, or rarely lianas, and can be characterized by having flowers with 2 connate lower outer sepals and non-crested keel (Pastore & Abbott 2012).

The origin of the name *Asemeia*

The generic name *Asemeia* originated independently from *Polygala grandiflora*, the generitype. Its derivation can be traced back to *Polygala senega* var. *rosea* Michx. Michaux's variety "rosea" was based on a specimen of *A. grandiflora* that was mounted alongside with *Senega officinalis* Spach. (formerly known as *Polygala senega* L.). Muhlenberg (1813) was the first to identify the variety 'rosea' as a distinct species from *S. officinalis*. However, the final combination '*Polygala rosea*' was blocked by *P. rosea* Desf. (1798). As a result, Muhlenberg, proposed the name *P. pubescens* instead. Nevertheless, *P. pubescens* Muhl. was later deemed illegitimate due to the confusion in the arrangement of names in the Muhlenberg's book, as extensively described by Pastore & Mota (2018). Consequently, *Polygala pubescens* was subsequently published again by Nuttall (1818) with a question mark. Although Rafinesque (1833) was the first to interpret *Polygala pubescens* as a member of a distinct genus, i.e. separate from *Polygala*, his interpretation of the genus itself was rather confusing. In Rafinesque's early work (1833) he initially included *Polygala pubescens* Muhl. as synonym of both *A. rosea* Raf. and *A. carnea* Raf. Consequently, if *Polygala pubescens* Muhl. can be interpreted as a new name and *status novus* for *P. senega* var. *rosea*, then *Asemeia rosea* would be illegitimate. Later, Rafinesque (1836) included *A. alba* Raf., both *A. carnea* and *A. alba* were described as "5-phylla calyx" suggesting they might be *Senega* species. The identity of *Asemeia carnea* is still enigmatic, while *Asemeia alba* could be a reference to *Polygala alba* Nutt. (= *Senega alba* (Nutt.) J. F. B. Pastore & J. R. Abbott). Nevertheless, the Rafinesque's original material were mostly damaged and destroyed (Pennell, 1944) and the Rafinesque's names were poorly described. Consequently, it is unlikely that these names will be accurately addressed in the future.

The delimitation of *Asemeia* as a group began with Chodat (1891), who includes the *Polygala* [V - fifth] section *Hebeclada* in a sectional key for *Polygala*. The entries to reach *Hebeclada* were 1. "Pétale inférieur sans appendice" [not crested keel]; 2. "Sépale persistants avec le fruit à la maturité" [calyx persistent in the mature fruit], and 3. "Les deux sépales inférieurs connés" [two external sepals connate], then indicating the members of section with

New World distribution, “Floride-Paraguay”. Currently the genus *Asemeia* has the same original delimitation made by Chodat (1891) to the section *Hebeclada* and could be recognized by the same set of characters originally described. Although the section *Hebeclada* was described in 1891, the species (and eventually infrageneric taxa) of *Hebeclada* were presented in the magnificent work *Monographia Polygalacearum* (Chodat 1893), where all previous species and several new ones (currently under genus *Asemeia*) were grouped under section *Hebeclada*. This was the first and unique complete treatment of this group, which currently correspond to *Asemeia*, until now. A number of species were later added by Chodat (1896, 1901, 1914). The section was elevated to subgenus by Blake (1916), who also divided the subgenus *Hebeclada* in two sections, *Apopetala* (= *Asemeia* subgenus *Apopetala*) and *Adenotricha* (= *Asemeia* subgenus *Asemeia*).

Small (1933) recovered the name *Asemeia* and provided a detailed circumscription and characterization of the genus, which closely resembles the current one. Despite Small’s work, some authors, such as Aguiar et al. (2008), continued to treat the genus as *Polygala* L. subg. *Hebeclada*, in their taxonomic review of the Brazilian species of *Asemeia*.

Later, due to revisions in the delimitation of the polyphyletic genus *Polygala*, several genera were separated (Abbott 2011, Pastore & al. 2010, Pastore 2012, Pastore & Moraes 2013, Abbott & Pastore 2015, Pastore & al 2023). Among these, *Asemeia* Raf. emend. Small was segregated by Pastore & Abbott (2012), who reestablished the name.

Despite the studies of Aguiar & al. (2008) and Pastore & Abbott (2012) in *Asemeia* (or as *Polygala* subg. *Hebeclada*), there is a notable lack of revisional and morphological studies, as the genus exhibits apparent problems with specific circumscription. Specifically, *Asemeia decumbens* (A. W. Benn.) M. Mota & J. F. B. Pastore, a widely distributed species in the Americas, presents a morphological amalgam with several species of its subgenus (*Asemeia*) section *Asemeia*, displaying several distinct morphotypes. Additionally, the specific delimitation of *A. hebeclada* (DC.) J. F. B. Pastore & J. R. Abbott is a subject of historical dispute, as some authors considered *A. rhodoptera* (Mart. ex A. W. Benn.) J. F. B. Pastore & J. R. Abbott as a synonym of *A. hebeclada* (Chodat 1893, Marques 1980, Bernardi 2000) while others considered them as distinct species (Bennett 1874, Wurdack 1971, Pastore 2014, Aguiar et al. 2008, Pastore & Abbott 2012). Lastly, *Asemeia violacea* has undergone multiple delimitations over time, with the broadest one including *Asemeia grandiflora* from the United States of America and several names from South America, in contrast to more restricted delimitations, such as that presented by Pastore & Abbott (2012).

In this context, the objective of this study is to conduct a thorough revision and systematic analysis of the genus *Asemeia*, including an evaluation of the nomenclature and typification of names, as well as the delimitation of the genus, subgenera, sections, and species, based on detailed morphological analyses. Through these evaluations, we hope to shed light on the delimitations for the species in question, as well as for other taxa within the genus *Asemeia*.

MATERIAL AND METHODS

Access to Specimens—For the morphological studies in *Asemeia*, we visited the following herbaria: B, BHCB, BM, BR, CEN, CGE, CESJ, CORD, CEPEC, CTBS, CTES, E, FLOR, G, K, HAL, HUEFS, HUFU, IAN, ICN, INPA, MBM, MG, MO, NY, P, R, RB, SP, SPF, UB, UEC, UFG, UPCB, and W (Thiers 2023). We also studied some duplicates sent to CTBS (herbarium where this study was performed) from ASE, CEN, HUFU, INPA, JAR, MBML, MO and SPF. Additionally, digital images of specimens from other herbaria were examined at platforms INCT - Virtual Herbarium of Flora and Fungi (2022), Re flora - Herbário Virtual (2023), Plants Jstor, and Tropicos. Field trips were carried out in Brazil, states of Bahia, Goiás, Minas Gerais, and São Paulo.

Typification—To ensure accuracy in our revision, we thoroughly examined the protologues of all names involved in this review. Furthermore, we analyzed type specimens from various herbaria, including B, BM, BR, CEPEC, CGE, COL, E, G, HAL, K, L, M, MG, MO, MPU, NY, P, R, RB, SP, U, and W. All names were verified in its historical context. When it was applicable, i.e. a) when the typification had not been previously selected, b) when the previous tipification did not conform to the ICN (International Code of Nomenclature for algae, fungi, and plants, Turland & al. 2018), or c) when more than one original element (usually a specimen) was available, a lectotypification was undertaken. The selection of the lectotype was guided by the evidence presented in the protologue, information accessible through the online version of Taxonomic Literature II (<http://www.sil.si.edu/DigitalCollections/tl-2/search.cfm>), original annotations on the specimen labels, and a thorough examination of herbarium specimens. These decisions were made in accordance with the ICN (Turland et al. 2018).

Geographic Distribution—A specimen database containing all the studied specimens and their respective geographic coordinates was compiled. Coordinates were

either sourced from the original herbarium labels or, if unavailable, estimated based on municipality or locality information found through online sources. The dot distribution maps were created using Qgis 3.0.1 (2018) and then edited in Corel® PHOTO-PAINT™ X7.

Morphological Analyses—Descriptions and measurements were conducted using a magnifying binocular stereoscope (Tecnival) equipped with a camera. The flowers and fruits were dissected, and their structures were photographed using the ToupView® software. Original images were edited using Corel® PHOTO-PAINT™ X7, which was also used for the plates. The terminology used in the descriptions follows the works of Chodat (1893), Bennett (1874), Marques (1980), Pastore (2006), and Aguiar et al. (2008). Bracts are classified as persistent, caducous (when the bract falls before flower anthesis) or deciduous (when the bract drops after the petals have fallen) following Candolle (1813). A morphological guide plate is provided in Figure 1.

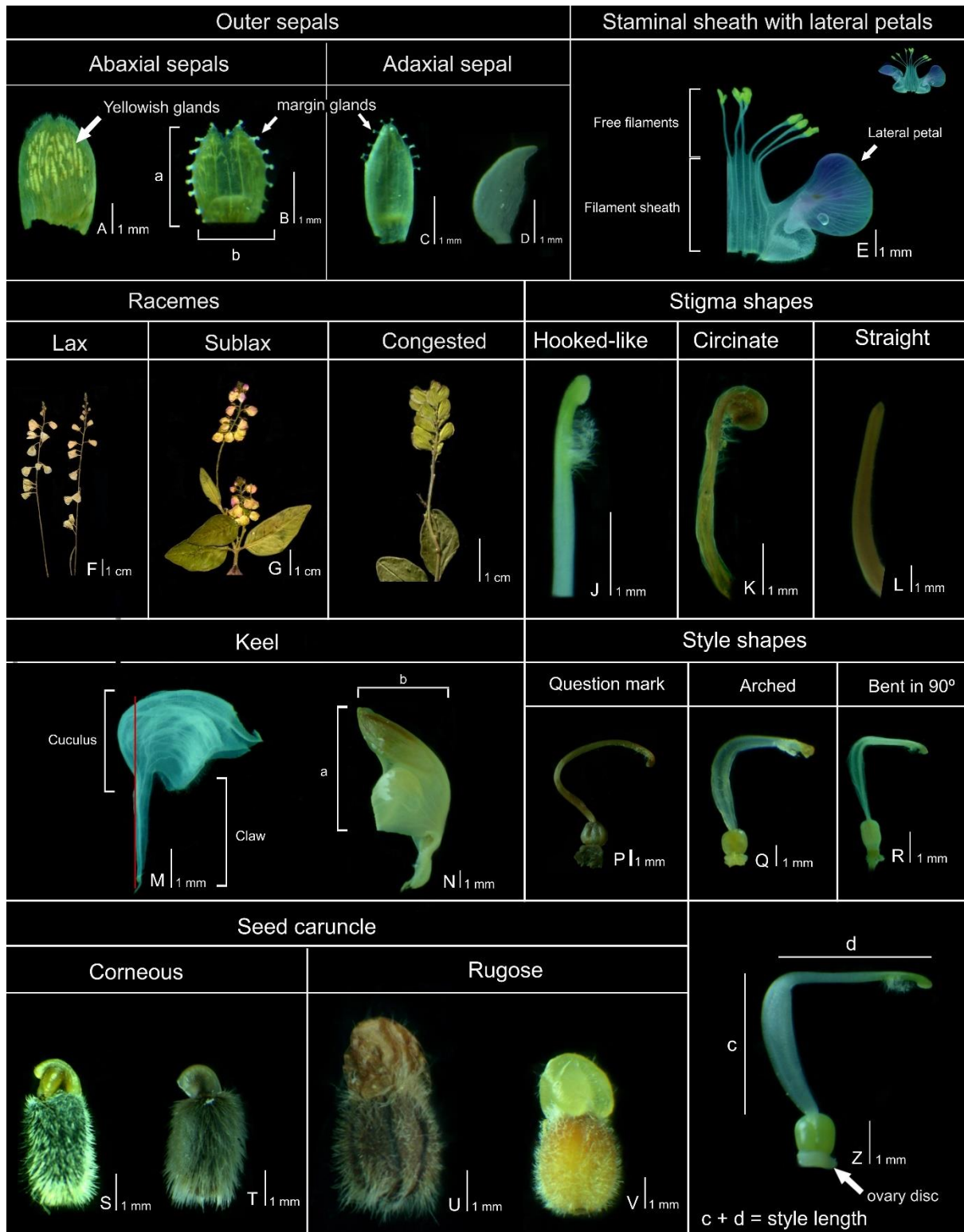


Figure 1. Guide to morphological terms and morphological characters in *Asemeia*. —A and B. Outer abaxial sepals. A. yellowish glands. B. glands at the margins. —C and D. Outer adaxial sepals, C, front view. D, lateral view. —E. Partial androecium and one of the adhered lateral petals (reduced complete structure in the right corner). —F, G, and H. Examples of racemes in *Asemeia*. —J, K, and L. Stigma shapes. —M, N. Keel. —P, Q, and R. Style shapes. —S, T, U, V. Seeds. S, T. Seeds with corneous caruncle. U. Seed dry with rugose caruncle. V. Seed immature with rugose caruncle —X, Y, and Z. Gynoecium (c: basal part of the style, d: Distal part of the style) —A. *N. A. Molina 23338*, BM (*A. sphaerospora*). —B. *O. Scariot et al. 881*, CTBS (*A. lindmaniana*). —C. *J. F. B. Pastore & E.*

Suganuma 433, CTBS (*A. subaphylla*). —D, G. M. Mota & J. F. B. Pastore 238, CTBS (*A. nana*). —E, J, Z. M. Mota et al. 237, CTBS (*A. coracoralinae*). —F. J. R. Abbott 17329, CTBS (*A. grandiflora*). —H. M. Mota et al. 222, CTBS (*A. hebeclada* var. *impensa*). —K. E. T. Heyde & E. Lux 4314, G (*A. tonsa*). —L. J. R. Abbott 19752, CTBS (*A. sphaerospora*). —M. J. F. B. Pastore 5476, CTBS (*A. ilheotica*). —P. T. Hambury (*A. apopetala*). —Q. M. Mota & J. F. B. Pastore 176, CTBS (*A. campestris*). —R. O. S. Ribas & Pereira 2569, CTBS (*A. ovata*). —S. A. S. Rodrigues & F. L. Chesini 196, CTBS (*A. aguiariana*). —T. M. Mota & J. F. B. Pastore 246, CTBS (*A. minensis*). —U. G. T. Prance 8473, CTBS (*A. acuminata*). —V. G. M. Antar 1171, CTBS (*A. acuminata*). (a. length, b. width, white line indicating the measurement axis of the piece). Photos by M. Mota

Species delimitation— The species were delimited based on the morphological approach, i.e. by the analysis of vegetative, and dissected flower parts, fruits, and seeds. The species concept used in this study follows the ‘Morphological species concept (MSC)’ described by Cronquist (1978) with insights from the multiaccess molecular phylogeny conducted by Mota et al. (in prep.). Specifically, we grouped specimens based on their morphological affinities, and when no clear morphological boundaries could be established, we treated heterotypic names as referring to the same species.

RESULTS AND DISCUSSION

A total of 120 names underwent scrutiny and 36 species of *Asemeia* were recognized, grouped into four subgenera, and the subgenus *Asemeia* organized in four sections. Thus, this study introduces two newly described subgenera, namely: subgen. *Longipeccicelata* M. Mota & J. F. B. Pastore and subgen. *Wurdackia* M. Mota & J. F. B. Pastore, together with subgen. *Apopetala* (S. F. Blake) J. F. B. Pastore & J. R. Abbott, and the typical, the subgen. *Asemeia*. Within the subgenus *Asemeia*, four sections were recognized: the typical *Asemeia*, as well as the newly combined *Hebeclada* (DC.) M. Mota & J. F. B. Pastore, and two new sections *Purpurea* M. Mota & J. F. B. Pastore, and *Striata* M. Mota & J. F. B. Pastore. Furthermore, this study introduces the following taxonomic novelties: *Asemeia tonsa* (S. F. Blake) J. F. B. Pastore & J. R. Abbott was synonymized with *A. hondurana* (Chodat) J. F. B. Pastore & J. R. Abbott, and *A. sphaerospora* (Chodat) J. F. B. Pastore & J. R. Abbott with *A. floribunda* (Benth.) J. F. B. Pastore & J. R. Abbott. *Polygala fimbriata* A. W. Benn., formerly recognized as a synonym of *A. acuminata* (Willd.) J. F. B. Pastore & J. R. Abbott by Pastore & Abbott (2012), is now recognized as *A. fimbriata* (A. W. Benn.) M. Mota & J. F. B. Pastore. Additionally, a new combination and *status novus* for *A. hebeclada* var. *impensa* (Wurdack) M. Mota & J. F. B. Pastore, recognized here as *A. impensa* (Wurdack) M. Mota & J. F. B. Pastore, a new combination, *A. decumbens* (A. W. Benn.) M. Mota & J. F. B. Pastore, and finally, a new species, *A. cipoensis* M. Mota & J. F. B. Pastore.

Taxonomic treatment

Asemeia Raf. emend Small

Asemeia Raf., Herb. Raf. 79. 1833 emend. Small, Man. S. E. Fl. 766. 1933. (type, designated by Pastore & Abbott (2012: 802), *Asemeia grandiflora* (Walter) Small).

Polygala sect. *Syngala* Griseb. Fl. Brit. W.I. [Grisebach] 28. 1859. (type, designated here, *Polygala angustifolia* Kunth. [= *Asemeia violacea* (Aubl.) J. F. B. Pastore & J. R. Abbott]).

Polygala sect. *Hebeclada* Chodat, Biblioth. Universelle Rev. Suisse 25: 698. 1891. *Polygala* subg. *Hebeclada* (Chodat) S. F. Blake, Contr. Gray Herb. 47: 59. 1916. (type, designated here, *Polygala hebeclada* DC. [= *Asemeia hebeclada* (DC.) J. F. B. Pastore & J. R. Abbott]).

Herbs, subshrubs or shrubs, simple or branched. Stem cylindrical. Leaves alternate, petiolate; blades entire, linear, lanceolate, oblong, elliptical, ovate, from membranaceous to chartaceous, rarely coriaceous, abaxial and adaxial covered by simple trichomes, straight or curved, ciliated or not on the margins. *Racemes* sublax (Fig 1, G), lax (Fig 1, F) or congest (Fig 1, H); *Flowers* pedicellate; one bracts and two bracteoles; the bract may be persistent after fruiting, caducous or deciduous; the bracteoles, tiny and not very evident, always deciduous in the flower; Five sepals: three outer sepals (Figure 1, C–D), concave, puberular or not, margins ciliated or not, with or without glandular trichomes, with or without yellow glands in both surfaces; the two abaxial sepals (Figure 1, A–B), in relation to the axis, connate in almost all their extension, acute, obtuse or rounded at the apex; one adaxial sepal (Figure 1, C–D) of the same length or a little longer, concave, acute to obtuse at the apex; two inner sepals asymmetrical, margin without glands, ciliated or not. Five petals: one keel (Figure 1, M–N) covering the androecium and the gynoecium, unguiculated (claw) with apex not crested, trilobed, central lobe emarginate and the two lateral lobes pleated; two lateral petals (Figure 1, E), asymmetrical, attached to the staminal sheath, narrow in the middle, and two rudimentary petals, that may be absent in some species, attached to the staminal sheath. Eight stamens, the filaments basally connate, forming a staminal sheath surrounding the gynoecium (Figure 1, E); oblong anthers; Gynoecium (Figure 1, Z) compressed laterally, Ovary, with or without a conspicuous disc at base of ovary; style (Fig. 1, P–R), curved in the middle forming a 90° angle, question mark-shaped or arched, dilated in the basal and median thirds, stigma (Fig. 1, J–L) straight, circinate or hooked-like. Capsule loculicidal, slightly

winged or not. Seeds (Figure 1, S–V) globose, oval or oblong, covered by trichomes, longitudinally; caruncle, corneous or rugose, appendaged or not.

The pollen in *Asemeia* was described by Aguiar et al. (2008) as medium-sized, isopolar pollen grains, which were suboblate, oblate-spheroidal, or prolate-spheroidal, 13-or-15-colpated.

IDENTIFICATION KEY TO SUBGENERA IN THE GENUS *ASEMEIA*

- 1a. Flowers coriaceous.....
*Asemeia* subgenus *Apopetala* (S. F. Blake) J. F. B. Pastore & J. R. Abbott
- 1b. Flowers membranaceous.....2
- 2a. With yellow glands forming spots on the surfaces of the outer abaxial sepals, inner sepals, and capsule..... *Asemeia* subgenus *Wurdackia* M. Mota & J. F. B. Pastore
- 2b. Without yellow glands3
- 3a. Keel unilobate, stigma circinate.....
*Asemeia* subgenus *Longipedicelata* M. Mota & J. F. B. Pastore
- 3b. Keel trilobate, stigma hooked-like.....*Asemeia* subgenus *Asemeia*

Asemeia* subgenus *Apopetala (S. F. Blake) J. F. B. Pastore & J. R. Abbott. *Polygala* section *Apopetala* S. F. Blake, Contr. Gray Herb. 2: 59. 1916. (type, designated here, *Polygala apopetala* S. F. Blake [= *Asemeia apopetala* (S. F. Blake) J. F. B. Pastore & J. R. Abbott]) (Species 1–3).

Coriaceous flowers, absence of glands on the margin of the outer sepals, distributed from Mexico to Costa Rica.

IDENTIFICATION KEY TO *ASEMEIA* SUBGEN. *APOPETALA*

- 1a Outer sepals, with yellow glands forming spots, rudimentary petals present.....3. *Asemeia securidaca* (Chodat) J. F. B. Pastore & J. R. Abbott
- 1b. Outer sepals, without glands, rudimentary petals absent.....2
- 2a Style question mark-shaped, stigma circinate, petiole 1.3–3 mm.
1. *Asemeia apopetala* (Brandege) J. F. B. Pastore & J. R. Abbott
- 2b. Style bent in the middle at ca. 90°, stigma hooked-like, petiole 5.5–6 mm.
2. *Asemeia floribunda* (Benth.) J. F. B. Pastore & J. R. Abbott

1. **Asemeia apopetala** (Brandege) J. F. B. Pastore & J. R. Abbott, *Kew Bull.* 67: 803. 2012.

Polygala apopetala Brandege, *Proc. Calif. Acad. Sci.* 2: 130. 1889. TYPE: Mexico.

[Baja California, Comandu. "Lower California, Comondu"], 19 Feb. 1889, *Brandege s.n.* (holotype, photo at UC [bc] 109732!; isotype, photo at CAS [bc] 0004115!).

Polygala apocarpa Brandege *in Sched.* Figures 2, 3A–B.

Shrub, 1–2 m tall, erect, branches pubescent-adpressed; roots not seen; *Leaves* chartaceous; petiole 1.3–3 mm long., pubescent-adpressed; blade 2.8–7.9 × 1–3 cm ovate-lanceolate, apex rounded, mucronate, base acute to attenuate, margin sparsely ciliated-adpressed, pubescent-adpressed on the main vein, glabrous towards the margins on both surfaces. *Racemes*, peduncle 1–1.4 cm long., rachis 8.8–27.4 cm long., lax, pubescent-adpressed; pedicel 7–10.3 mm long. (in capsule 9.8–15 mm long.) sparsely pubescent-adpressed, straight. *Flower*, except the pedicel 10–11.2 mm long., coriaceous; outer sepals, without yellow glands forming spots on the surfaces, adaxial sepal 5.1 × 3.8 mm, apex rounded, glabrous both surfaces, margin without glands, densely ciliated, abaxial sepals 5.6 × 4.1 mm, apex rounded glabrous both surfaces, margin without glands, densely ciliated; inner sepals 13.4 × 13.8 mm, glabrous both surfaces, margin ciliated in the lateral sides; Keel, cuculus 13 × 7.8 mm, unilobate, glabrous on both surfaces; claw 2.1 mm long., glabrous; lateral petals 10.4 × 2.8 mm, glabrous on both surfaces, ciliated at the base; staminal sheath 5.8 mm long., outer surface glabrous, inner surface pubescent and ciliated in the lower half, free filaments 6.2–7.4 mm long., glabrous; rudimentary petals absent; style 15 mm long., question mark-shaped, sparsely pubescent around stigma, stigma circinate; ovary 1.9 × 2.1 mm, globose, glabrous, conspicuous disc at base of ovary. *Capsule* 12.5–13.3 × 13–14.4 mm, globose, apex hardly lobed, slightly winged apex, glabrous. Seeds 8.2 × 8.8 mm, globose, sparsely pubescent, caruncle 1 × 1 mm long., corneous, appendaged, with dorsal and two lateral appendages, glabrous.

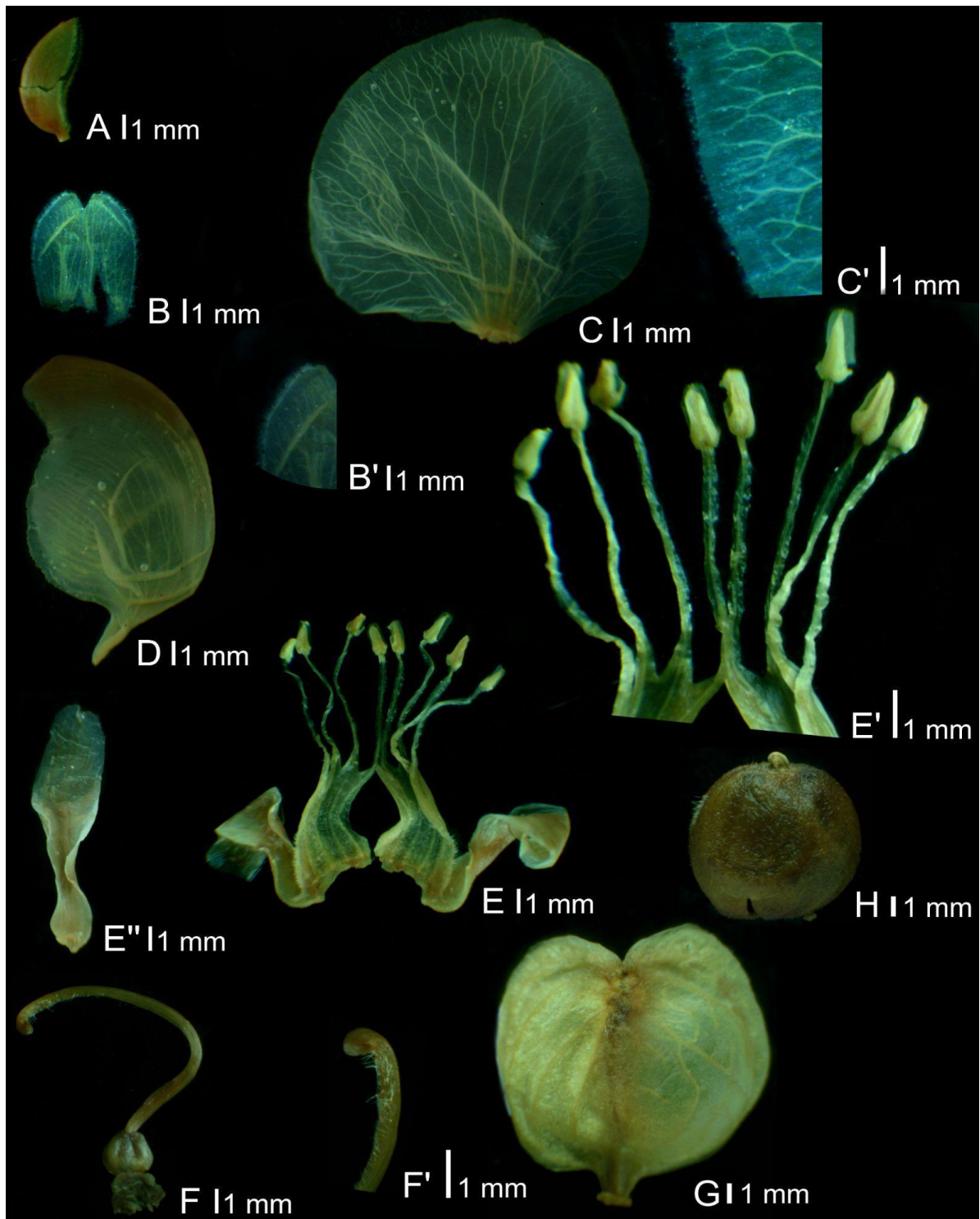


Figure 2. *Asemeia apopetala* (Brandege) J. F. B. Pastore & J. R. Abbott. (A–F'. *K. Hambury s.n.*, K. G–H. *I. R. A Wiggins 15705*, K). —A. Outer adaxial sepal. —B. Outer abaxial sepals. —B'. Detail of the margin of the outer abaxial sepals. —C. Inner sepal. —C'. Margin detail of the inner sepal. —D. Keel. —E. Lateral petals with androecium. —E'. Free filaments. —E''. Lateral petals. —F. Gynoecium. —F'. Stigma detail. —G. Capsule. —H. Seed.

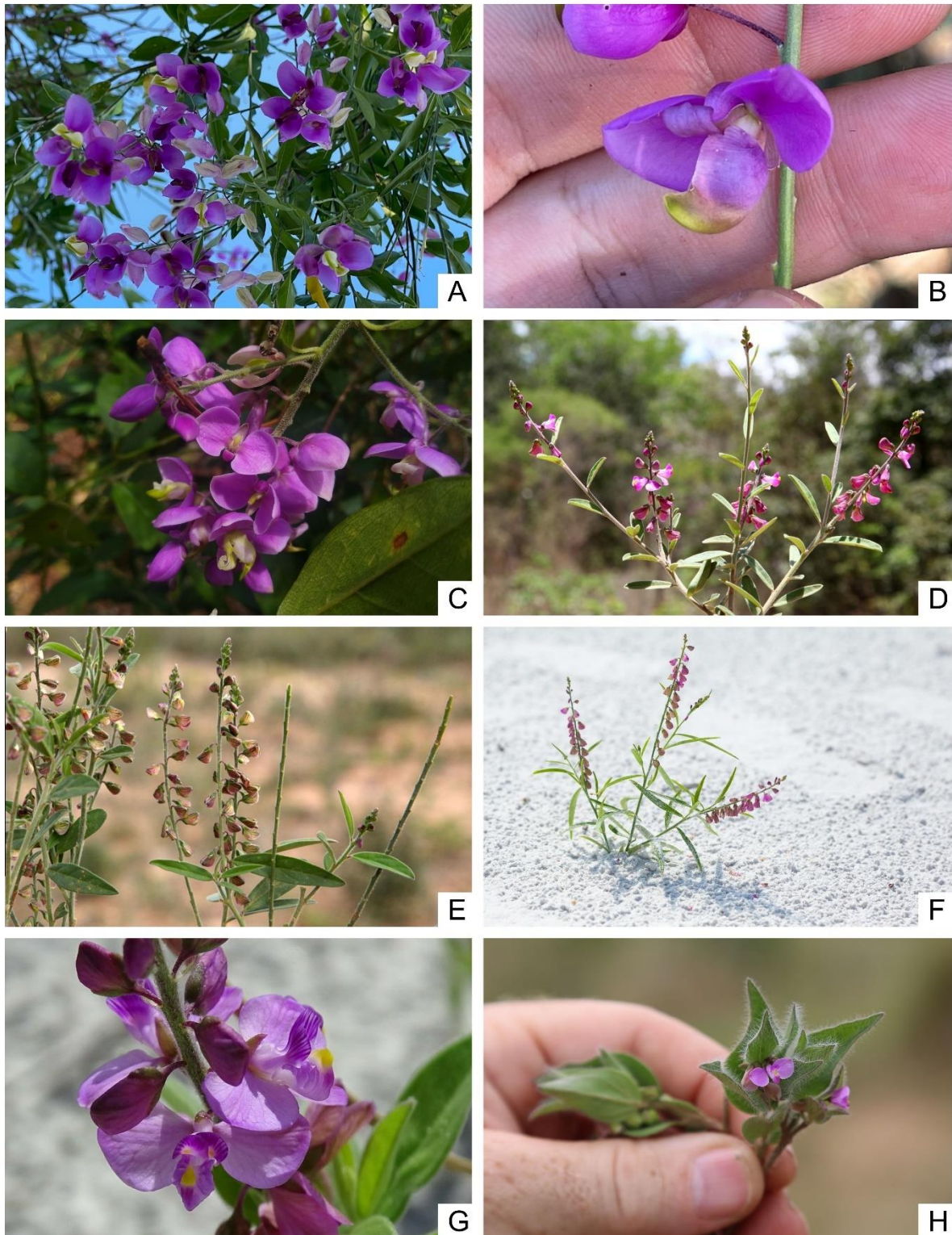


Figure 3. —A, B. *Asemeia apopetala* (Brandege) J. F.B. Pastore & J. R. Abbott. —C. *A. floribunda* (Benth.) J. F. B. Pastore & J. R. Abbott. —D, E. *A. decumbens* (A. W. Benn.) M. Mota & J. F. B. Pastore. —F, G. *Asemeia grandiflora* (Walter) Small. —H. *A. hirsuta* (A. St.-Hil. & Moq.) J. F. B. Pastore & J.R. Abbott. Photos: A, B by G. Ehrenberg; C by D. M. Méndez; D, E by H. Moreira; F by M. McMasters; G by L. McLaurin; H by J. F. B. Pastore.

Distribution. *Asemeia apopetala* is endemic to the state of Baja California Sur in Mexico. The specimens grow in slope areas found in granitic hill sides, with rocky and well drained soil. Figure 4.

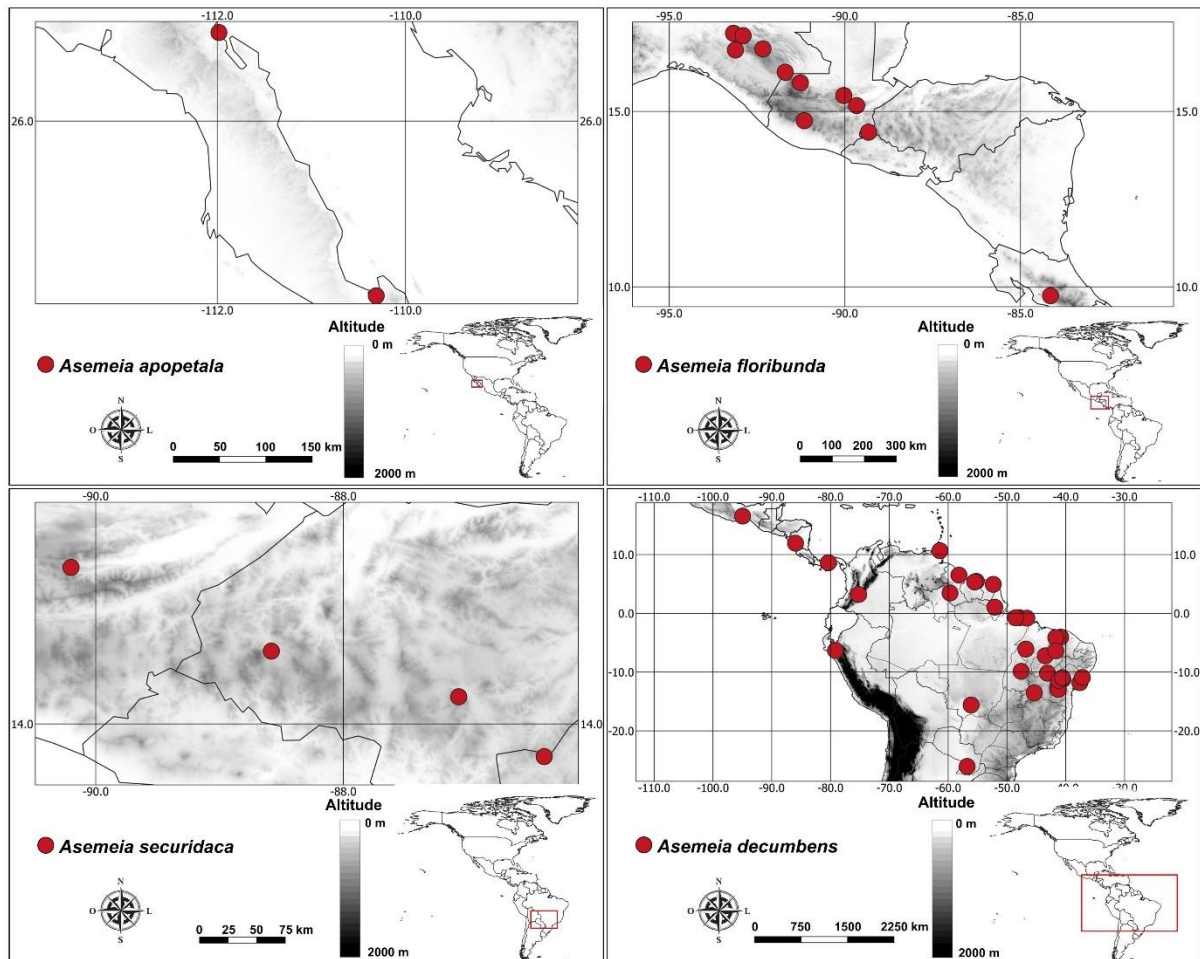


Figure 4. Distribution map of *Asemeia apopetala* (Brandege) J. F. B. Pastore & J. R. Abbott, *A. floribunda* (Benth.) J. F. B. Pastore & J. R. Abbott, *A. securidaca* (Chodat) J. F. B. Pastore & J. R. Abbott and *A. decumbens* (A. W. Benn.) M. Mota & J. F. B. Pastore.

Additional Notes. *Asemeia apopetala* presents capsules slightly winged at the apex and an unique type of seed in the genus *Asemeia*, which is globose and large in relation to the minute caruncle.

Additional Specimens Examined. MEXICO. **Baja California:** Granitic Hillside 21 mi. SE of La Paz along road to Los Planes, 2050 ft., 1 Dec. 1959, *I. L. Wiggins 15705* (K, G); in canyon south of Cienega de Todos Santos, south of La Laguna, Sierra de la Laguna, east of

Todos Santos, 1700 m alt., 27 Dec. 1947, *A. Carter et al.* 2417 (K); Cerro de la Giganta, 1 Mar. 1939, *H. S. Gentry* 4270 (MO); 23 Oct. 1893, *J. S. Brandgee s.n.* (K).

2. *Asemeia floribunda* (Benth.) J. F. B. Pastore & J. R. Abbott, *Kew Bull.* 67: 803. 2012.

Polygala floribunda Benth. TYPE: Mexico. [Oaxaca, Tonagua, “*Ad muros templi christiani Zonagua*”], *K. T. Hartweg* 447 (lectotype, designated here, K [bc] 000263086!; isoelectotypes, BM [bc] 000888050!, E [bc] 00201575!, G [bc] 00440365!, K [bc] 000263085!, K [bc] 000263086!, photo at LD1244775!, P [bc] 00445541!).

Asemeia sphaerospora (Chodat) J. F. B. Pastore & J. R. Abbott, *Kew Bull.* 67: 805. 2012.

Polygala sphaerospora Chodat, *Bot. Jahrb. Syst.* 115: 75. 1914. TYPE: Guatemala. Baja Verapaz, Salamá, San Jerónimo [“*Tropisches Zentral amerika: Guatemala, Dept. Salamá, oberhalb St. Geronimo*”], 26 Dec. 1896, *C. Seler & E. G. Seler* 3393 (holotype B†, B as photo F neg. 013018 in F!). NEOTYPE: Guatemala. Alta Verapaz, 8 kilómetros antes de llegar a Cobán, 15°27'N, 90°24'W, 18 March 1990, *J. J. Castillo M.* 1019 (neotype, designated here, NY [bc] 00085460). Figure 3C, 5.

Lianescent shrub 2–6 m tall, branches pubescent. *Leaves* chartaceous; petiole 5.5–6 mm long., pubescent; blade 6.0–7.1 × 2.3–3.1 cm, ovate-lanceolate, apex acuminate, base rounded to obtuse, margin entire, ciliated, adaxial surface both surfaces glabrous. *Racemes* subax rachis 11.6–12 cm long., pubescent, lax, bracts not seen; pedicel 11–12.6 mm long., straight. *Flower*, except the pedicel 9.6–11.1 mm long., coriaceous; outer sepals, without yellow glands forming spots on the surfaces, apex, adaxial sepal 4 × 4 mm, apex, glabrous on both surfaces, margin without glands, densely ciliated, abaxial sepals 4 × 2.8 mm, apex, margin without glands, densely ciliated; inner sepals 10.8 × 11.1 mm, glabrous on both surfaces, margin ciliated at the base. Keel, cuculus 8 × 6 mm, trilobate, glabrous; claw 5 mm long., glabrous; lateral petals 10 × 3.2 mm, glabrous on both surfaces, lateral margin ciliated; filament sheath 6.9 mm long., glabrous on both surfaces, lateral margin ciliated, free filaments 6.1 mm long., glabrous; rudimentary petals absent; style 10.5 mm long., bent in the middle at ca. 90°, sparsely puberulous at the apex, stigma hooked-like; ovary 2 × 1.6 mm, oblong, glabrous, without a conspicuous disc at the base of the ovary. *Capsule* not seen.

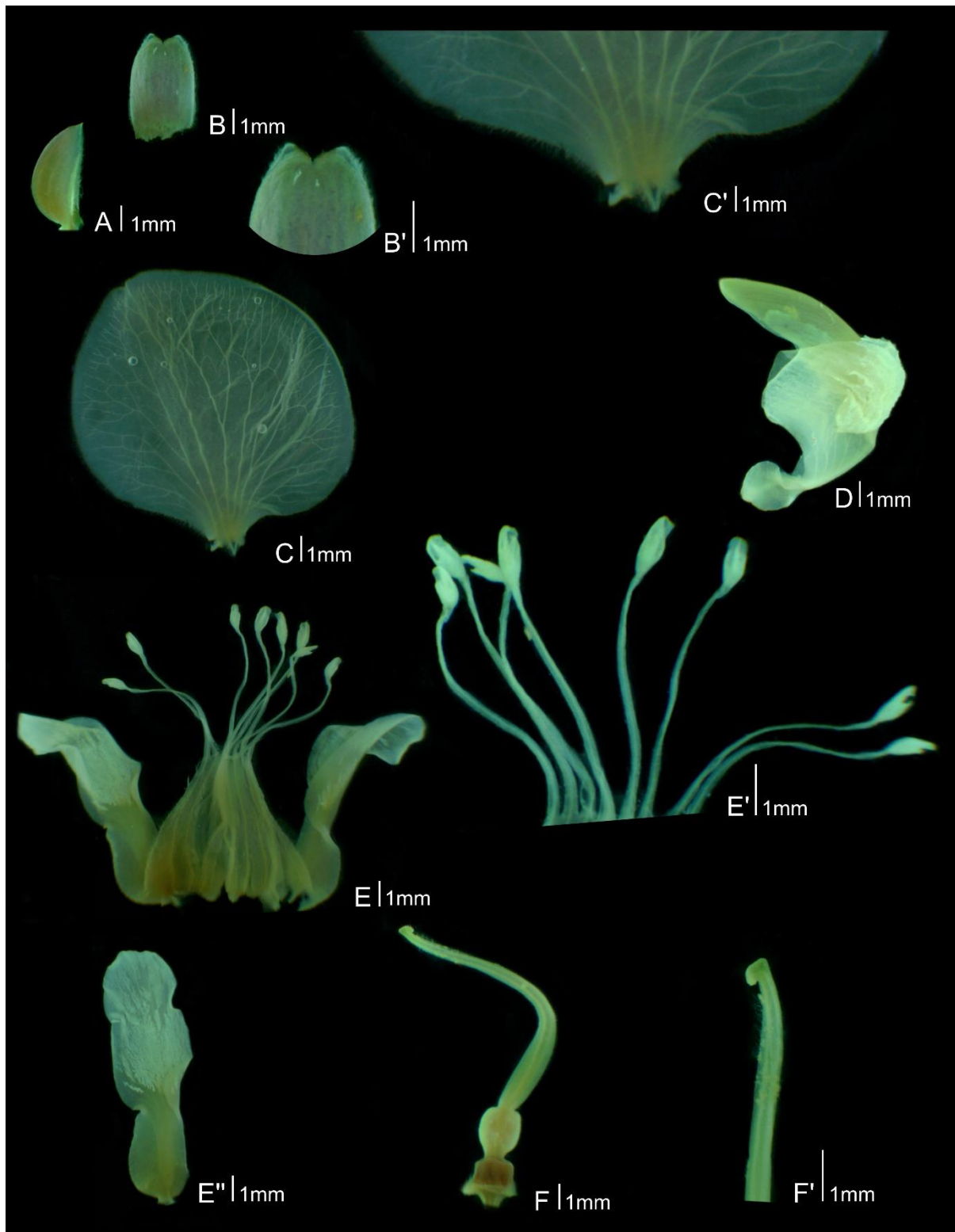


Figure 5. *Asemeia floribunda* (Benth.) J. F. B. Pastore & J. R. Abbott. (*M. S. Geck 554*, BM). —A. Adaxial sepal. —B. Abaxial sepals. —B'. Detail of the margin of the abaxial sepals. —C. Inner sepal. —C'. Detail of the base of the inner sepals. —D. Keel. —E. Lateral petals with androecium. —E'. Free filaments. —E''. Lateral petals. —F. Gynoecium. —F'. Stigma detail.

Distribution. *Asemeia floribunda* has a distribution range that extends from southern Mexico to Honduras in Central America; however, there is a distribution gap, with no

confirmed records in Costa Rica. The specimens can be found at elevations ranging from 700 to 2200 m. Figure 4.

Nomenclatural Notes. The original material of *Polygala sphaerospora* was lost in B during the WW2, and no duplicate were found in herbaria visited. Therefore, a neotype is designated here.

Additional Notes. It was not possible to find specimens with bracts, likely because the bracts had fallen before the anthesis. *Asemeia sphaerospora* was described by Chodat (1914), who characterized the flowers of *A. sphaerospora* as similar to *A. floribunda*. The morphological delimitation between these two species has indeed always been ambiguous. The analysis of type materials and dissection of many specimens did not enabled the recognition of distinct species, leading to the synonymization of *A. sphaerospora* with *A. floribunda*.

Additional Specimens Examined. COSTA RICA. **San José:** Aserri, 9°48'30"N, 84°07'20"W, 1500–1700 m alt., 1 Dec. 2002, *J. F. Morales 8816* (B, BM, INB, MO). EL SALVADOR. **Chalatenango:** Cítala, Ctón. Talquezalar, A.N.P.P. La Encantada, sector La Esperanza, 89°19'43"W, 14°24'30"N, 1843 m alt., 17 Feb. 2021, *D. Rodríguez et al. 8208* (B, LAGU, MO). GUATEMALA. **Alta Verapaz:** Pansamalá, May 1887, *H. von Tuerckheim* (G). **Huehuetenango:** Barillas, along the road from Barillas to Malpais, 15°49'N, 91°16'W, 1554 m alt., 28 Feb. 2009, *M. J. Christenhusz et al. 5373* (BM, USCG). **Sololá:** Panajachel, 15 km of Panajachel, S of Lake Atitlan, alt. ca. 2200 m alt., 12 May 1972, *D. Burch* (USF). **Zacapa:** sierra de Las Minas, along trail between Rio Hondo and summit of mountain at Finca Alejandria, 1000–1500 m alt., 11 Oct. 1939, *J. A. Steyermark 29658* (G). MEXICO. **Chiapas:** from road between Tuxtla Gutiérrez and San Cristobal de las Casas (Federal highway 190), 09 Jan. 2005, *J. R. Abbott 19863* (CTBS, CICY, FLAS); On the side of the road from Ocoatepec to Santa Carmen, 700 m past the last house of Ocoatepec, 17°13'35"N, 93°10'16"W, 1520 m alt., 22 Nov. 2014, *S. M. Geck 554* (G); Huixtán, 17.2 mi NE of Huixtán, and 5.7 mi NE of the Oxchuc turnoff on road to Ococingo, 9 Feb. 1998, *J. Bauml et al. 628* (HNT, USF); La Trinitaria, Lagunas de Montebello, 8 Oct. 1978, *W. Schwabe & W. Kailing s.n.* (B-100174427, MEXU); La Trinitaria, 5 km E of entrance to Monte Bello National Park and ca. 5 km NW of Lago de Tziskao, 1300 m alt., 27 May 1985, *W. Thomas & J. L. Villaseñor 3656* (USF); Pueblo Nuevo Solistahuacán, north of Clinica Yera Suena near Pueblo Nuevo Solistahuacan, 25 Jan. 1965, *P. H. Raven 20051* (BM).

3. *Asemeia securidaca* (Chodat) J. F. B. Pastore & J. R. Abbott, Kew Bull. 67: 805. 2012.

Polygala securidaca Chodat, Bot. Jahrb. Syst. 115: 76. 1914. TYPE: Honduras.

“Bergwald oberhalb Copan”, 8 Jan. 1897, C. Seler & E. Seler 3345 (lectotype, designated here, G [bc] 0032298!); isolectotype, B†, B as photo F neg. 013062 in F!).

Figure 6.

Shrub 1–3 m tall, branches pubescent-adpressed. *Leaves* membranaceous; petiole 4–4.5 mm long., pubescent-adpressed; blade 29–50 × 14–25 mm, elliptic, apex acuminate, mucronate, base obtuse, margin entire, sparsely ciliated, adaxial surface estrigose, abaxial surface sparsely estrigose, more densely in the main vein. *Racemes*, peduncle 1 cm long., rachis 4–5 cm long., densely pubescent-adpressed; pedicel 10–11 mm long. pubescent-adpressed, straight. *Flower*, except the pedicel 10 mm long., coriaceous; outer sepals, with yellow glands forming spots, adaxial sepal 3.7 × 2.7 mm, apex rounded, glabrous on both surfaces, margin without glands, ciliated, abaxial sepals 4.5 × 2.6 mm, apex rounded, glabrous on both surfaces, margin without glands, ciliated; inner sepals 11.5 × 9.5 mm, glabrous on both surfaces, margin ciliated at the lower third and base; Keel, cuculus 11.2 × 5.1 mm, trilobate, glabrous on both surfaces; claw 2.4 mm long., not ciliated; lateral petals 9.7 × 4.6 mm, glabrous on both surfaces, ciliated at the lower third and base; staminal sheath 5.7 mm long., glabrous on both surfaces, ciliated at the lower half and base, free filaments 6 mm long., glabrous; rudimentary petals present; style 11 mm long., bent in the middle at ca. 90°, sparsely puberulous, stigma straight; ovary 2 × 1.3 mm, oblong, without a conspicuous disc at the base of the ovary. *Capsule* 5.6 × 5.8 mm, apex hardly lobed, glabrous. Mature seeds not seen.

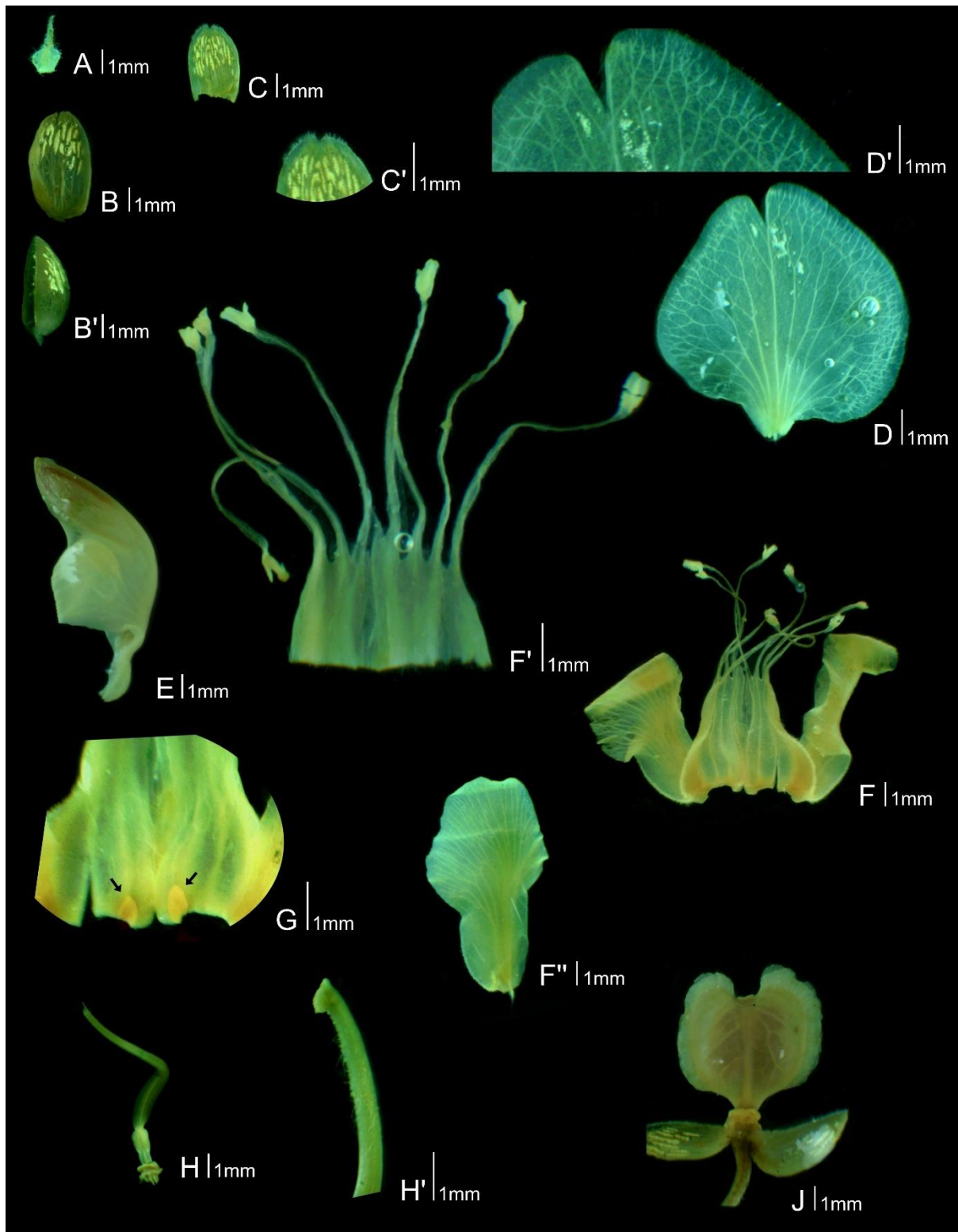


Figure 6. *Asemeia securidaca* (Chodat) J. F. B. Pastore & J. R. Abbott. (A, D–E, F'', H'. *J. R. Abbott 19752*, CTBS. B–C', F–F', G. *J. A. Molina 23338*, BM. H. *M. Chorley 281*, BM). —A. Bract. —B. Adaxial sepal. B'. Detail of the margin of the adaxial sepal. —C. Abaxial sepals. C'. Margin detail of abaxial sepals. —D. Inner sepal. —D'. Margin detail of inner sepal. —E. Keel. —F. Lateral petals with androecium. —F'. Free filaments. —F''. Lateral petals. —G. Rudimentary petals (Black arrow). —H. Gynoecium. —H'. Stigma detail. —J. Immature capsule.

Distribution. *Asemeia securidaca* is distributed across Central America, ranging from southern Guatemala to Nicaragua. This species was commonly collected in pine forest of Central America. Figure 4.

Nomenclatural Notes. Likely, there were only original specimens of *Polygala securidaca*, Seler & Seler 3345, in B and G. The specimen in B was destroyed in B during the WWII, thus the specimen in G is selected here as lectotype.

Additional Notes. *Asemeia securidaca* has been misidentified as *A. floribunda* due to their overlapping distribution and similar habitats. However, *A. securidaca* can be easily distinguished by the presence of conspicuous yellow glands forming spots on the surfaces of the outer sepals.

Additional Specimens Examined. GUATEMALA. **Baja Verapaz:** Purulha, Aidea Mocuan, south of Cobán on CA-14, 3.5 km South of the Alta Verapaz state line, near km169.5, 31 Dec. 2005, J. R. Abbott & F. Archilla 19752 (CTBS, CICY, FLAS). HONDURAS. **Comayagua:** Los Alpes on Cordillera Montecillos road to El Cedral, 1300 m alt., 11 Jan. 1969, R. Molina 23338 (EAP, G); **Lempira:** Gracias, Montaña de Celaque, 18 Sep. 1991, M. Chorley 289 (BM). **Morazán:** San Juancito, arriba del Mineral El Rosario, 24 Mar. 1957, A. Molina 7785 (EAP, US). NICARAGUA. **Nueva Segovia:** 13°44'08"S, 86°22'40"W, 1280 m alt., 24 Mar. 2015, W. D. Stevens & O. M. Montiel 35966 (MO, NY).

Asemeia subgenus **Asemeia** (Species 4–34)

Polygala subgenus *Hebeclada* section *Adenotricha* S. F. Blake, Contr. Gray Herb. 47: 63. 1916. TYPE: *Polygala grandiflora* Walter [= *Asemeia grandiflora* (Walter) Small].

Asemeia subgenus **Asemeia** section **Asemeia** (Species 4–18)

IDENTIFICATION KEY TO *ASEMEIA* SUBGEN. *ASEMEIA* SECTION *ASEMEIA*

- 1a. External sepals without glands in the margin of the outer sepals.....2
 - 2a. Pedicel pubescent.....5. *Asemeia extraaxillaris* (Chodat) J. F. B. Pastore & J. R. Abbott
 - 2b. Pedicel glabrous to sparsely puberulous.....3
 - 3a. Internal sepals (wings) 3.9–5.6 mm long.....4
 - 4a. Racemes congested, bracts ovate, 0.6–1 × 0.3–0.4 mm, petiole hirsute.....5

- 4b. Racemes lax, bracts deltate, 1.6–1.7 × 0.8–0.9 mm, petiole pubescent.....13. *Asemeia monticola* (Kunth) J. F. B. Pastore & J. R. Abbott
- 3b. Internal sepals (wings) 6–9 mm long.....5
- 5a. Bracts persistent until frutification.....
.....11. *Asemeia minensis* M. Mota & J. F. B. Pastore
- 5b. Bracts caduceous in anthesis.....6
- 6a. Plant often <10 cm tall, petiole hirsute (endemic to Serra da Canastra region, Minas Gerais states, Brazil)..... 15.
Asemeia pohliana (A.St.-Hil. & Moq.) J. F. B. Pastore & J. R. Abbott
- 6b. Plant often >15 cm tall (commonly much more), petiole glabrous to puberulous, (distributed in Bahia state, Brazil or Paraguay).....7
- 7a. Petiole 2–2.4 mm, capsule 4.8–5 mm compr., endemic to Paraguay
.....17. *Asemeia tobatensis* (Chodat) J. F. B. Pastore & J. R. Abbott
- 7b. Petiole 0.8–1.9 mm, capsule 6 mm compr., endemic to Bahia and Rio Grande do Norte states, Brazil.....8
- 8a. Leaves elliptic to oblong, racemes sublax..... 16.
Asemeia pseudohebeclada (Chodat) J. F. B. Pastore & J. R. Abbott
- 8b. Leaves linear, racemes lax.....
.....9. *Asemeia ignatii* (Chodat) J. F. B. Pastore & J. R. Abbott
- 1b. External sepals with glands in the margin of the outer sepals.....9
- 9a. Small flowers, 3.6–4.2 mm long.....10
- 10a. Racemes congest; leaves elliptic, rounded to elliptic-lanceolate.....
.....10. *Asemeia martiana* (A. W. Benn.) J. F. B. Pastore & J. R. Abbott
- 10b. Racemes lax to sublax; leaves linear to lanceolate.....11
- 11a. Flower 4–6 mm compr., rudimentary petals present, style 5–6.5 mm.....
..... 7. *Asemeia grandiflora* (Walter)
- Small

- 11b. Flower 3.6–3.9 mm compr., rudimentary petals absent, style 3.8–4.3 mm.....18. *Asemeia violacea* (Aubl.) J. F. B. Pastore & J. R. Abbott
- 9b. Large flowers, (4.7–) 6–9 mm long.
- 12a. Leaves ovate to wide lanceolate, apex acuminate or acute.....13
- 13a. Leaves apex acuminate, rudimentary petals present.....
.....14. *Asemeia parietaria* (Chodat) J. F. B. Pastore & J. R. Abbott
- 13b. Leaves apex acute, rudimentary petals absent.....
..... 12. *Asemeia monninoides* (Kunth) J. F. B. Pastore & J. R. Abbott
- 12b. Leaves linear to wide elliptic, rarely rounded, apex acute to retuse..... 14
- 14a. Internal sepals (wings), without prominent veins.....4. *Asemeia decumbens* (A. W. Benn.) M. Mota & J. F. B. Pastore
- 14b. Internal sepals (wings) with prominent veins15
- 15a. Pedicel 3.5–4 mm, bracts deltoid
.....*Asemeia extraaxillaris* (Chodat) J. F. B. Pastore & J. R. Abbott
- 15b. Pedicel 2–2.5 mm, bracts ovate7. *Asemeia grandiflora* (Walter) Small

- 4. *Asemeia decumbens*** (A. W. Benn.) M. Mota & J. F. B. Pastore, comb. nov. *Polygala decumbens* A. W. Benn., Fl. Bras. (Martius) 13(3): 15. 1874. *Polygala martiana* A. W. Benn. var. *decumbens* (A. W. Benn.) A. C. A. Aguiar, Marques & K. Yamam., Revista Brasil. Bioci. 6: 89. 2008. TYPE: Brazil. Bahia, Serra da Jacobina, [Utinga], *J. J. S. Blanchet* 2688 (lectotype, designated by Pastore & Abbott (2012: 809), second-step designated here, K [bc] 000555748!; isolectotypes B†, B as photo F neg 013012 in F!, BM [bc] 000566413!, FI [bc] 005798!, P [bc] 00733506!).
- Polygala planellasi* Molinet & M. Gómez, Anales Soc. Esp. Hist. Nat. 19: 233. 1890. (*nom. nov. pro Polygala peduncularis* Rich. Hist. Phys. Cuba, Pl. Vasc. 106. 1841, *nom. illeg.* Cuba. *R. de la Sagra s.n.* (lectotype designated by Pastore & Abbott (2012: 809) P [bc] 00733357!).

- Polygala bahiensis* Chodat, Mém. Soc. Phys. Genève 31, 2 (2): 49, t. 15. 1893. TYPE: Brazil. Bahia, “Hab. in Brasilia (Salzmann, Hb. Deless)”, *P. Salzmann s.n.* (lectotype, designated here: G [bc] 00189529!; isolectotypes: CGE!, FI [bc] 005805!, P [bc] 02548803!).
- Polygala mollis* Kunth f. *ramosa* Chodat, Mém. Soc. Phys. Genève 31, 2(2): 71. 1893. TYPE: Guyana. “Schomburgk. n° 260, in Guiana”, 1868, *R. Schomburgk 260* (lectotype, designated here, G [Deless.]; isolectotypes BM [bc] 000027056, BM [bc] 000027057, CGE!, CGE! [bis], K [bc] 000264953!, K [bc] 000264957!, P [bc] 02576934!).
- Polygala nicaraguensis* Chodat, Mém. Soc. Phys. Genève 31, 2 (2): 54. 1893. TYPE: Nicaragua. “Habitat in Costa Rica et Nicaragua. Levy Pt. Nicar. 238 (v. in Hb. Boiss) Pitt. et Dur. Pt. Costar., n° 348 (?)”, Sep.–Oct. 1869, *P. Lévy 238* (holotype, G [Boissier]; isolectotypes G [Deless.], P [bc] 00733341, P [bc] 00733342, P [bc] 00733343!).
- Polygala piauhiensis* Chodat, Mém. Soc. Phys. Genève 31, 2 (2): 60, t. 15. 1893. *Polygala martiana* A. W. Benn. var. *piauhiensis* (Chodat) A. C. A. Aguiar, Marques & K. Yamam, Revista Brasil. Bioci. 6: 90. 2008. TYPE: Brazil. Piauí: “Habitat in Brasiliae prov. Piauhiensi, in campis arenosis (Mart. Hb. Monae), in Brasilia (Hb. Zuccarini)”, Maio 1819, *C. F. P. von Martius s.n.* (lectotype, designated by Abbott & Pastore (2012: 809) M [bc] 153067!).
- Polygala translucida* Chodat, Bot. Jahrb. Syst. 52 (1-2, Beibl. 115): 77. 1914. TYPE: Peru. Piura, Serran, “Subäquatoriale andine Provinz: Peru, Senan, Westhänge der Anden ost-südöstlich von Piura, Grasfluren, um 200–300 m (Weberbauer n. 5982)”, March 1912, *A. Weberbauer 5982* (lectotype, designated here, G [Deless.]; isolectotypes US [bc] 00109051! V [bc] 0042777F!, V [bc] 0041956F!).
- Polygala violacea* Vahl, Symb. Bot. 2: 79. 1791. nom. illeg. (non *P. violacea* Aubl., 1775). TYPE: Guyana. Cayenne, “Habitat Cayenna, Dn von Rohr”, *J. P. B. von Röhr s.n.* (lectotype, designated here, C [bc] 10017336!; isolectotypes C [bc] 10017337!, C [bc] 10017338!, PH [bc] 00042450!, S [bc] S08-19888!).
- Polygala violacea* Vahl var. *robusta* Chodat. TYPE: Guyana. “Gabriel (1802) Legit in Cayenne, Guyana gallica. (Hb. Delessert)”, 1820, *M. Gabriel s.n.* (lectotype, designated by Pastore & Abbott (2012: 809) G [bc] 00227247!; isolectotypes, G [bc] 00227248!).
Figure 3D–E, 7.

Subshrub, 30 cm tall, branches pubescent. *Leaves* membranaceous; petiole 1.4–3 mm long., pubescent; blade 2.6–3.2 × 1.3–2.1 mm, elliptic to ovate, apex round to obtuse, base acute to obtuse, margin entire, ciliated, adaxial surface sparsely estrigose, abaxial surface pubescent. *Racemes*, rachis 8.5–24 cm long., sublax, pubescent, bracts 2.2–2.4 × 0.5–0.6 mm ovate, apex acute, outer surface pubescent, inner surface sparsely estrigose, margin ciliated; pedicel 2.1–2.5 mm long. sparsely pubescent, straight. *Flower*, except the pedicel 4.8–5 mm long., membranaceous; outer sepals, without yellow glands forming spots on the surfaces, apex, adaxial sepal 2.9 × 1.5–2 mm, apex rounded, glabrous both surfaces, margin with glands, ciliated to sparsely ciliated, abaxial sepals 2.9 × 2 mm, apex acute, glabrous both surfaces, margin with glands, ciliated to sparsely ciliated; inner sepals 5.3 × 4–4.9 mm, margin not ciliated; Keel, cuculus 3.2 × 3.6–3.9 mm, trilobate, glabrous, except for the basal margin of the cuculus pubescent; claw 2.3–2.9 mm long., ciliated; lateral petals 4.5–4.9 mm, outer surface glabrous, inner surface pubescent in the lower third, ciliated at the base; filament sheath 2.9–3.2 mm long., outer surface pubescent at the basal portion, inner surface pubescent at the basal portion, ciliated at the middle and basal portion, free filaments 2.3–2.7 mm long.; rudimentary petals absent; style 5.4–5.6 mm long., with a semi-circle of trichomes in the pre-stigmatic region, stigma hooked-like; ovary 1 × 0.9 mm, oblong, glabrous, without conspicuous disc at the base of the ovary. *Capsule* 5.7 × 3.2 mm. Seeds 3 × 1 mm, oblong pubescent, caruncle 0.8 × 1 mm long., pubescent, corneous, with dorsal and two lateral appendages.

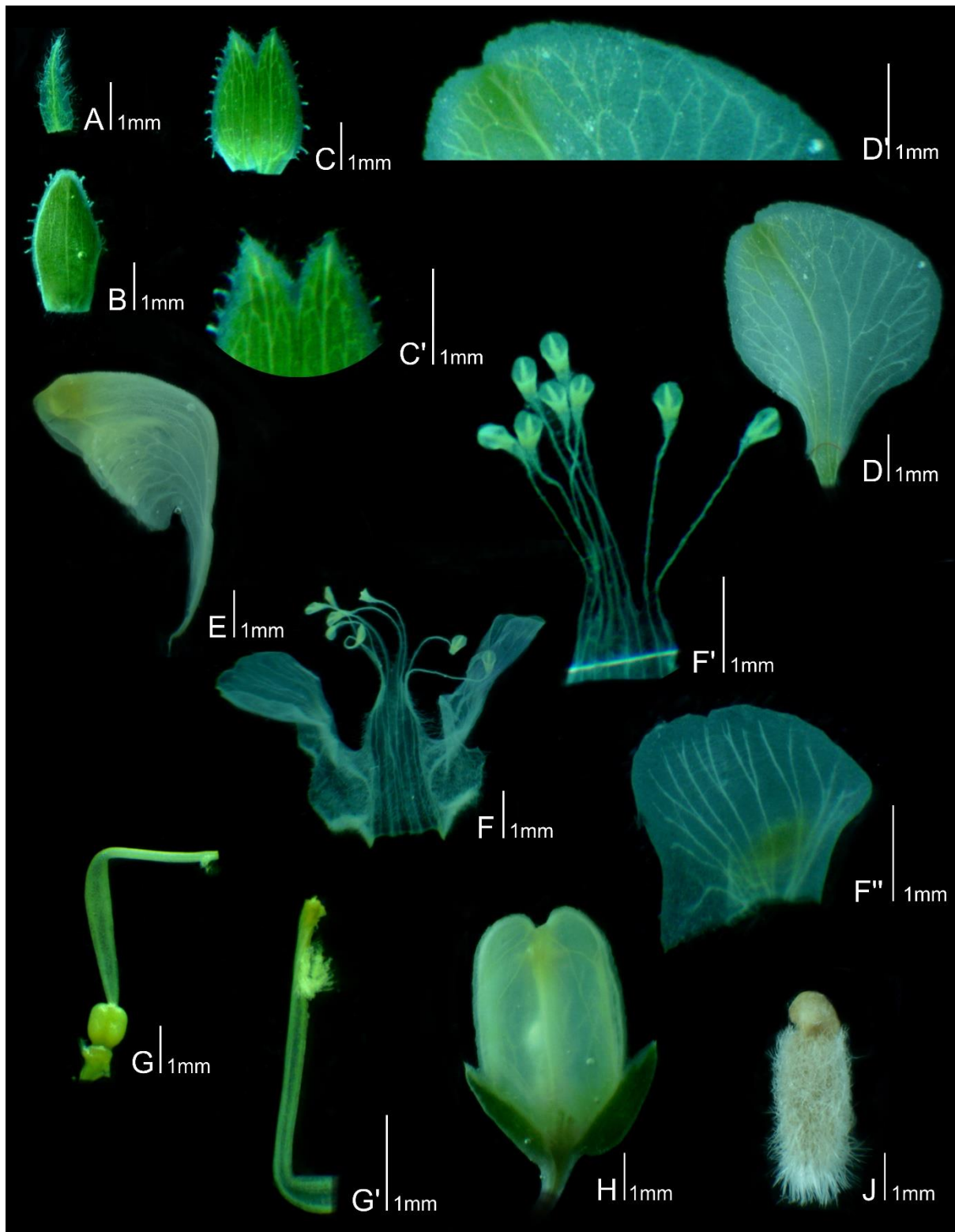


Figure 7. *Asemeia decumbens* (A. W. Benn.) M. Mota & J. F. B. Pastore. (*J.F.B. Pastore & M. Mota 5488*, CTBS). —A. Bract. —B. Adaxial sepal. —C. Abaxial sepals. —C'. Margin detail of abaxial sepals. —D. Inner sepal. —D'. Margin detail of inner sepal. —E. Keel. —F. Lateral petals with androecium. —F'. Free filaments. —F''. Apex detail of lateral petals. —G. Gynoecium. —G'. Stigma detail. —H. Capsule. —J. Seed.

Distribution. *Asemeia decumbens* is a widely distributed species spanning from southern Mexico to Paraguay (Figure 4). Its distribution encompasses various habitats, which are somewhat linked to its morphotypes (Figure 8). The typical morphotype, which includes the type specimen of *A. decumbens* [from Utinga, Bahia state], is a short plant up to 15 cm, with elliptical leaves, exhibits dense pubescence in the stems, axis of racemes, and leaves, eventually with several stems arising from the base. This morphotype is found in the *Caatinga*, an arid region of Brazil. The morphotype which includes the type specimen of “*Polygala violacea* Vahl” and also of “*Polygala planelasii*”, thrives in the sandy savannas of the Amazon region, found in the northern of South America, and Central America, including the Antilles islands, and the *Restinga* vegetation. This morphotype is also frequently collected in the boundaries of forests, as well as in semi-antropic and antropic environments. Another morphological variation was noted in shadowy vegetation of the Atlantic Forest (Bahia State). These specimens are shrubby, often exceeding 1 m in height, and are characterized by ovate and membranaceous leaves, as well as comparatively smaller flowers in relation to the other morphotypes. Specimens of this morphotype of *A. decumbens* (ex. *S. F. Conceição* 586, HUEFS) resemble to members of *A. monninoidea*. Finally, there is a morphotype from sandy restinga habitats that is recognized by nearly round and membranaceous leaves, prostrate habitat, short and dense racemes with flowers varying in size among the specimens. This morphotype (ex. *E. Melo* 9505, HUEFS) occur from the French Guyana to the Coastal region of Bahia State (Brazil), and its morphology is comparable with *A. martiana* members. Among the above mentioned extremes, several intermediary morphotypes of *A. decumbens* can be observed.

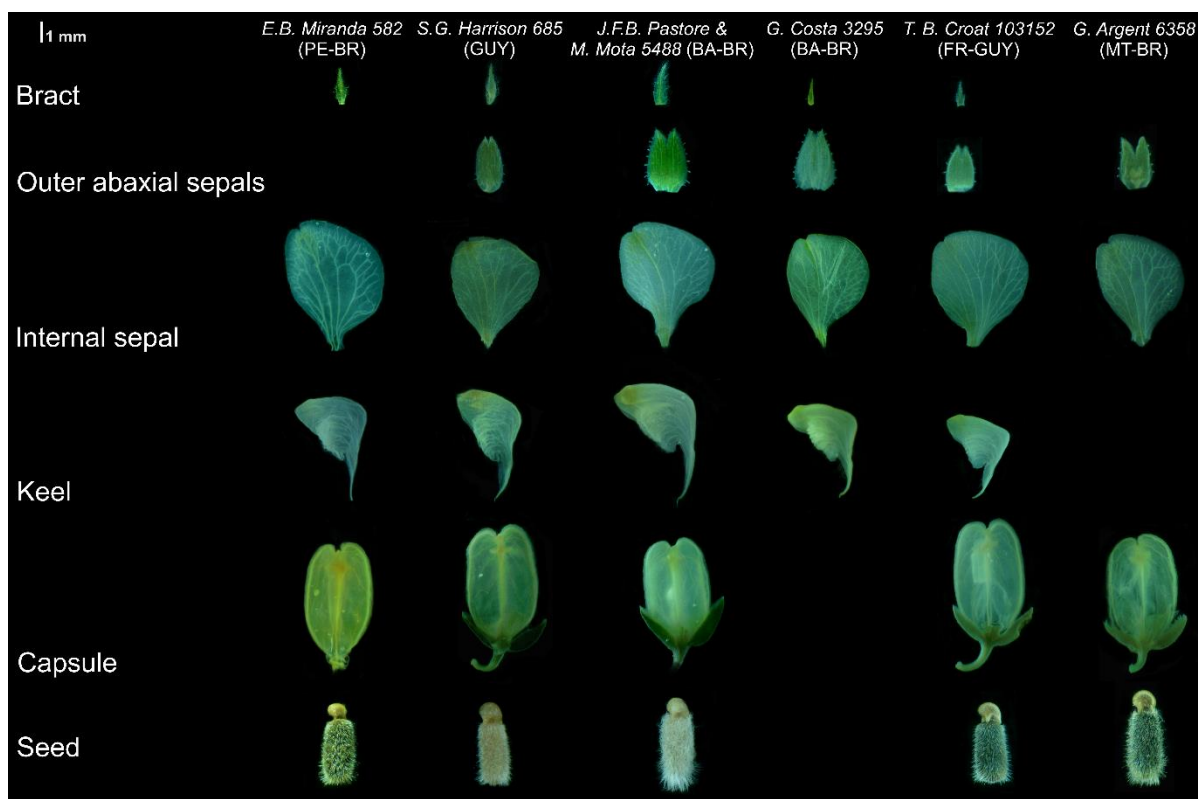


Figure 8. Comparative plate of morphotypes of *Asemeia decumbens* (A. W. Benn.) M. Mota & J. F. B. Pastore.

Nomenclatural Notes. Although *Asemeia ovata* is widely used in herbarium specimens, there is a problematic around this name which stems from the Poiret's identification on two specimens of *A. martiana* from 'Guyana' as *P. ovata*, FI016149 p.p. [herbarium number] and P02576921 [barcode]. In fact, these are the only two specimens known that have the Poiret's original handwriting, as well the specimen in FI is from the 'Desfontaine Herbarium' which was cited in protologue. These circumstances lead Pastore & Abbott (2012) to recognize *P. ovata* as a member of *Asemeia*. However, the original description of *P. ovata*, Poiret (1804) mentioned glabrous leaves and pubescent capsules and these features does not match with the *Asemeia martiana* specimens, also the protologue of *P. ovata* indicated that the material was collected by Nectoux from Santo Domingo. Searches in the P and FI herbaria does not result in find any specimen collected by Nectoux from Santo Domingo, labeled from originally from 'Desfontaine herbarium', and eventually identified by Poiret as "*Polygala ovata*", which could be considered the irrefutably the type of *P. ovata*. Consequently, the original description, specimen cited in protologue, and the Poiret's identification of specimens in P does not converge to any specimen. In fact, there are a specimen, P00733335 [barcode] from the genus *Hebecarpa*, collected by Nectoux from Santo Domingo in which agrees with the

original description. This specimen was already identified (probably before 1824) as *P. ovata* by De Candolle, with a likely duplicate in G [G00210848] bearing immature fruit which are absent in the P specimen. De Candolle (1824) described *Polygala hebecarpa* DC. including *P. ovata* as its likely synonym. This suggests the eventual type of *Polygala ovata* was not seen by De Candolle until 1824. The specimen in P has the note '*Polygala hebecarpa* DC.' strikethrough, and '*Polygala ovata* Poir.' written by de Candolle handwritten. Thus, *Polygala ovata* is interpreted here to belong to the genus *Hebecarpa* (Chodat) J. R. Abbott. (Mota et al. *in prep.*)

Pastore & Abbott (2012) designated the lectotype of *Polygala decumbens* A. W. Benn. (= *Asemeia decumbens*) as a specimen located in K. However, there are two specimens kept in K, both were annotated by Pastore (in 2008) as 'isotype'. Here, the specimen with the Bennett's original notes and identification, is chosen as the lectotype.

Pastore & Abbott (2012) designated as lectotype of *Polygala bahiensis* Chodat [W18890316370], based on the only specimen which has a original label by Chodat identifying the species as "*Polygala bahiensis*" – this specimen is annotated as *Salzmann s.n.* which matches with the original information on the protologue of *P. bahiensis*. However, *Polygala bahiensis* was described as the original material in G [Delessert], and the original description of the plant does not match with the specimen W18890316370.

The lectotype designated by Pastore & Abbott (2012), *Salzmann s.n. (in umbrosis)* in W [W18890316370] represent a duplicate of the specimen *Salzmann s.n. (in umbrosis)* (G00227246), the lectotype of *Polygala orobus* (= *A. violacea*). The description of *Polygala bahiensis* matches with another Salzmann's specimen of "*Bahia, In sabulosis maritimis*" from herbarium Delessert. which is considered here the original material of *P. bahiensis*.

Although, the absence of Chodat's original notes, which might be lost during the fire which destroyed part of the Chodat's original herbarium in the University of Geneva in 24–25 December of 1898, the lectotype designated by Pastore & Abbott (2012) is superseded, and the specimen *Salzmann s.n. "Bahia, In sabulosis maritimis"*, is designated here as lectotype and perhaps the holotype.

Additional Notes. *Asemeia decumbens* display a wide distribution and significant morphological variation. Within this species, we could identify several distinct morphotypes, with at least 30 different variations that are not easily distinguishable from each other. This raises the possibility that some of these variations may represent different species or even

suggest a reticulated evolution. Therefore, at the moment we refrain from assigning any taxonomic recognition to these morphotypes.

Aguiar et al. (2008) treated *A. decumbens* (formerly *Polygala decumbens*) as a variety of *A. martiana*, designating it as *A. martiana* var. *decumbens*, and restricting its distribution to the states of Bahia and Alagoas in Brazil. Here these entities were treated as separate species, although we recognize that *Asemeia decumbens* is closely related to *A. martiana*, and eventually not easy to identify one from the other. For this reason we speculate that hybrids between both species may exist.

The barcode cited by Pastore & Abbott (2012: 809) to the lectotype of *Polygala peduncularis* Rich., P00733337, is incorrect, the correct barcode is P00733357.

Additional Specimens Examined. BRAZIL. **Amapá:** Serra do Navio, on road to Água Branca, 1°3'N, 52°4'W, 4 Jan. 1985, *S. A. Mori 17688* (NY, US). **Bahia:** Brumado, Rodovia Brumado - Itauçu, 12°56'47"S, 41°16'12"W, 21 Feb. 2007, *J. F. B. Pastore 1758* (ALCB, CEN, HST, HUEFS, MBM, SPF, UB); Conde, Litoral Norte, Caminho para Cavalo Russo, 11°48'S, 37°36'W, 27 Jan. 2014, *M. L. Guedes & T. F. Costa 21580* (ALCB, MBM); Correntina, Fazenda Alegre, 13°31'57"S, 45°21'33"W, 710 m alt., 13 Mar. 2018, *E. O. Moura 1874* (RB, UB); Lençóis, Parque Nacional da Chapada Diamantina. Estrada para o povoado de Remanço, 12 Mar. 2015, *P. H. Labiak et al. 6081* (CEPEC, RB, UPCB); Igatu, 08 Aug. 2006, *J. F. B. Pastore 1533* (CEN, HUEFS); Mirangaba, 27 Apr. 1981, *R. P. Orlandi 363* (HUEFS); Morro do Chapéu, Parque Morro do Chapéu, estrada para o Barracão., 11°25'20"S, 41°12'33"W, 1,111 m alt., 28 Apr. 2006, *J. L. Ferreira 12* (HUEFS, RB); Pilão Arcado, Brejo do Carrasco, 10°10'45"S, 43°6'38"W, 20 Mar. 2006, *D. S. Carneiro-Torres 641* (HUEFS). **Ceará:** São Benedito, 7 June 1981, *A. Fernandes & F. J. A. Matos s.n.* (EAC10454). **Maranhão:** Lajeado Novo, Rodovia BR 226, Próximo ao povoado da Passagem Boa, 6°5'3"S, 46°46'56"W, 266 m, 21 May 2012, *C. Snak et al. 1008* (CEN, HUEFS, MBM). **Mato Grosso:** Cuiabá, 2 July 1978, *T. M. Pedersen 12211* (MBM, MO). **Pará:** Bragança, Península de Ajuruteua, Praia de Ajuruteua, duna baixa na desembocadura do canal de maré Furo do Chavascal, 0°48'57"S, 46°36'56"W, 8 Mar. 2011, *U. Mehlig 913* (HBRA); Curuçá, 13 Dec. 1974, *J. E. Nascimento-Júnior 873* (ASE, UEC); Maracanã, ca. 73 airline km NE of Castanhal; savanna adjoining the village of Martins Pinheiro; Campo Martins Pinheiro, 09°52'S, 47°35'W, 50 m alt., 06 Apr. 1980, *G. Davidse 17945* (INPA, MG, NY); Salvaterra, 10 Apr. 2015, *N. F. O. Mota et al. 2882* (MG, RB). Santarém, s.d., *R.*

Spruce 636 (P). **Piauí:** Piripiri, PARNA Sete Cidades, 4°08'09"S, 41°42'08"W, 19 May 2018, *M. I. B. Loiola & N. C. Rebouças 2728* (EAC); Caracol, Área do entorno dos cálices rochosos., 9°13'15"S, 43°28'56"W, 681 m alt., 26 Feb. 2011, *E. Melo 9244* (HUEFS); Valença do Piauí, Estrada para pimenteiras, 6°23'12"S, 41°41'44"W, 350 m alt., 24 Apr. 2013, *C. Correia 881* (HUEFS). **Sergipe:** São Cristovão, Campus Universitário, 17 Oct. 1981, *M. C. Santana 34* (ASE, IPA). COLOMBIA. **Huila:** Villavieja, about 5km north of Villavieja, upper basin of Río Magdalena, 6 Feb. 1949, *H. L. Mason 13815* (US). FRENCH GUIANA. **Guyanne:** Cayenne, Department of Guyane, Approuague-Kaw District, Kapiri Creek Lumber Road, departing N2 Hwy, 43 km S of Approuague River bridge (center) at ca. PK 125, ca. 1 km NW of main N2 Hwy., 21 Aug. 2011, *T. B. Croat 103152* (CTBS, MO). GUYANA. s.d., *G. S. Perrottet 1820* (P). **Rupununu:** Manari, 3°28'N, 59°41'W, 22 Oct. 1979, *P. J. M. Maas & L. Y. Westra 3755* (U). **Demerara-Mahaica:** Road from Timehri to Linden, 1.3 km SE of junction with airport road, 6°30'N, 58°10'W, 13 Aug. 1995, *S. R. Hill & C. N. Horn 27125* (U). JAMAICA. 2 Sep. 1901, *W. Harris 5153* (G). MEXICO. **Oaxaca:** Juchitán de Zaragoza, La Ventosa, a 100 m de La Carretera Transístmica, em el terreno del Sr. Marcelno López, 16°33'27"N, 94°56'59"W, 40 m alt., 15 Oct. 2013, *F. Sánchez 124* (MEXU, US). PANAMÁ. s.d., *J. Ebinger 2008* (MO, NO). PARAGUAY. National Park Ybycuí, 3km south of northwestern corner of park, 26°03'S, 56°46'W, 22 June 1991, *E. Zardini & R. Velázquez 27798* (MO, PY). PERU. Cajamarca: Cajamarca, La Peña Negra, 21 May 1975, *A. Sagástegui et al. 7928* (HUT, NY). SURINAME: Along railroad between Republiek and Zanderij I Para – Surinam, 4 Sep. 1948, *J. Lanjouw et al. 149* (U); **Saramacca:** Experimental farm Coebiti, 22 June 1982, *A. P. Everaarts 663* (U, WAG). TRINIDAD AND TOBAGO: Mt. St. Benedict, 15 Aug. 1929, *D. G. Geyskes s.n.* (U1527941).

5. *Asemeia extraaxillaris* (Chodat) J. F. B. Pastore & J. R. Abbott, *Mém. Soc. Phys. Genève* 30, 2, (8): 103, t. 28. 1889. *Polygala extraaxillaris* Chodat. TYPE: Paraguay. Paraguari, Cerro Pelado, [Cerro Peró] “In collibus incultis: Villa-Rica, n. 2180, cerro Pelado apud Paraguari 4716”, 6 April 1883, *B. Balansa 4716* (lectotype, designated by Pastore & Abbott (2012: 805), P [bc] 00733448!; isolectotypes, G [bc] 00413576!, G [bc] 00413580! K [bc] 000590951!, P [bc] 02576986!).

Polygala fallax Chodat, *Mém. Soc. Phys. Genève* 30, 2 (8): 104, t. 28. 1889, nom. Illeg. (non *Polygala fallax* Hemsl. in Forbes & Hemsley 1886), TYPE: Paraguay. [Paraguari],

[“Prairies de Capitindu, à l’est de la Cordillère de Villa Rica”], 29 Sep. 1874, *B. Balansa 2179* (lectotype, designated here, G [bc] 00413678!, isolectotypes K [bc] 000590950!, P [bc] 00733451!, P [bc] 00733452!)

Polygala fallax Chodat f. *angustifolia* Chodat, Bull. Herb. Boissier 2, 1: 434. 1901. TYPE: Paraguay. [Canindeyú], [“In campo pr. fl. Curuguaty”, Sierra de Maracayú, River Curuguaty], Sep. 1898, *E. Hassler 4620* (lectotype, designated here, G [bc] 00413674!, isolectotypes: G [bc] 00413579!, GH [bc] 00007651, MPU [bc] 012047!, P [bc] 00733453!, P [bc] 00733454!, UC [bc] 944886)

Polygala extraaxillaris Chodat var. *concepcionis* Chodat, Bull. Herb. Boissier 2: 57. 1902. TYPE: Paraguay. Prov. Concepcion “in cam pis pr. flumen Aquibadan. Oct., n. 7652, in regione cursus superioris fluminis Apa, Febr., n. 7652a”, Oct. 1911, *E. Hassler 7652* (lectotype, designated here, P [bc] 00733449!), isolectotypes: BM [bc] 000549967!, K!, MO [bc] 524123!, NY [bc] 00259820!, P [bc] 00733450!, S [bc] S-0818559!, UC [bc] 940885).

Polygala extraaxillaris Chodat f. *humilis* Hicken, Darwiniana 1: 126. 1924. TYPE: Argentina. Salta, Quebrada, Jan. 1923, *I. C. Vattuone 88* (holotype, SI [bc] 0031361).

Polygala extraaxillaris Chodat var. *linearis* Chodat in Sched. Figure 9.

Herb, 15 cm tall, branches pubescent. *Leaves* chartaceous; petiole 1.7–4 mm long., pubescent; blade 24–45 × 4–8 mm, elliptic, apex rounded to acute, base acute, margin entire, ciliated, pubescent in both surfaces. *Racemes*, rachis 10–12 cm long., pubescent, bracts 1.1–2.3 × 0.3–0.4 mm, deltoid, apex acute, outer surface pubescent, inner surface glabrous, margin with glands, ciliated, caducous; pedicel 3.5–4 mm long. pubescent, curved. *Flower*, except the pedicel 5–7 mm long., membranaceous; outer sepals ovate, without yellow glands forming spots on the surfaces, adaxial sepal 3.4 × 2 mm, apex rounded, outer surface short pubescent, inner surface glabrous, margin with glands, ciliated, abaxial sepals 2.6–3.1 × 1.4–2 mm, apex rounded to acute, outer surface short pubescent, inner surface glabrous, margin with glands, ciliated; inner sepals 6–8 × 5–7 mm, glabrous on both surfaces, margin glabrous; Keel, cuculus 3.2–3.9 × 5.2–5.8 mm, trilobate, glabrous on both surfaces; claw 2.1–3 mm long., sparsely ciliated; lateral petals 6 × 3 mm, outer surface pubescent near the basal margins, inner surface pubescent at the lower half, sparsely ciliated at the apex; filament sheath 3–3.7 mm long., outer surface pubescent at the lower third, inner surface pubescent at the lower half, free filaments 2.2–3.6 mm long., glabrous; rudimentary petals present; style

5–7.7 mm long., bent in the middle at ca. 90°, with a semi-circle of trichomes in the pre-stigmatic region, stigma hooked-like; ovary 1.5–2.5 × 1.3–2.3 mm, globose, glabrous, without conspicuous disc at the base of the ovary. *Capsule* 5.2–5.3 × 3.8–3.9 mm, elliptic, glabrous. Seeds 3 × 1.7 mm, oblong, pubescent, caruncle 1–1.1 × 1.4 mm long., corneous, appendaged, with dorsal and two lateral appendages, pubescent.

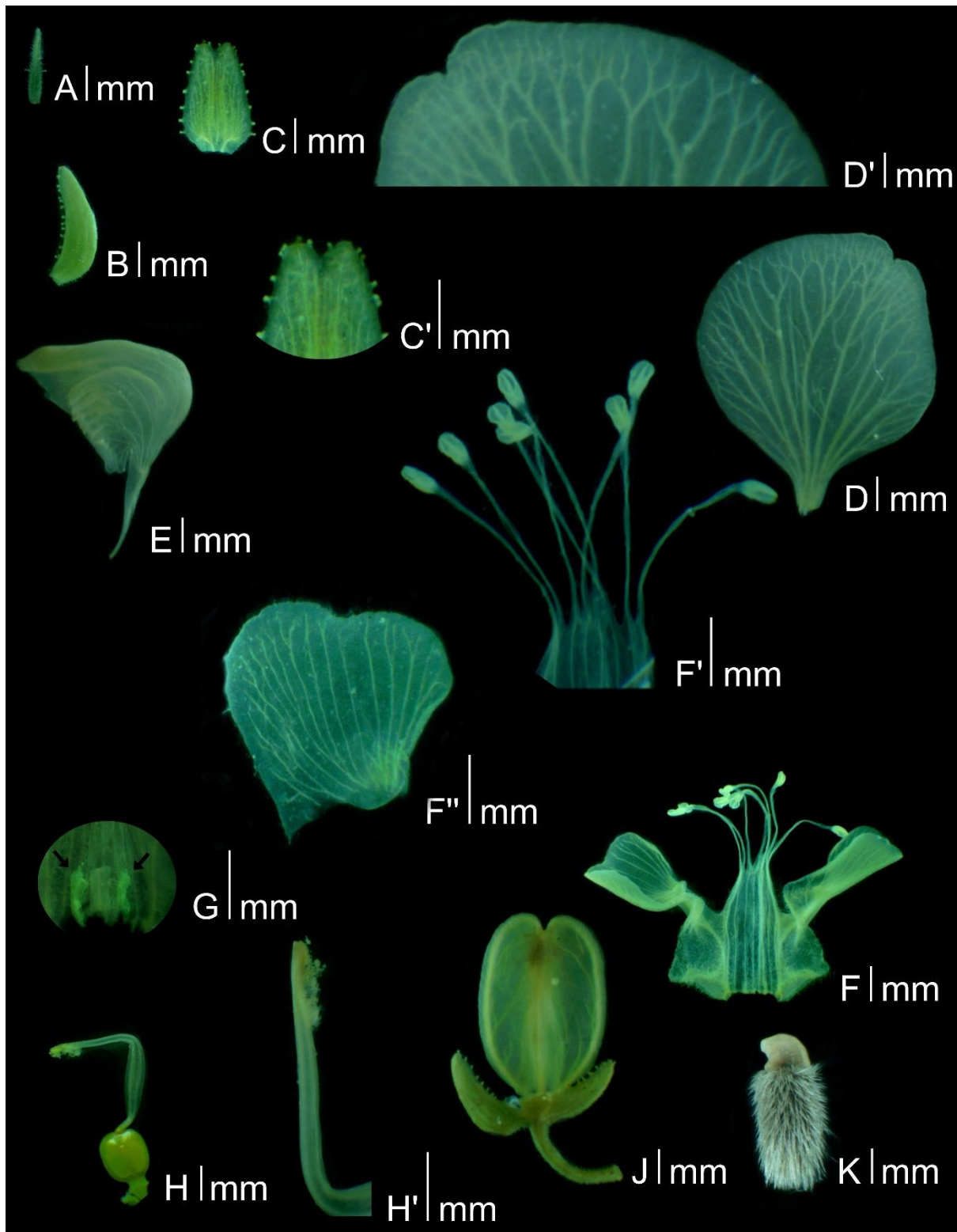


Figure 9. *Asemeia extraaxillaris* (Chodat) J. F. B. Pastore & J. R. Abbott. —A. Bract. —B. Adaxial sepal. —C. Abaxial sepal. —C'. Margin detail of abaxial sepals. —D. Inner sepal. —D'. Margin detail of inner sepal. —E. Keel. —F. Lateral petals with androecium. —F'. Free filaments. —F''. Apex detail of lateral petals. —G. Rudimentary petals (black arrow). —H. Gynoecium. —H'. Stigma detail. —J. Capsule. —K. Seed. A–K from *E.M. Zardini e I. Chaparro 49422* (CTBS).

Distribution. *Asemeia extraaxillaris* occurs in the southern region of Brazil and in Paraguay, Bolivia, and Argentina. Figure 10.

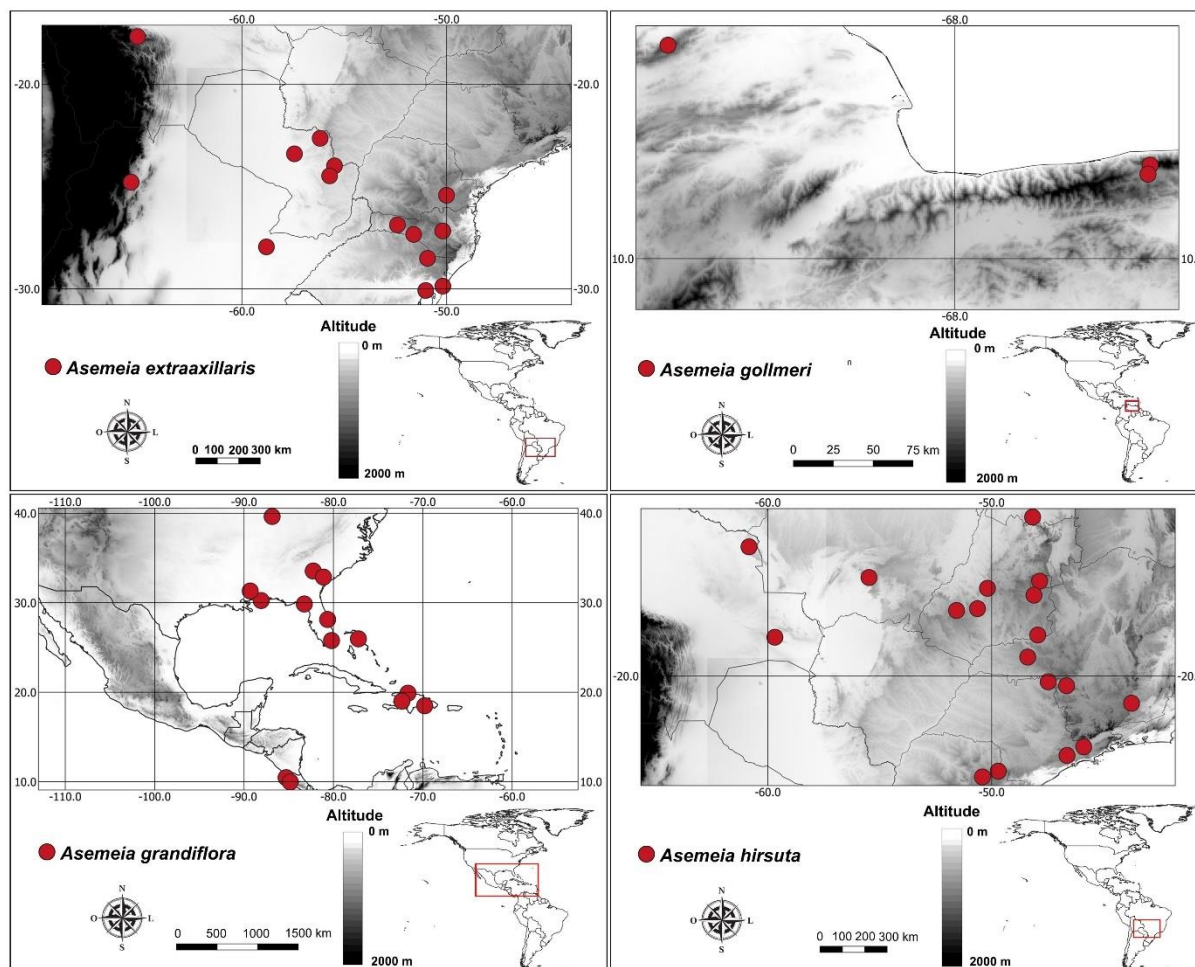


Figure 10. Distribution map of *Asemeia extraaxillaris* (Chodat) J. F. B. Pastore & J. R. Abbott, (Chodat) J. F. B. Pastore & J. R. Abbott, *A. grandiflora* (Walter) Small. and *A. hirsuta* (A. St.-Hil. & Moq.) J. F. B. Pastore & J. R. Abbott.

Additional Notes. *Asemeia extraaxillaris*, as treated in this context, as a polymorphic species with a wide distribution range extending from Bolivia to Argentina, and the southern states of Brazil. It comprises a complex of morphotypes that, have been historically recognized as separate species or infraspecific taxa. The observed variation in characters such as pubescence, presence or absence of glands on the sepal margins, and flower size suggests the possible involvement of more than one taxon. This variation in morphology could result from a reticulate evolution involving this putative distinct species, or potential hybrids. Until additional evidence can provide further evidence into this complex situation, we consider all of these morphotypes to be part of a variable species.

Additional Specimens Examined. ARGENTINA. **Corrientes:** Empedrado, Estancia, Las Tres Marias, 7 Feb. 1968, T. M. Pedersen 8762 (E, L). BRAZIL. **Paraná:** Palmeira, Rio

dos Papagaios, 12 Oct. 1970, *L. Dombrowski & Y. S. Kuniyoshi 2975* (US). **Santa Catarina:** Capinzal, 7 km southeast of Capinzal, 28 Feb. 1957, *L. Smith & R. Klein 11922* (HBR, US). Frei Rogério, beira da estrada entre Frei Rogério e Curitibaanos, ca. de 10 km de Curitibaanos para Frei Rogério, 9 Dec. 2016, *J. F. B. Pastore et al. 5244* (CTBS); Xanxerê, 9 km North of Abelardo Luz, 19 Feb. 1957, *L. Smith & R. Klein 11444* (HBR, US). **Rio Grande do Sul:** Viamão, 6 Oct. 1971, *P. L. Oliveira s.n.* (ICN 8735, U); Osório, próximo à lagoa das Traíras, 29°52'08"S, 50°11'13"W, 6 m, 28 Nov. 2014, *E. Valduga 509* (HUCS, HURB); Vacaria, 10 km W of Vacaria, by the R. Maria Inácia., 17 Dec. 1979, *T. M. Pedersen 12727* (L, MO, NY). **PARAGUAY. Amambay:** Parque Nacional Cerro Cora, 22°40'S, 56°05'W, 1 Nov. 1983, *W. J. Hahn 1748* (MO, US). **Canendiyú:** Mbaracayú Natural Reserve, 23°59'39"S, 55°28'44"W, 31 Oct. 1998, *E. M. Zardini & I. Chaparro 49422* (AS, CTBS, MO). **Cochabamba:** Carrasco, Epizana, 3–5 km E de Epizana, carretera antigua Cochamaba–Santa Cruz, 17°41'22"S, 65°06'11"W, 2855 m alt., 10 Feb. 2003, *J. R. I. Wood & M. Mendoza 19070* (K, USZ).

6. *Asemeia gollmeri* (Chodat) J. F. B. Pastore & J. R. Abbott [as 'galmeri'], *Kew Bull.* 67: 806. 2012. *Polygala gollmeri* Chodat [as 'galmeri'], *Mém. Soc. Phys. Genève* 31, 2(2): 45. 1893. TYPE: Venezuela. Caracas "Galmer, Caracas in Hb. Berol.", 23 June 1854, *J. Göllmer s.n.* (holotype B†, B as photo F!, neg. 013020 in F!). NEOTYPE: Venezuela. Caracas, Ave. Los Ilustres, frente al Paseo Los Ilustres, como a 100 mts del Rio Guaire, 25 Nov. 1980, *Hernández 6* (neotype, designated by Pastore & Abbott (2012: 806), NY [bc] 00856830!).

Polygala americana Mill var *glabrescens* Kuntze, *Revis. Gen. Pl.* 1: 48. 1891. TYPE: Venezuela. Caracas "Caracas", May 1874, *C. E. O. Kuntze 1693* (holotype, NY [bc] 00856784!). Figure 11.

Herb, 20–70 cm tall, branches pubescent. *Leaves* chartaceous; petiole 2.5 mm long; blade 2.8–6.6 × 0.5–2.2 cm, elliptic to ovate-lanceolate, apex acute to acuminate, base acute, margin entire, ciliated. *Racemes*, rachis 5.5–16 cm long., lax, pubescent, bracts 2 × 0.5 mm deltoid, apex acuminate, outer surface sparsely pubescent, adpressed, inner surface glabrous, margin ciliated, without glands; pedicel 3–4 mm long. puberulous, straight. *Flower*, except the pedicel 6 mm long., membranaceous; outer sepals without yellow glands forming spots on the surfaces, adaxial sepal 3 × 2.7 mm, apex rounded, glabrous on both surfaces, margin

with glands, ciliated at the lower third, abaxial sepals 2.4×2 mm, apex rounded, glabrous on both surfaces, margin with glands, ciliated at the lower third; inner sepals 7.8×6.8 mm, glabrous on both surfaces, margin not ciliated; Keel, cuculus $3.5\text{--}4 \times 5$ mm, trilobate, glabrous, except for the basal margin of the cuculus ciliated; claw 2.8 mm long., ciliated; lateral petals 4.6 mm, outer surface glabrous, inner surface pubescent and ciliated at the lower half portion; filament sheath 3.3 mm long., outer surface glabrous, inner surface pubescent and ciliated at the lower half portion, free filaments 4.6 mm long., glabrous; rudimentary petals present; style 7.4 mm long., bent in the middle at ca. 90° , with a semi-circle of trichomes in the pre-stigmatic region, stigma hooked-like; ovary 1.3×1.3 mm, globose, glabrous, without conspicuous disc at the base of the ovary. *Capsule* 5.7×4.8 mm, oblong, glabrous. Seeds 2.6×2 mm, oval, pubescent, caruncle 1.3×1.6 mm long., puberulous, corneous, appendaged, with dorsal and two lateral appendages.

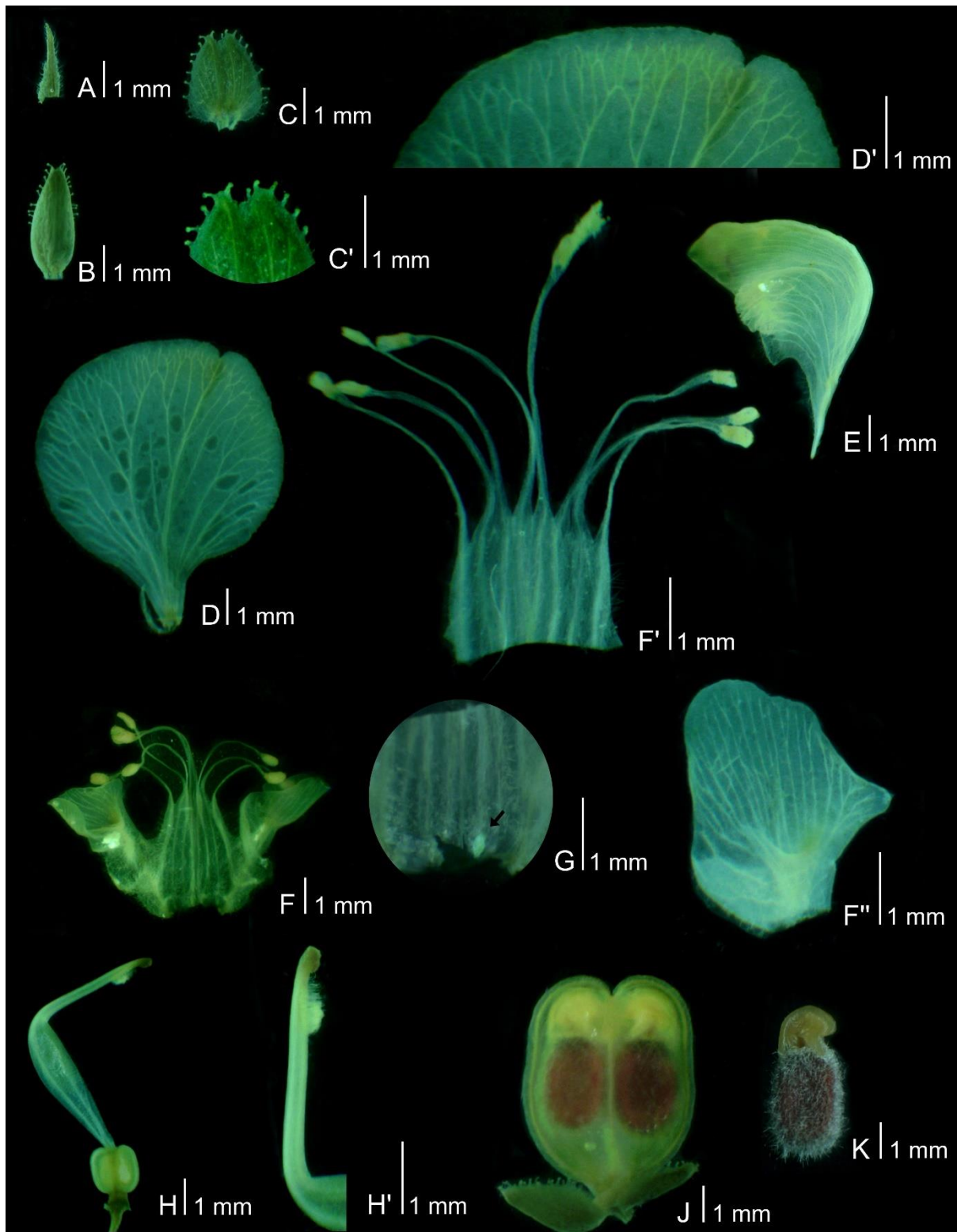


Figure 11. *Asemeia gollmeri* (Chodat) J.F.B. Pastore & J. R. Abbott. (A–H'. *J. A. Steyermark* 99035, K. J–K. *J. A. Steyermark* 99091, K). —A. Bract. —B. Adaxial sepal. —C. Abaxial sepal. —C'. Margin detail of abaxial sepals. —D. Inner sepal. —D'. Margin detail of inner sepal. —E. Keel. —F. Lateral petals with androecium. —F'. Free filaments. —F''. Apex detail of lateral petals. —G. Rudimentary petals (black arrow). —H. Gynoecium. —H'. Stigma detail. —J. Capsule. —K. Seed.

Distribution. *Asemeia gollmeri* is endemic to Venezuela, and occurs in megathermic trophophilous forests, characterized by humid and warm conditions. Figure 10.

Nomenclatural Notes. Chodat (1893) described *Polygala gollmeri* as ‘*Polygala galmeri*’, once the original collector’s name was *Julius Göllmer*. Following the art. 60.1 of ICN (Turland 2018) the original spelling is revised.

Additional Specimens Examined. VENEZUELA. **Distrito Capital:** Caracas, Ave. Los Ilustres, frente al Paseo Los Ilustres como a 100 mts del Rio Guaire, 10°48’N, 16°30’W, 25 Nov. 1980, *L. M. Hernández* 6 (NY, VEN); Parque nacional El Ávila, a lo largo de la pica entre Papelón y Los Venados, 10°32’N, 66°53’W. 1700 m alt., 24 Nov. 2009, *W. Meier et al.* 16093 (US). **Falcón:** Sierra de San Luis, entre Curimagua y San Luis., 18 July 1967, *J. A. Steyermark* 99091 (NY, VEN); Sierra de San Luis, Vecindad del hotel Parador. Al sur de La tabla., 17 July 1967, *J. A. Steyermark* 99035 (NY, VEN). **Miranda:** Quebrada de Turumo, near Guarenas, 2 Dec. 1923, *H. F. Pittier* 11267 (K, G, NY, US).

7. *Asemeia grandiflora* (Walter) Small, Man. S.E. Fl. 766. 1933. *Polygala grandiflora*

Walter, Fl. Carol. [Walter] 179. 1788. TYPE: United States. South Carolina, Ladies Island, near Beaufort, 30 April 1917, *C. F. Batchelder* 4905 (neotype GH00268144, selected by Ward (2008: 482); isoneotype, MO [bc] 3092106!).

Polygala grandiflora var. *angustifolia* Torr. & A. Gray, Fl. N. Amer. (Torr. & A. Gray) 1: 671. 1840. TYPE: United States. Florida, “Southern Florida, Dr. Leavenworth! Middle Florida, Dr. Chapman.”, *M. C. Leavenworth s.n.* (lectotype, designated by Gillis (1975: 39).

Polygala flabellata Shuttlew. ex A. Gray, Smithsonian Contr. Knowl. 3: 41. 1852. TYPE: United States. Florida, Key West, “Pl. Rugel, exsicc. No. 37, from Key West”, Feb. 1846, *F. Rugel* 37 (lectotype, designated by Pastore & Abbott (2012: 806), P [bc] P00733332!; isolectotypes, BM [bc] BM000566306! [also numbered as ‘#77’], COLO [bc] COLO00405761, DAO [bc] 000424412, K [bc] 000592286!, K [bc] 000592287!, US [bc] 00108944).

Polygala bahamensis S. F. Blake, Contr. Gray Herb. 47: 64. 1916. TYPE: Bahamas. New Providence, “Bahamas: New Providence: sandy loam, pine region about 13.5k. S.W. of Nassau, 12 Apr. 1905, A. E. Wight 272”, 12 April 1905, *C. Wright* 272 (holotype, GH [bc] 00025966; isotypes, F-225463, K [bc] 000591007!).

- Asemeia cumulicola* Small, Man. S.E. Fl. 766. 1933. *Polygala cumulicola* Small (Small), Bull. Torrey Bot. Club 51: 381. 1924. TYPE: United States. Florida, Miami, “Active sand-dunes, eastern coast of southern peninsular Florida”, 26 Nov. 1913 – 20 Dec. 1913, *J. K. Small 4568* (holotype, NY[bc] NY406783!; isotypes, BM013719019!, GH [bc] GH00025847, MO [bc] MO-201272!, MO [bc] MO-1260940!, NY [bc] NY406782!, PH [bc] PH00047181, PH [bc] PH00047182, TEX [bc] TEX00371575, US [bc] US00108929, US [bc] US01094566).
- Polygala grandiflora* Walter subsp. *krugii* (Chodat) Nauman, Sida 9: 17. 1981. *Polygala krugii*, Chodat, Mém. Soc. Phys. Genève 31(2). 2: 63. 1893. TYPE: Bahamas. New Providence “Habitat in Insula Novae Providentiae Bahamensi (Eggers; Flor. Ind. occ. exsc. n° 4450”, 10 Mar. 1888, *H. F. A. von Eggers 4450* (B†, fragm. NY [bc] 00074495).
- Polygala senega* L. var. *rosea* Michx. Fl. Bor.-Amer. (Michaux) 2: 53(1803). *Polygala pubescens* Muhl. Cat. Pl. Amer. Sept. 63, 1813. *nom. nov. pro P. senega* L. var. *rosea* Michx. ‘*Polygala pubescens* Muhl. ex Nutt’ Gen. N. Amer. Pl. [Nuttall]. 2: 87. 1818. *isonym. Polygala muhlenbergii* G. Don Gen. Hist. 1: 358 (1831). (*nom. nov. pro P. pubescens* Muhl. *nom. illeg. superf. Polygala grandiflora* Walt. var. *pubescens* Chodat Mém. Soc. Phys. Genève 31(2): 57. 1893). TYPE: United States. Carolina or Georgia, *A. Michaux s.n.* (lectotype P!, selected by Pastore & Abbott (2012: 806), p.p. the specimens with not crested keel, i.e. the specimens of *P. grandiflora*, not the specimens of *P. senega* L. which are mounted together with the lectotype specimens on the same sheet).
- Polygala wrightii* Chodat. Mém. Soc. Phys. Genève 31(1): 67. 1893. Type: Cuba. *C. Wright 112* p.p. (holotype B†, lectotype, designated by Rankin-Rodrigues (2003: 38), [prov. Guantánamo, prope villam Monte Verde dictam”, Jan. – July 1859, *C. Wright 112 p.p.*], GH [bc] 00025970; isolectotypes, GOET, P [bc] 02577488!).
- Polygala cubensis* Chodat Mém. Soc. Phys. Genève 31(1): 62. 1893. Type: Cuba. *C. Wright 112* p.p. (holotype B†; lectotype, designated by Nauman (1981: 15), second step, Rankin-Rodrigues (2003: 38), [prov. Holguín “Savana Hato del Medio”, 23 Aug. 1860, *C. Wright 112 p.p.*], GH [bc] 00025969, GH [bc] 00025971; isolectotype, GOET).
- Polygala grandiflora* Walter var. *leptophylla* Chodat Mém. Soc. Phys. Genève 31(2): 57 1893. *Polygala corallicola* Small Bull. N. Y. Bot. Gard. 3: 425. 1905. Cuba. *Wright*

112 (lectotype, designated by Nauman (1981: 15), second step designated by Rankin-Rodrigues (2003: 38), GH [bc] 00025972).

Polygala grandiflora Walter var. *orbicularis* Chodat. Dominican Republic. “prope Santiago ad Cuesta de Pietra, *Preneloup*, 1004 (?)

Polygala ambigens S. F. Blake in Britton. Bull Torrey Bot. Club. 50: 40. 1923. Type: Cuba. Sabana del cerro, near Cerro pelado, between Zarzal y Nagua, Jul. 1922, *Leon 10860* (holotype US).

Polygala grandiflora var. *leiodes* S. F. Blake. N. Amer. Fl. 25(5): 339. 1924. Type: United States. Florida. Lee co.: Pineland vicinity of Ft. Myers, 19 Mar. 1916, *J. P. Standley 25* (holotype US, isotypes GH [bc] 00025850, NY, MO). Figures 3F–G, 12.

Herb 20–60 cm tall, branches pubescent to densely pubescent. Leaves membranaceous; petiole 2–4 mm long., sparsely pubescent to pubescent; blade 12–32 × 1.7–8 mm, linear, narrow–elliptic to lanceolate, apex acute to rounded, mucronate, base acute, margin entire, ciliated, adaxial surface sparsely puberulous on both surfaces to estrigose on both surfaces. Racemes, rachis 3.5–10 cm long., lax, pubescent, bracts 1.2–1.7 × 0.5–0.6 mm ovate, apex acute to acuminate, outer surface sparsely pubescent, inner surface glabrous, margin without glands, ciliated, caducous; pedicel 2–2.5 mm long. pubescent, straight. Flower, except the pedicel 4–6 mm long., membranaceous; outer sepals, apex, adaxial sepal 2.6–2.7 × 1–1.3 mm, apex rounded, outer surface estrigose, inner surface glabrous, margin with glands, ciliated, abaxial sepals 2.2–2.8 × 1.2–1.6 mm, apex, outer surface estrigose, inner surface glabrous, margin with glands, ciliated; inner sepals 6.1 × 5.1–5.5 mm, glabrous on both surfaces, margin not ciliated; Keel, cuculus 3.7–3.9 × 2.9–4 mm, trilobate, glabrous, except for the basal margin of the cuculus pubescent; claw 2.4–2.8 mm long., sparsely ciliated; lateral petals 4.8–5.4 × 2.1–2.6 mm, outer surface glabrous, inner surface pubescent at the lower half portion, ciliated at the base; staminal sheath 3–3.8 mm long., outer surface sparsely pubescent, inner surface pubescent at the half basal portion to pubescent at the lower half on both surfaces, ciliated at the lateral sides, free filaments 2.9–3 mm long., glabrous; rudimentary petals present; style 5–6.5 mm long., bent in the middle at ca. 90° pubescent around the stigma, stigma hooked–like; ovary 1 × 1 mm, glabrous, without conspicuous disc at the base of the ovary. Capsule 4.8–5.2 × 3.3–3.7 mm, elliptic, glabrous. Seeds 2.8 × 1.4 mm, oblong, caruncle 1.1 × 1 mm long., sparsely pubescent, corneous, with dorsal and two lateral appendages.

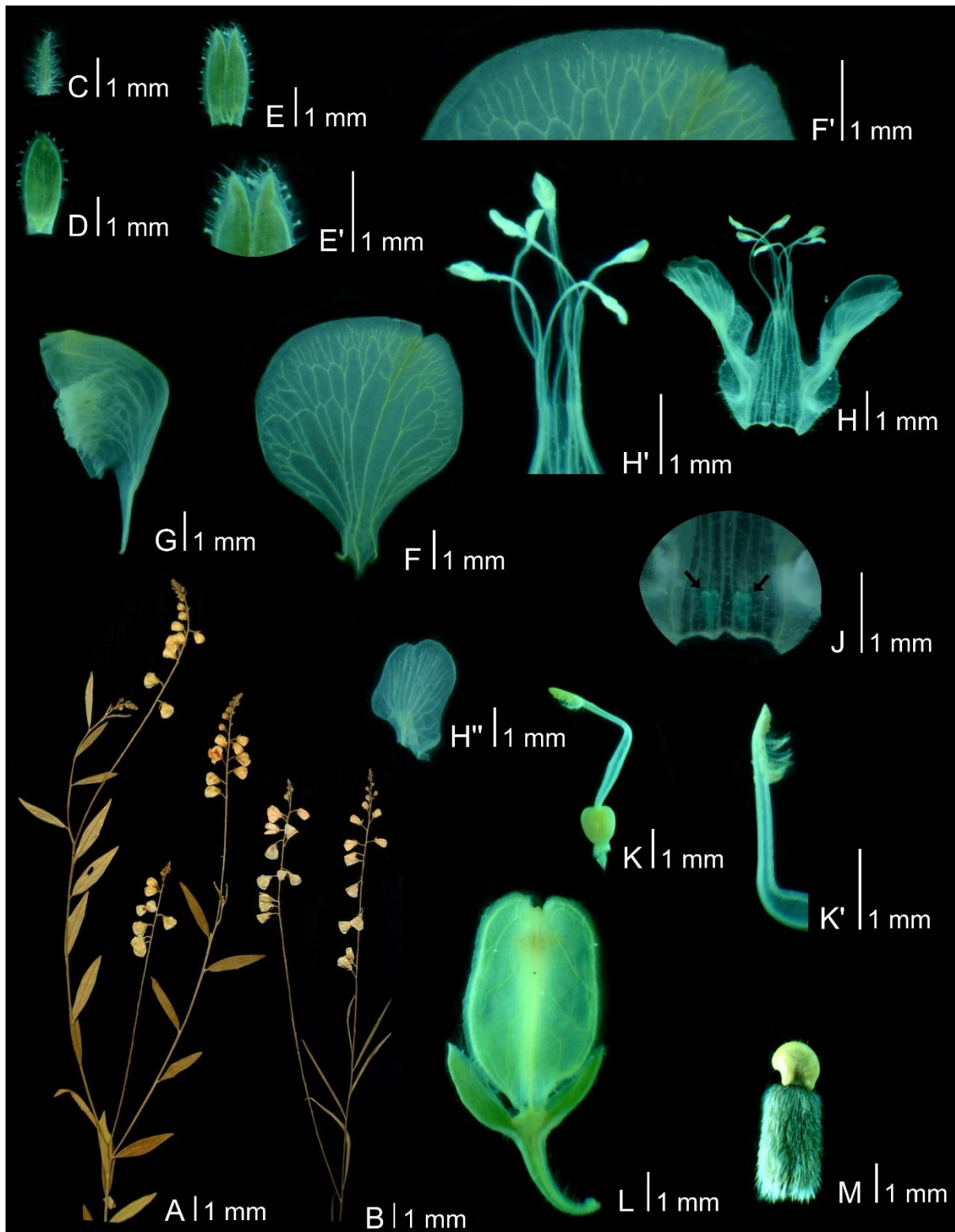


Figure 12. *Asemeia grandiflora* (Walter) Small. (A. J. R. Abbott & B. Herring 13684, CTBS. B. J. R. Abbott 17329, CTBS. C–M. J. R. Abbott & B. Carlswald 13887, CTBS). —A, B. Habit. —C. Bract. —D. Adaxial sepal. —E. Abaxial sepals. —E'. Detail of the margin of the abaxial sepals. —F. Inner sepal. —F'. Margin detail of inner sepal. —G. Keel. —H. Lateral petals with androecium. —H'. Free filaments. —H''. Apex detail of lateral petals. —J. Rudimentary petals (black arrow). —K. Gynoecium. —K'. Stigma detail. —L. Capsule. —M. Seed.

Distribution. *Asemeia grandiflora* is distributed across the southeastern and southern regions of the United States, including states such as Indiana, Georgia, Mississippi, and South Carolina. It is also found in Haiti, the Dominican Republic, the Bahamas, and Costa Rica. According to Pastore & Abbott (2012), *A. grandiflora* is also reported to occur in Mexico, although no specimens from Mexico were found for the present study. Figure 10.

Nomenclatural Notes. Although there are a few pre-Linnean specimens of *Asemeia grandiflora* collected by M. Catesby (1722) and W. Houston (1731) [BM000566425] both of them kept in BM, *Polygala grandiflora* was only described by Thomas Walter in the *Flora Caroliniana* in 1788. Walter (1788) was the first author to utilize the Linnean binominal system in the North America flora (Ward 2006). Ward (2007) argued that the “Walter herbarium”, though seemingly attributed to Walter, was collected by Fraser and not used in the production of the *Flora Caroliniana*. Consequently, Ward (2008) designated a neotype, *Batchelder 4905* [GH00268144] for *P. grandiflora*, based in a modern specimen from South Carolina.

Additional Notes. *Asemeia grandiflora*, as defined in this context, exhibits significant morphological variability. This variability is evident in various morphotypes, with leaves ranging from linear to broadly elliptic and flower sizes varying by more than twice between the smaller and larger flowered morphotypes, also pubescence, and presence of glandular trichomes. Notably, numerous morphotypes of *Asemeia grandiflora* have been historically identified as distinct species (Small 1933). In a comprehensive study of this group, Nauman (1981) recognized three morphotypes of *A. grandiflora* as distinct varieties within a polymorphic species. However, this infraspecific classification has not been endorsed by Rankin-Rodrigues & Greuter (2003), or more recently by Abbott (2022). The complex *Asemeia grandiflora* involves morphotypes of *A. violacea* and *A. decumbens* in Central America countries and Antilles islands. Additionally, some specimens do not neatly fit into any of the three varieties proposed by Nauman (1981).

While we do acknowledge the presence of various distinct entities, which could warrant taxonomic recognition as varieties or species, we must also consider the existence of gradients that may be associated with the occurrence of hybrids or reticulate evolution. Thus, we have chosen not to address this matter further until additional studies can provide much clarity on the *Asemeia grandiflora* complex.

Additional Specimens Examined. BAHAMAS. **South Abaco:** Abaco National Park, 21 June 2004, *E. Freid & B. Mueller 04-087* (NY). COSTA RICA. **Guanacaste:** Bagaces, Volcán Miravalles falda Oeste, sitio Miravalles, 10°44'40"N, 85°10'40"W, 900–1000 m alt., 18 July 2002, *J. F. Morales & J. González 8650* (B, INB, MO). **Puntarenas:** Carcajal, 25 km ESSE of Puntarenas, Hacienda Sta. Marta, 5 July 1949, *R. W. Holm & H. H. Iltis 244* (U). CUBA. 1843–1844, *J. J. Linden 1704* (G, syntype of *P. grandiflora* var. *leptophylla* Chodat). **Oriente:** Gamboa, 28 July 1922, *E. L. Ekman 14999* (G). CUBA. **Oriente:** Bayate, 16 Jun. 1975, *E. L. Ekman 6060* (G). DOMINICAN REPUBLIC. **Distrito Nacional:** Santo Domingo, em el jardín Botánico Nacional, 18°29'N, 69°47'W, 50–60 m alt., 14 Oct. 1985, *T. Zanoni 35586* (JBSD, NY). **Monte Cristi:** San Fernando de Monte Cristi, below the Morro Cristi, just above beach, 20 m alt., 19°53'34"N, 71°39'25"W, 14 June 2006, *J. R. Abbott et al. 21070* (CTBS). HAITI **Centre:** Valle de Artibonite, em la base del Santo Saut d'Eau, chaine des Montagnes Terribles, poblado Ville Bonheur, 18°50'N, 72°13'W, 280 m alt., 12 June 1985, *T. Zanoni et al. 35179* (JBSD, NY). UNITED STATES **Alabama:** Mobile, douth of Mobile, eastern end of Dauphin Island, 30°14'55"N, 88°5'13"W, 26 Aug. 2000, *J. R. Abbott & B. Carlsward 13887* (CTBS). Chilton Co., 1 m. S Mapleville, 19 Jul. 1979, *R. Kral 64055* (BM). **Florida:** ad Spring-Garden, Jun. 1848, *F. Rugel 38* (BM). Brevard co. about 8 miles west of Melbourne, 10 Dec. 1929, *H. N. Moldenke 227* (FAU, NCU, NY); La Fayette, ca. 7.6 mi NE of Tenille, ca. 5 mi S of Mud Creek, 29°51'42"N, 83°15'18"W, 12 July 2000, *J. R. Abbott & B. Herring 13684* (CTBS); near Oak Forest, 1.5 mi N of Hernando County line on U.S. 41, on W side of road, 28°41'17"N, 82°19'10"W, 9 July 2002, *J. R. Abbott 17329* (CTBS, SEL). Long Key, 25 May 1901, *M. Tracy 7616* (BM). **Georgia:** overlaid by Lafayette and Columbia., 27 June 1901, *R. M. Harper s.n.* (FAU, NY). **Indiana:** Greencastle, near Flymouth, Florida, 24 Aug. 1934, *W. H. Helch 1887* (DPU, NY). **Mississippi:** hattiesburg, 11 mi south of hattiesburg, 17 July 1950, *G. L. Webster & R. L. Wilbur 3433* (US). **South Carolina:** Hampton, 3.2 miles SE of Early Branch, 3.1 mi NW of Yemassee on SC Et 28, 11 May 1956, *C. R. Bell & H. Ahles 12434* (FAU, NY). SANTO DOMINGO. Serra del Palo Quemado, 10 May 1887, *H. F. A. von Eggers 1890* (G, G [bis]). **Barahona,** 1912, *P. M. Fuertes 1557* (G). **La Vega,** Marabocoa, Apr. 1912, *P. M. Fuertes 1658* (G). Constanza May 1910. *H. von Türckheim 3247* (G). TRINIDAD & TOBAGO. **Tobago,** 29 Sep. 1912, *W. E. Broadway 4252* (G).

8. *Asemeia hirsuta* (A. St.-Hil. & Moq.) J. F. B. Pastore & J.R. Abbott, Kew Bull. 67: 807.

2012. *Polygala hirsuta* A. St.-Hil. & Moq., Ann. Soc. Sci. Orléans 9: 54. 1828. TYPE: Brazil. Minas Gerais, [Coração de Jesus], s.d. [Sep. 1817], A. *Saint-Hilaire cat. B1 1946* (holotype, P [bc] 00733485!). Figures 3H, 13.

Herb, 10–20 cm tall, branches hirsute. *Leaves* membranaceous; petiole 1–1.5 mm long., hirsute; blade 12–21 × 6–19 mm, ovate to elliptic, apex acute, base acute to obtuse, margin entire, ciliated, hirsute in both surfaces, ciliated. *Racemes*, peduncle 1.2–2 cm long., rachis 1.2–5 cm long., congested, hirsute, bracts 0.6–1 × 0.3–0.4 mm ovate, apex acute, outer surface pubescent, inner surface glabrous, margin ciliated, persistent; pedicel 2.5–2.9 mm long. glabrous, curved. *Flower*, except the pedicel 4 mm long., membranaceous; outer sepals, adaxial sepal 2.1–2.9 × 1.1–1.2 mm, apex obtuse, glabrous on both surfaces, without glands, not ciliated, abaxial sepals 1.9–2.4 × 1.5–1.7 mm, apex obtuse, glabrous on both surfaces, margin without glands, ciliated; inner sepals 3.9–5.6 × 3.1–4.4 mm, glabrous on both surfaces, margin without glands, not ciliated; Keel, cuculus 3–3.1 × 2.5–3.2 mm, trilobate, glabrous, except for the basal margin of the cuculus pubescent; claw 2–2.5 mm long., glabrous; lateral petals 4 × 1.8 mm, outer surface glabrous, inner surface pubescent near the base; staminal sheath 2.9–3 × 1.2 mm long., outer surface sparsely puberulous at the base, inner surface sparsely pubescent at the base, free filaments 2.1–2.4 mm long., glabrous; rudimentary petals present; style 4.5–5.2 mm long., bent in the middle at ca. 90°, pubescent around the stigma, stigma hooked-like; ovary 1.1–1.2 × 1.1 mm, glabrous, without conspicuous disc at the base of the ovary. *Capsule* 5.1 × 3 mm, elliptic. Seeds 3.7 × 1.5 mm, oblong, caruncle 0.9 × 1.3 mm long., sparsely puberulous, corneous, with dorsal and two lateral appendages.

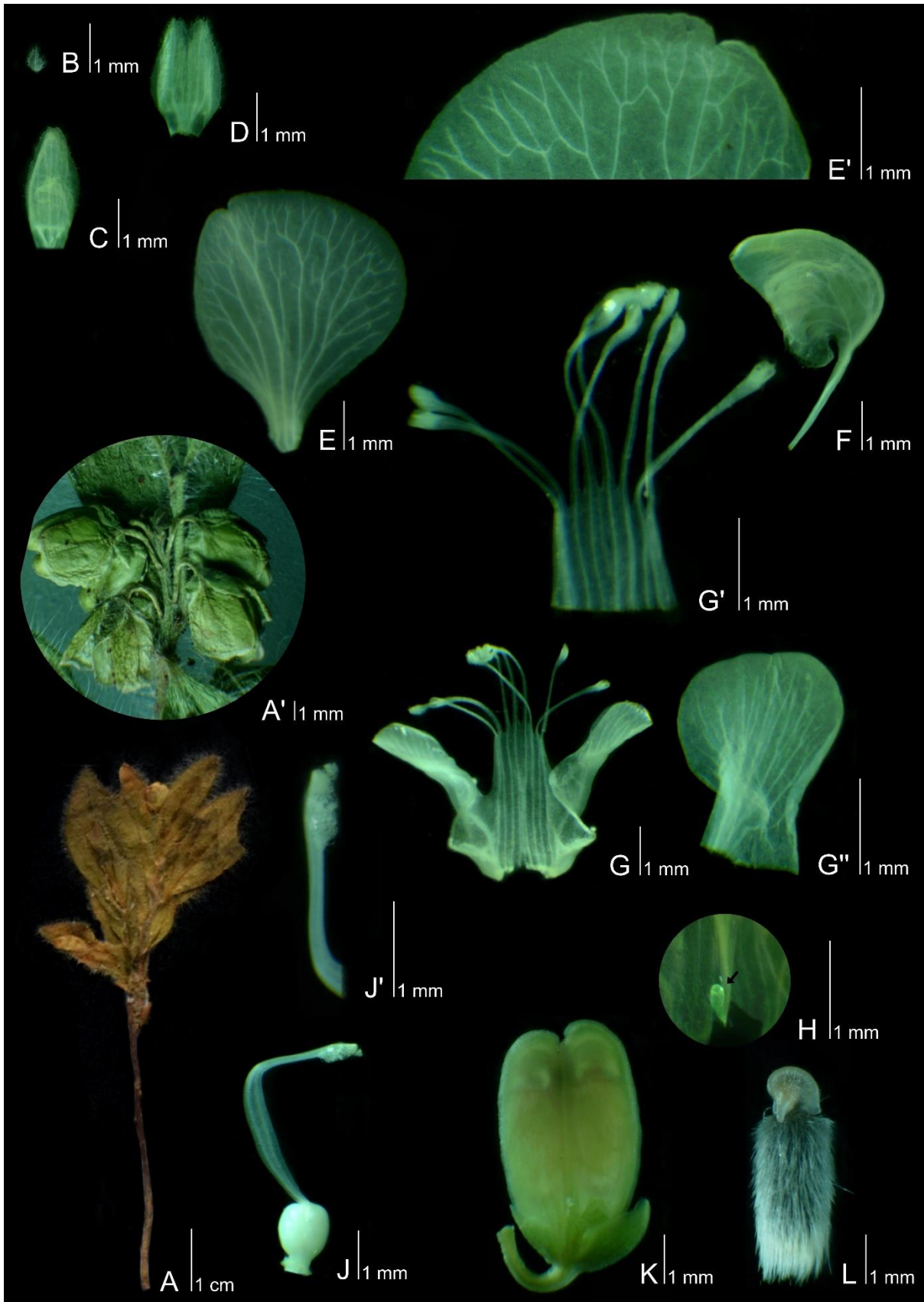


Figure 13. *Asemeia hirsuta* (A. St.-Hil. & Moq.) J. F. B. Pastore & J.R. Abbott. (A *M. Mota & J. F. B. Pastore* 247, CTBS. B–J. *M. Mota & J. F. B. Pastore* 241, CTBS. K–L. *M. Mota & J. F. B. Pastore*, 216, CTBS). —A. Habit. —A'. Inflorescence detail. —B. Bract. —C. Adaxial sepal. —D. Abaxial sepals. —E. Inner sepal. —E'. Margin detail of inner sepal. —F. Keel. —G. Lateral petals

with androecium. —G'. Free filaments. —G''. Apex detail of lateral petals. —H. Rudimentary petals (black arrow). —J. Gynoecium. —J'. Stigma detail. —K. Capsule. —L. Seed.

Distribution. *Asemeia hirsuta* occurs in the states of Minas Gerais, São Paulo, Paraná, Tocantins, Goiás, Distrito Federal, and Mato Grosso in Brazil, as well as in Santa Cruz, Bolivia. Figure 10.

Additional Notes. *Asemeia hirsuta* has similarities with *A. pohliana*, such as: small size (between 6–15 cm tall), ovate to elliptic leaf shape, branch indument. However, they can be distinguished by petiole length (1–1.5 mm in *A. hirsuta* vs 1.8–3.2 mm in *A. pohliana*), inflorescence (sublax in *A. hirsuta* vs congested in *A. pohliana*), flower size (4–4.6 in *A. hirsuta* vs 6–6.1 in *A. pohliana*), pedicel length (2.5–2.9 mm in *A. hirsuta* vs 3.2–4.4 mm in *A. pohliana*).

Additional Specimens Examined. **BOLIVIA. Santa Cruz:** Velasco, Parque Nacional Noel Kempff Mercado, Huanchaca, 214°20'02"S, 60°27'18"W, 782 m alt., 18 Nov. 2009, *J. R. I. Wood et al.* 26471 (K, USZ). **BOLIVIA. Santa Cruz:** Chiquitos, Zona de Motacú, 18°16'08"S, 59°41'03"W, 980 m alt., 4 Nov. 2007, *J. R. I. Wood et al.* 23748 (K, USZ). **Distrito Federal:** Brasília, UNB área 2, CEU - Casa do Estudante universitário, 22 Feb. 2021, *M. Mota et al.* 216 (CTBS). **Goiás:** Caiapônia, Bacia do Rio Caiapó, ponto 73. Folha SE-22-V-D, 752 m alt., 17°04'20"S, 51°34'02"W, 17 Nov. 2007, *Sousa-Silva et al.* 496 (IBGE, RB); Catalão, ca. 25 km NE of Catalão, 875 m alt., 21 Jan. 1970, *H. S. Irwin et al.* 25038 (NY, UB, US); Goiás, Serra Dourada, 26 Mar. 2005, *J. F. B. Pastore & E. Suganuma* 1336 (CEN); Luizânia, Saída de Luizânia para São Miguel do Passa Quatro, próx a posto, 16°23'20,9"S, 48°06'36,3"W, 857 m alt., 12 Feb. 2021, *M. Mota et al.* 241 (CTBS); Paraúna, beira da estrada para Serra dos Gales, 30 Sep. 1995, *H. D. Ferreira* 3214 (CTBS, IBGE, RB, UFG). **Mato Grosso:** Chapada dos Guimarães, Mirante do Centro Geodésico, 19 Oct. 1995, *G. Hatschbach et al.* 63599 (CTBS); **Minas Gerais:** Barbacena, Sítio Racho Novo, 21°13'S, 43°45'W, 24 Mar. 2017, *D. R. Gonzaga* 901 (RB); Delfinópolis, Casinha Branca, 20°26'04"S, 46°38'72"W, 841 m alt., 25 Oct. 2003, *J. N. Nakajima et al.* 3674 (HUFU, RB); Uberlândia, Estação Ecológica do Panga, 4 Sep. 1998, *A. A. A. Barbosa* 1082 (HUFU). **Paraná:** Jaguariaíva, 25 Oct. 1910, *P. Dúsen* 10704 (US); Tibagi, Fazenda Ingrata, 31 Jan. 1959, *G. Hatschbach* 5469 (MBM). **São Paulo:** Pedregulho, 12 Nov. 1994, *W. Marcondes-Ferreira et al.* 988 (SP, UEC); São José dos Campos, Ca. 10km SSE em linha reta da praça principal de São José dos Campos, 28 Nov. 1961, *I. Mimura* 132 (SP, US); São Paulo, Km 158 in road from São Paulo to Iondrina, 20 Oct. 1966, *J. C. Lindeman & J. H. de Haas* 3179

(U). **Tocantins:** Paranã, Estrada de acesso à vila Rosário, canteiro de obras da UHE São Salvador, 12°54'00"S, 48°10'12"W, 300 m alt., 24 Nov. 2007, *G. Pereira-Silva 12337* CEN)

9. *Asemeia ignatii* (Chodat) J. F. B. Pastore & J. R. Abbott, *Kew Bull.* 67: 807. 2012.

Polygala ignatii Chodat, *Bot. Jahrb. Syst.* 52: 76. 1914. TYPE: Brazil. Bahia, Serra do São Ignácio, "Sudbrasilianische Provinz: Bahia, Campo der Serra do São Ignacio (Ule n. 7536)", Feb. 1907, *E. H. G. Ule 7536* (lectotype, designated by Pastore & Abbott (2012: 807), K [bc] 000012555!, suppressed; lectotype, designated here, G [bc] 00032293!; isoelectotypes, B†, B as photo F negative 013028 in F!, K [bc] 000012555!).
Figure 14.

Herb to subshrub, 0.50–1m tall, branches glabrous to pubescent. Leaves chartaceous; petiole 0.8–1.2 mm long., sparsely puberulous to pubescent; blade 9.7–18.2 × 0.8–1.9 mm, linear, apex acute to acuminate, base acute, margin entire, ciliated densely pubescent in both surfaces, rarely glabrous in both surfaces, abaxial surface. Racemes rachis 10–17.5 cm long., lax, sparsely puberulous to pubescent, bracts 1.5–2 × 0.4–0.6 mm ovate, apex acuminate, both surfaces sparsely puberulous, margin ciliated, caducous; pedicel 2.6–3 mm long. glabrous, curved. Flower, except the pedicel 5–5.2 mm long., membranaceous; outer sepals, without yellow glands forming spots on the surfaces, adaxial sepal 3 × 1.2 mm, apex rounded, glabrous on both surfaces, without glands, not ciliated, abaxial sepals 2.6 × 1.6 mm, apex rounded, glabrous on both surfaces, margin without glands, ciliated; inner sepals 7 × 6 mm, glabrous on both surfaces, margin not ciliated; Keel, cuculus 5.3 × 4.8 mm, glabrous on both surfaces; claw 3 mm long., not ciliated; lateral petals 6 × 2.2 mm, outer surface glabrous, inner surface pubescent in the half basal portion, ciliated at the base; filament sheath 5.6 mm long., outer surface sparsely puberulous, inner surface glabrous, free filaments 5 mm long., glabrous; rudimentary petals present, presenting specimens without rudimentary petals; style 7–7.2 mm long., bent in the middle at ca. 90°, with a semi-circle of trichomes in the pre-stigmatic region, stigma hooked-like; ovary 1.2 × 1 mm, oblong, glabrous, without conspicuous disc at the base of the ovary. Capsule 6 × 3.6 mm, oblong, glabrous. Seeds 3.3 × 1.6 mm, caruncle, oblong, pubescent, caruncle 1 × 1.3 mm long., puberulous, corneous, with dorsal and two lateral appendages.

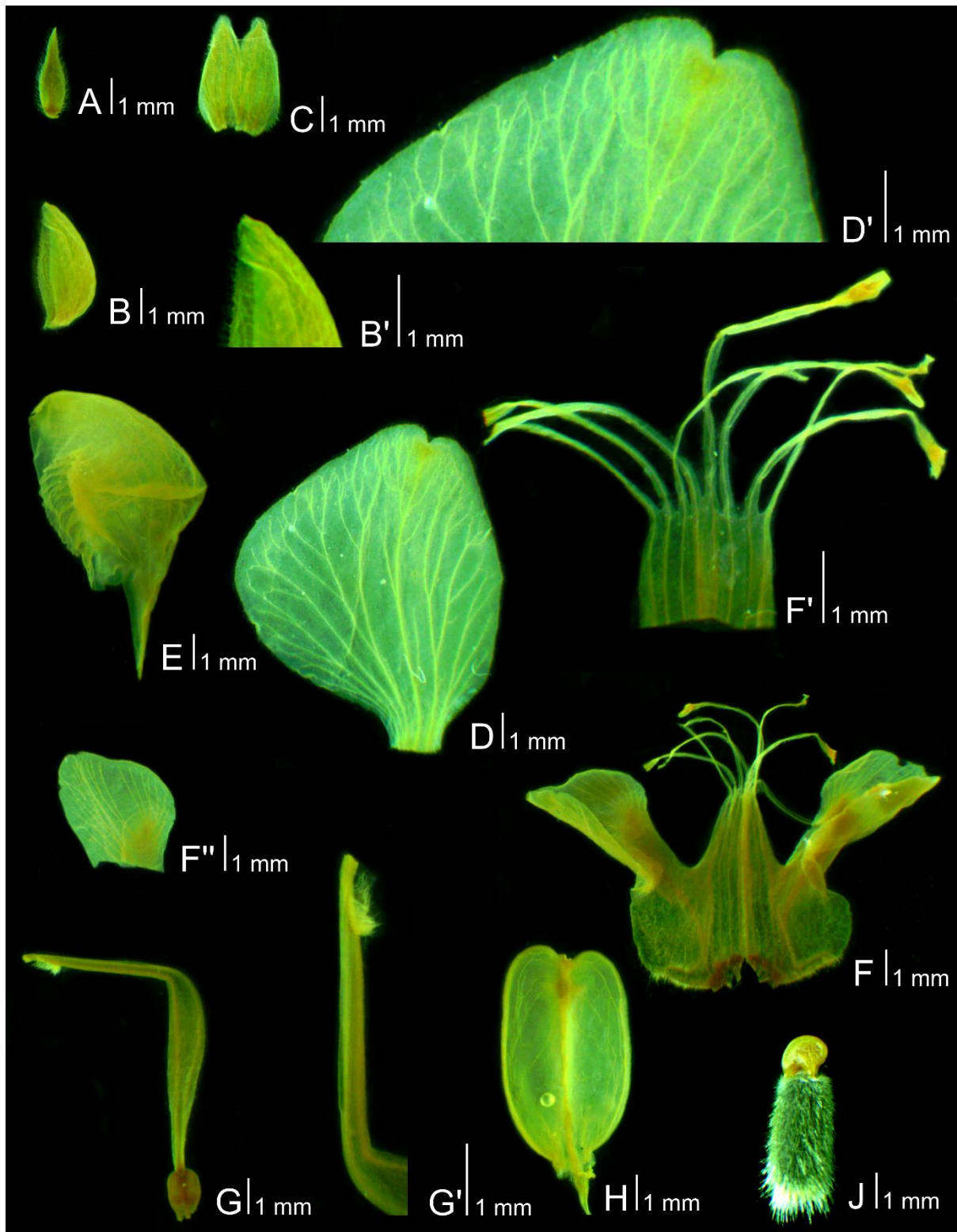


Figure 14. *Asemeia ignatii* (Chodat) J. F. B. Pastore & J. R. Abbott. —A. Bract. —B. Adaxial sepal. —B'. Margin detail of adaxial sepals. —C. Abaxial sepals. —D. Inner sepal. —D'. Margin detail of inner sepal. —E. Keel. —F. Lateral petals with androecium. —F'. Free filaments. —F''. Apex detail of lateral petals. —G. Gynoecium. —G'. Stigma detail. —H. Capsule. —J. Seed. A–G'. A. M. Giulietti 1860 (CTBS).

Distribution. *Asemeia ignatii* is endemic do São Inácio mountain in Bahia state, Brazil.

Figure 15

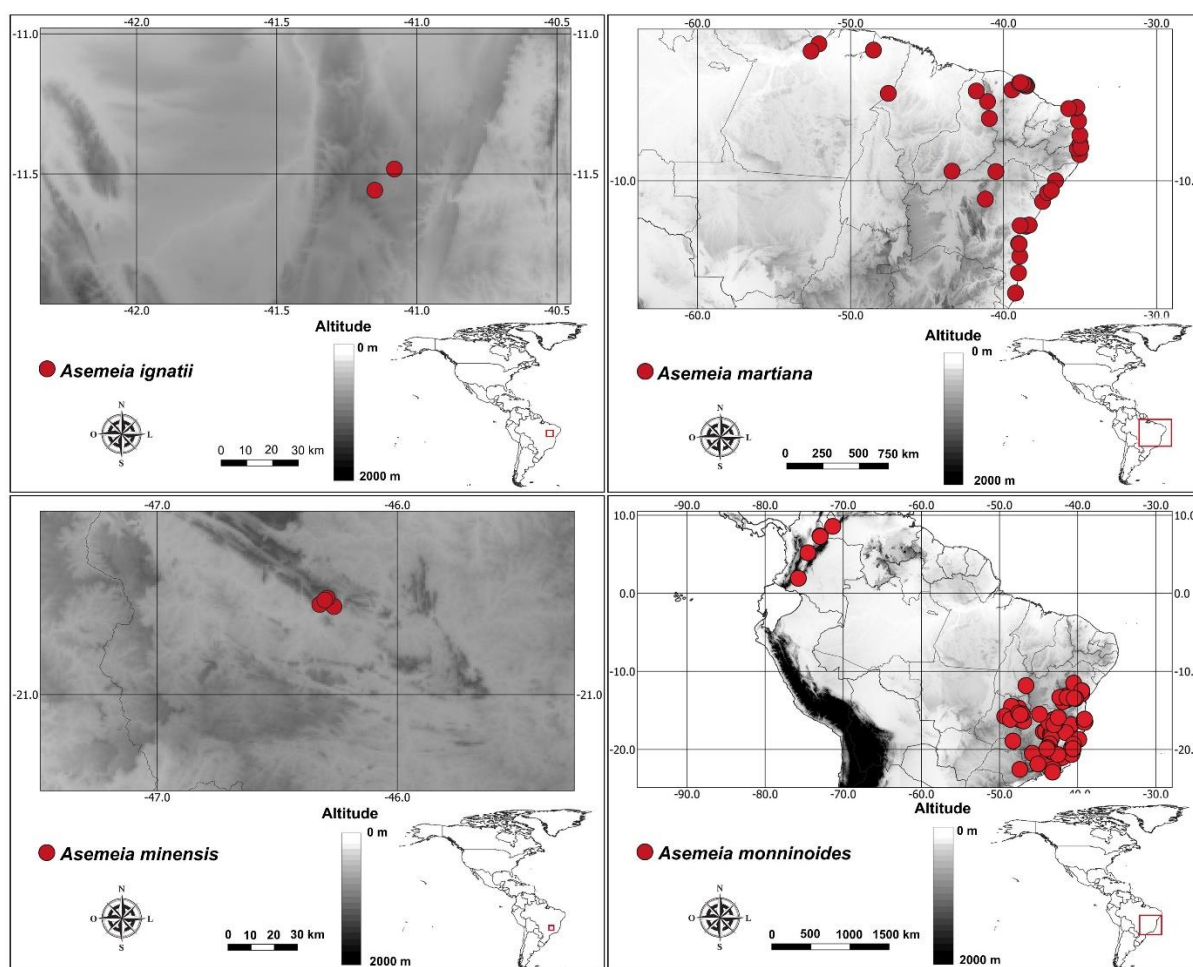


Figure 15. Distribution map of *Asemeia ignatii* (Chodat) J. F. B. Pastore & J. R. Abbott, *A. martiana* (A. W. Benn.) J. F. B. Pastore & J. R. Abbott, *A. minensis* M. Mota & J. F. B. Pastore, *A. monninioides* (Kunth) J. F. B. Pastore & J. R. Abbott.

Nomenclatural Notes. Pastore & Abbott (2012) selected a specimen in K as lectotype of *Polygala ignatia*. However, there is no evidence it was studied by Chodat once it has no original notes. Here, we designate a duplicate of the specimen in K, located at G as lectotype because it has original notes by Chodat, and was certainly studied by him.

10. *Asemeia martiana* (A. W. Benn.) J. F. B. Pastore & J. R. Abbott, Kew Bull. 67: 808.

2012. *Polygala martiana* A. W. Benn., Fl. Bras. 13(3): 13. 1874. *Polygala violacea* Vahl. var. *martiana* (A. W. Benn.) Chodat, Mém. Soc. Phys. Genève 31, 2(2): 60.

1893. TYPE: Brazil. Pará, "Habitat in sylvis prov. Para secus fluvium Amazonum, et in

prov. Bahia: Martius, Blanchet 9598, Blanchet 3492”, *Martius s.n.* (lectotype, designated by Pastore & Abbott (2012: 808), M [bc] M0153062!).

Polygala violacea Vahl. var. *brachystachya* Chodat, Mém. Soc. Phys. Genève 31, 2 (2): 59.

1893. Illeg. TYPE: Guyana. “Habitat in Bahia: Salzmann (Hb. Deless.), Luschnath (Hb. Berol. sub. nom. *P. mollis* det. A. W. Bennet) in Rio de Janeiro: *Glaziou 10264* (in Hb. Berol. sub. nom. *P. mollis* det. Schumann.)”, 1802, *M. Gabriel s.n.* (lectotype, designated by Pastore & Abbott (2012: 808), G [bc] G00220247!; isolectotype, G [bc] G00220248!). Figure 16.

Herb, 15–50 cm tall, branches pubescent. *Leaves* chartaceous; petiole 1.7–2.4 mm long., pubescent; blade 42.3–61 × 13–23 mm, ovate to elliptic, apex acute to rounded, mucronate, base acute, margin entire, densely ciliated, adaxial surface glabrous, abaxial surface sparsely puberulous in the main vein. *Racemes* rachis 7.3–10.1 cm long., pubescent, bracts 1.2–1.3 × 0.4 mm deltoid, apex acuminate, outer surface pubescent, inner surface glabrous, margin ciliated, without glands, caducous; pedicel 1.1–1.5 mm long. sparsely puberulous, curved. *Flower*, except the pedicel 4–4.2 mm long., membranaceous; outer sepals, without yellow glands forming spots on the surfaces, apex, adaxial sepal 2.1 × 1–1.1 mm, apex acute, glabrous both surfaces, margin with glands, ciliated, sparsely towards the base, abaxial sepals 2 × 1.2–1.3 mm, apex rounded, glabrous on both surfaces, margin with glands except at the apex, ciliated at the apex; inner sepals 4 × 3.1 mm, glabrous on both surfaces, margin not ciliated; Keel, cuculus 2.5 × 1.8 mm, trilobate, glabrous; claw 1.5–1.7 mm long., ciliate sparsely; lateral petals 3.1–3.3 × 1.5 mm, outer surface glabrous, inner surface pubescent, ciliated in the half basal portion; filament sheath ca. 2.3 mm long., outer surface glabrous, inner surface pubescent in the half basal portion, free filaments ca. 2 mm long., glabrous; rudimentary petals absent; style 3.8–4 mm long., bent in the middle at ca. 90°, pubescent around the stigma, stigma hooked-like; ovary 0.9 × 0.9 mm, globose, glabrous, without disc in the ovary base. *Capsule* 4–4.2 × 3.1 mm, elliptic, glabrous. Seeds 2–2.1 × 1.2–1.3 mm, oval, pubescent, caruncle 0.9 × 1 mm long., sparsely puberulous, corneous, with dorsal and two lateral appendages.

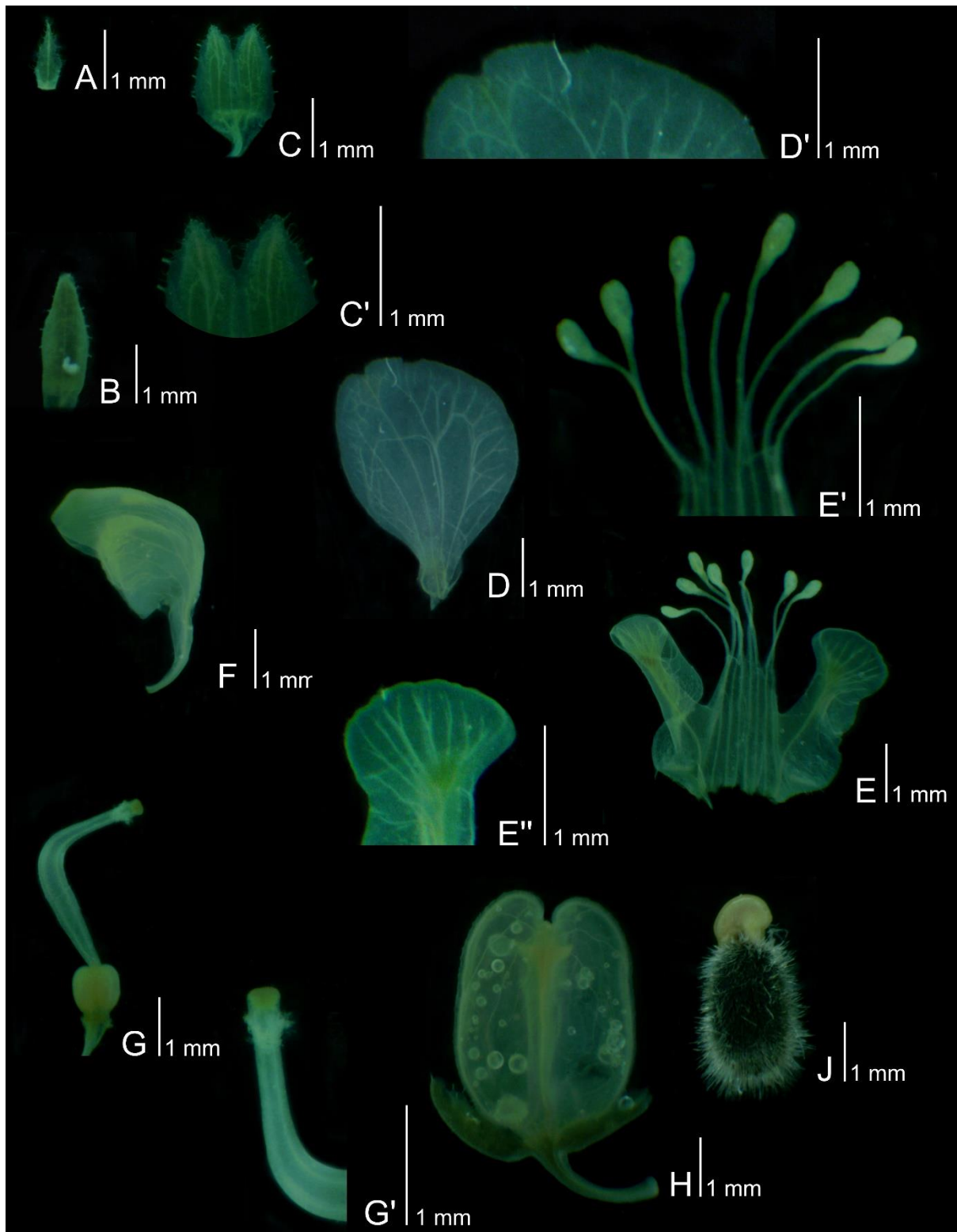


Figure 16. *Asemeia martiana* (A. W. Benn.) J. F. B. Pastore & J. R. Abbott. (*A. Giullietti 1656*, CTBS). —A. Bract. —B. Adaxial sepal. —C. Abaxial sepals. C'. Margin detail of abaxial sepals. —D. Inner sepal. —D'. Margin detail of inner sepal. —E. Lateral petals with androecium. —F. Keel. —G. Gynoecium. —G'. Stigma detail. —H. Capsule. —J. Seed.

Distribution. *Asemeia martiana* occurs along the northeastern coast of Brazil and in the state of Pará. Figure 15.

Additional Specimens Examined. BRAZIL. **Alagoas:** Pilar, Mata do Lamarão, 18 July 2006, *A. P. Prata et al.* 1251 (MAC). **Amapá:** Macapá, vicinity of Serra do Navio, 8km NNW of village of Serra do Navio on road to Água Branca, 04 Jan. 1985, *S. A. Mori et al.* 17688 (US). **Bahia:** Lauro de Freitas, Imbassá, Litoral Norte a 50 Km de salvador, 15 Aug. 2006, *J. F. B. Pastore & E. Sukanuma* 1545 (CEN, HUEFS); Porto Seguro, Estrada para Santa Cruz Cabralia, 27 Dec. 2005, *T. S. Nunes* 1356 (HUEFS); Prado, km 15–25 da rodovia para Itamaraju, 12 Aug. 1995, *G. Hatschbach et al.* 63008 (US); Maragojipe, Quintal de morador da comunidade Salamina Putumuju e trilha dos vilarejos, 7 Aug. 2014, *B. F. Santana* 180 (HUEFS, RFA); Marauá, Barra Grande, 4 Jan. 2008, *J. F. B. Pastore & E. Sukanuma* 2694 (HUEFS); Marauá, Península de Marauá. Pousada Bahia Boa, Distrito de Saquiaira, 13 Aug. 1999, *J. G. Jardim* 2161 (HUEFS); Mata de São João, Praia do Forte, caminho para o Castelo Garcia D'avilla, 10 Oct. 2007, *J. F. B. Pastore & E. Sukanuma* 2240 (HUEFS); Rio de Contas, Estrada Real. 2 Jan. 2000, *A. M. Giuliatti* 1656 (HUEFS); Salvador, Lagoa do Abaeté, 1 Oct. 2013, *J. F. B. Pastore s/n* (CEN); Vera Cruz, Ilha de Itaparica, Praia da Coroa, ramal que liga a BA-001 à praia da Coroa, 9 Feb. 1997, *L. P. de Queiros* 4746 (HUEFS). **Ceará:** Caucaia, Praia de Tabuba Setor 3, 6 Apr. 2019, *V. S. Sampaio & G. F. Mendes* 730 (EAC); Crateús, Serra das Almas, around plot 1, 29 Mar. 2017, *P. W. Moonlight* 617 (HUEFS); Fortaleza, campus do Itaperi da Universidade Estadual do Ceará, 17 Aug. 2018, *E. M. P. Lucas et al.* 228 (EAC); Fortaleza, Parque Estadual Botânico do Ceará, 13 July 2018, *V. S. Sampaio et al.* 583 (EAC); General Sampaio, RPPN Fancy Nunes, Fazenda Natália, 29 Apr. 2007, *M. F. Moro et al.* 82 (EAC); São Gonçalo do Amarante, Jardim Botânico de São Gonçalo do Amarante, 20 Apr. 2018, *E. M. P. Lucas et al.* 26 (EAC); Poranga, à 74 km da Igreja Matriz de Dom Pedro II (PI). Estrada para Poranga (CE), 17 May 1988, *L. de B. Bianchetti* 674 (CEN). **Pará:** Almeirim Mt. Dourado, Bloco Planalto, área 63, próximo do aeroporto, *J. M. Pires & N. Silva* 1224 (US); Belém, 5Km NW of IAN, near São Joaquim, 13 Sep. 1942, *M. B. da Silva* 66 (IAN, US); Belém, on lands of IAN, 1km of Administration Building, 31 Jan. 1944, *A. da Silva* 71 (IAN); Belém, Museu Goeldi, 20 Jan. 2004, *J. F. B. Pastore* 735 (CEN); Belém, roads and fields of the IAN, 28 Nov. 1942, *W. A. Archer* 7888 (IAN); Paragominas, along Belém-Brasília Highway (BR-010), 17 km south of Ligação, near kilometer marker 1509, 2 Mar. 1980, *T. C. Plowman et al.* 9438 (MO, US). **Paraíba:** *J. C. de Moraes* 2096 (US). **Pernambuco:** Cabo de Santo

Agostinho Reserva do Paiva, loteamento Paiva, lotes C2 e 1B4 da quadra G-2, 8 Feb. 2014, *L. R. Silva 456* (HUEFS); Igarassu, Refúgio Ecológico Charles Darwin, por trás da casa sede, 29 Feb. 1996, *M. Falcão 128* (HUEFS, HST, UFP); Igarassu, Usina São José, Mata dos Macacos, 15 Aug. 2007, *A. A. Alves-Araújo et al. 509* (HUEFS, UFP); Paudalho, Mata do Bicopeba, 21 Aug. 1965, *G. Teixeira 2830* (HST, US); Petrolina, BR-428, Petrolina-Salgueiro, Km 32, 3 Apr. 1979, *L. Coradin 1266* (CEN). **Piauí:** Brasileira, Fazenda Angelim, 22 Feb. 2001, *J. M. Costa 243* (HUEFS); Serra Grande, PARNA Serra das Confusões, 18 July 2011, *A. A. Conceição 4032* (HUEFS). **Rio Grande do Norte:** Extremoz, APA de Genipabu, 15 Sep. 2012, *L. M. Santiago 6* (HUEFS); Natal Parque da Cidade, 25 June 2007, *V. R. R. Sena 167* (HUEFS); Nísia, Floresta Praia de Barra de Tabatinga, Lagoinha, 31 May 2009, *J. L. Costa-Lima 168* (HUEFS); São Miguel do Gostoso, Novo Horizonte, 14 May 2007, *M. I. B. Loiola & G. B. C. Paterno 1193* (EAC). **Sergipe:** Japarutuba, povoado São José, no entorno da Caverna Casa do Caboclo, 27 July 2015, *J. A. Santana Jr. & M. A. M. Figueiredo 227* (ASE); Maruim, Fundo do Posto Flecha, na margem do Rio Sergipe, no entorno da Caverna de Pedra Branca, 10 June 2015, *J. A. Santana Jr. et al. 162* (ASE); Santa Luzia do Itanhi, RPPN Mata do Crasto, 14 Aug. 2012, *L. Gomes et al. 622* (ASE, JPB, NY, UFP).

11. *Asemeia minensis* M. Mota & J. F. B. Pastore, TYPE: Brazil. Minas Gerais: São João Batista do Glória, acesso pela estrada do Tista, caminho da Pedreira Lagoa Azul, 20°36'23"S, 46°18'08"W, 1168 m alt., 25 Feb. 2021, *M. Mota & J. F. B. Pastore 246* (Holotype, CTBS-6001). Figure 17, 18A–B.

Herb, 20–30 cm tall, branches pubescent. *Leaves* membranaceous; petiole 1–3 mm long., pubescent; blade 15–39 × 2–4 mm, linear to elliptic, apex acute, base acute, margin entire, not ciliated sparsely puberulous in both surfaces. *Racemes*, peduncle 0.3–1 cm long., rachis 1.5–9 cm long., subax, pubescent, bracts 1.2–2.4 × 0.4–0.8 mm ovate, apex acute to acuminate, outer surface puberulous to sparsely pubescent, inner surface glabrous to sparsely at the apex, margin without glands, ciliated, persistent; pedicel 1.5–3 mm long. sparsely puberulous, curved. *Flower*, except the pedicel 4.5–6.3 mm long., membranaceous; outer sepals ovate, adaxial sepal 2.1–3 × 1–1.3 mm, apex rounded, glabrous on both surfaces, margin without glands, ciliated, abaxial sepals 2–2.5 × 1–2 mm, apex acute, glabrous on both surfaces, margin without glands, ciliated; inner sepals 5.7–7 × 5.1–5.5 mm, glabrous on both

surfaces, margin not ciliated to sparsely ciliated; Keel, cuculus $2.5\text{--}3.5 \times 3.5\text{--}4.2$ mm, trilobate, glabrous, except for the basal margin of the cuculus pubescent, ciliated at the base; claw $2\text{--}3$ mm long., ciliated; lateral petals $4.1\text{--}4.5$ mm, outer surface glabrous, inner surface pubescent at the basal half, ciliated at the base; staminal sheath $2\text{--}3.4$ mm long., outer surface glabrous, inner surface sparsely pubescent at the half basal portion, free filaments $1.9\text{--}2.9$ mm long., glabrous; rudimentary petals present, glabrous; style $5.3\text{--}7.2$ mm long., bent in the middle at ca. 90° , pubescent around the stigma, stigma hooked-like; ovary $1\text{--}1.1 \times 1$ mm, globose, glabrous, with a conspicuous disc at the base of the ovary. *Capsule* $4.4\text{--}4.5 \times 3\text{--}3.6$ mm, glabrous. Seeds $2.5\text{--}3.3 \times 1.2\text{--}1.6$ mm, oblong, caruncle $0.8\text{--}1$ mm long., sparsely puberulous, corneous, appendaged, with dorsal and two lateral appendages.

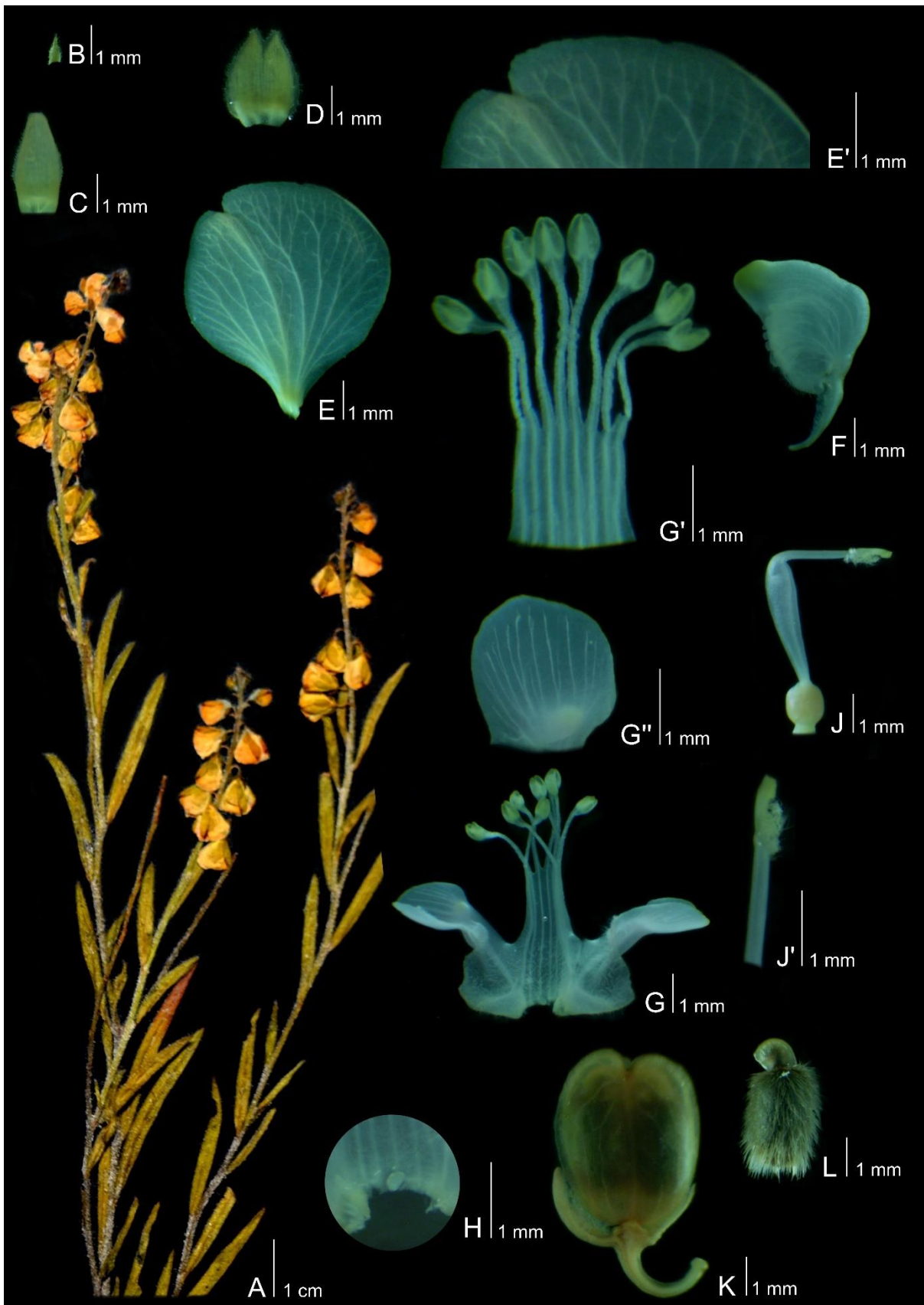


Figure 17. *Asemeia minensis* M. Mota & J. F. B. Pastore. (*M. Mota & J. F. B. Pastore 246*, CTBS). —A. Habit. —B. Bract. —C. Adaxial sepal. —D. Abaxial sepals. —E. Inner sepal. —E'. Margin detail of inner sepal. —F. Keel. —G. Lateral petals with androecium. —G'. Free filaments.

—G'. Apex detail of lateral petals. —H. Rudimentary petals. —J. Gynoecium. —J'. Stigma detail.
—K. Capsule. —L. Seed.

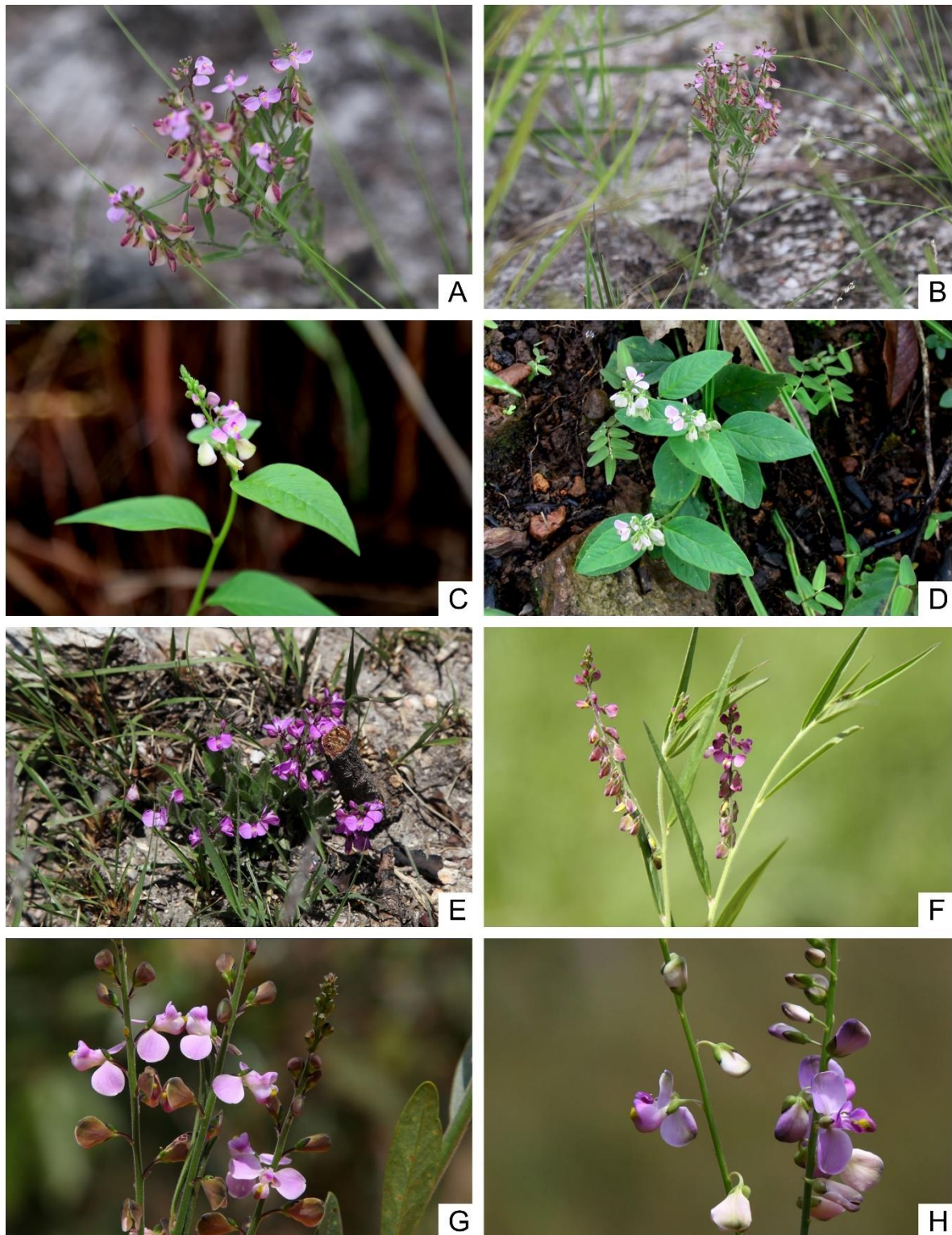


Figure 18. —A, B. *Asemeia minensis* M. Mota & J. F. B. Pastore. —C, D. *Asemeia monninioides* (Kunth) J. F. B. Pastore & J. R. Abbott. —E. *Asemeia pohliana* (A. St.-Hil. & Moq.) J. F. B. Pastore & J. R. Abbott. —F. *Asemeia violacea* (Aubl.) J. F. B. Pastore & J. R. Abbott. —G. *Asemeia*

aguiariana J. F. B. Pastore & M. Mota. —*H. Asemeia campestris* J. F. B. Pastore & M. Mota. Photos: A, B, C, D by M. Mota; E, F, G, H by H. Moreira.

Distribution. *Asemeia minensis* is endemic to São João Batista do Glória City, Minas Gerais state, and occurs in Cerrado and rupestrian fields, between 800–1000 m alt. Figure 15.

Additional Specimens Examined. BRAZIL. **Minas Gerais:** Furnas, Trilha Paraíso Perdido, ca. 5 km da Rodovia MG 050, Região da Represa de Furnas, 8 Dec. 2005, *J. N. Nakajima et al.* 4081 (CTBS, HUFU); Furnas, Região da Represa de Furnas, Estrada para Pedreira Souza, ca. de 2 km da Rodovia MG 050, 20°38'02"S, 46°15'53"W, 17 Feb. 2006, *R. Romero et al.* 7687 (CTBS, HUFU); Furnas, Estrada para Mineradora Gabi Extrações, depois do teceiro córrego, região da represa de Furnas, 20°35'55"S, 46°17'33"W, 26 Oct. 2006, *J. N. Nakajima et al.* 4357 (CTBS, HUFU); São João Batista do Glória, Paraíso Perdido, córrego Quebra Anzol, 4,5 km da rodovia MG-050, região da Represa de Furnas, 20°37'28"S, 46°19'24"W, 29 Sep. 2005, *J. N. Nakajima et al.* 3921 (CTBS, HUFU); São João Batista do Glória, acesso pela estrada do Tista, caminho da Pedreira Lagoa Azul, 20°36'23.2"S, 46°18'08.9"W, 25 Feb. 2021, *M. Mota & J. F. B. Pastore* 246 (CTBS).

12. *Asemeia monninoidea* (Kunth) J. F. B. Pastore & J. R. Abbott, *Kew Bull.* 67(4): 808.

2012. *Polygala monninoidea* Kunth, *Nov. Gen. Sp.* 5: 408. 1821. TYPE: Colombia. "Crescit in montibus Novo-Granatensibus, prope fodinam Santanna, alt. 400 hex. b Floret Junio", *Humboldt & Bonpland s.n.* (holotype, P [bc] 00679149!); TYPE: Colombia. Santander, Upper Rio Lebrija valley, northwest of Bucaramanga, alt. 400 – 700 m alt., 29 Dec. 1926, *E.P. Killip & Smith* 16307 (epitype, designated by Pastore (2009: 1), NY [bc] 00856831!).

Polygala communis A. St.-Hil. & Moq., *Ann. Soc. Sci. Orléans* 9: 54.1828. TYPE: Brazil. Minas Gerais, 1818 – 1821, *A. Saint-Hilaire Cat. B1* 466 (lectotype, designated by Pastore (2012: 808), P [bc] P00733413!; isoelectotypes, P [bc] P00733412!, P [bc] P002576940!).

Polygala lindeni Chodat, *Mém. Soc. Phys. Genève* 31, pt. 2, no. 2: 44. 1893. TYPE: Venezuela. Merida, "Linden 593; Venezuela in Andibus Truxillo et Merida. V. s. in Hb. Deless. Moritz. 1268 Merida. V. s. in Hb. Berol.", *L. Linden* 593 (lectotype, designated by Pastore & Abbott (2012: 808) BR [bc] BR000000663588!).

Polygala urbani Chodat, *Mém. Soc. Phys. Genève* 31 (2)2: 58. 1893. TYPE: Brazil. Minas Gerais, "Habitat in Brasiliae prov. Minas Geraes uni legit Prof. Pizzaro (Cabin. de Bot.

et Zool. fac. de Rio, n° 86, n° 10”, Feb. 1887, *Pizzaro 10* (holotype, B† n.v. photo F, Macbride 13052, NEOTYPE: Brazil. Minas Gerais, Ouro Preto, Feb. 1894, *L. B. Damazio 703* (P [bc] 02577167).

Polygala xyloclada Chodat, Mém. Soc. Phys. Genève 31, 2 (2): 48, t. 15. 1893. TYPE:

Brasil. “inter Vittoria et Bahia”, May 1819, *F. Sellow 704* (holotype, B† photo F Macbride 13068, lectotype, designated by Pastore (2012: 809) HAL [bc] 0070961!).

Polygala gymnosepala Chodat, Meded. Rijks-Herb. 27: 26. 1915. TYPE: Bolivia. Camatindi,

“Auf Campos u. an Wegrändern bei Camatindi, 700 m (no. 1159, im Dez. 1910)”, Dec. 1910, *T. K. G. Herzog 1159* (lectotype, designated here, G!; isolectotypes, L [bc] 0796868, S-R-10247, Z [bc] 000046871).

Polygala diversa S. F. Blake, Bull. Torrey Bot. Club 51: 83. 1924. TYPE: Colombia. Tolima,

Honda, “Colombia: On sandstone cliff at Honda, Dept. Tolima”, 3 – 4 Jan. 1918, *F. W. Pennell 3602* (holotype, US [bc] 00108934!; isotypes, V [bc] 0067461F, K [bc] 000590928, MO-843901!, NY [bc] 00435715!). Figures 18C–D, 19.

Herb 35–80 cm tall, branches pubescent. Leaves carthaceous; petiole 2–3 mm long., pubescent; blade 17.5–35 × 10–22 mm, elliptic to ovate, apex acute, base acute, margin entire, pubescent in both surfaces. Racemes, rachis 3.5–6 cm long., subax, pubescent, bracts 1.6–3 × 0.4–0.8 mm ovate, apex acuminate, pubescent in both surfaces, margin ciliated, deciduous; pedicel 3–4 mm long. pubescent, straight. Flower, except the pedicel 7–9 mm long., membranaceous; outer sepals, without yellow glands forming spots on the surfaces, apex, adaxial sepal 3–4 × 2.4–2.8 mm, apex, outer surface sparsely pubescent, inner surface glabrous, margin with glands, ciliated at the lower third, abaxial sepals 2.8–3.4 × 1.5–2 mm, apex, outer surface pubescent, inner surface glabrous, margin with glands, sparsely ciliated at the apex; inner sepals 7.6–9 × 5.8–7.3 mm, glabrous on both surfaces, glabrous on both surfaces, margin not ciliated; Keel, cuculus 4–6.5 × 4.2–5.2 mm, trilobate, glabrous on both surfaces; claw 3.2–3.9 mm long., ciliated; lateral petals 6–7.9 mm, outer surface pubescent near the base, inner surface pubescent in the half basal portion; filament sheath 3.9–5 mm long., outer surface sparsely pubescent, inner surface pubescent at the basal portion, free filaments 3.9–4.6 mm long.; rudimentary petals absent; style 8.5–9.4 mm long., bent in the middle at ca. 90°, with a semi-circle of trichomes in the pre-stigmatic region, stigma hooked-like; ovary 1.2–1.3 × 1 mm, oblong, glabrous, without conspicuous disc at the base of the ovary. Capsule 6–6.9 × 4.2–4.8 mm, glabrous. Seeds 3–3.5 × 1.6–1.8 mm, oblong, caruncle

1–1.3 × 1.6–1.7 mm long, cornous, appendaged, with dorsal and two lateral appendages, pubescent.

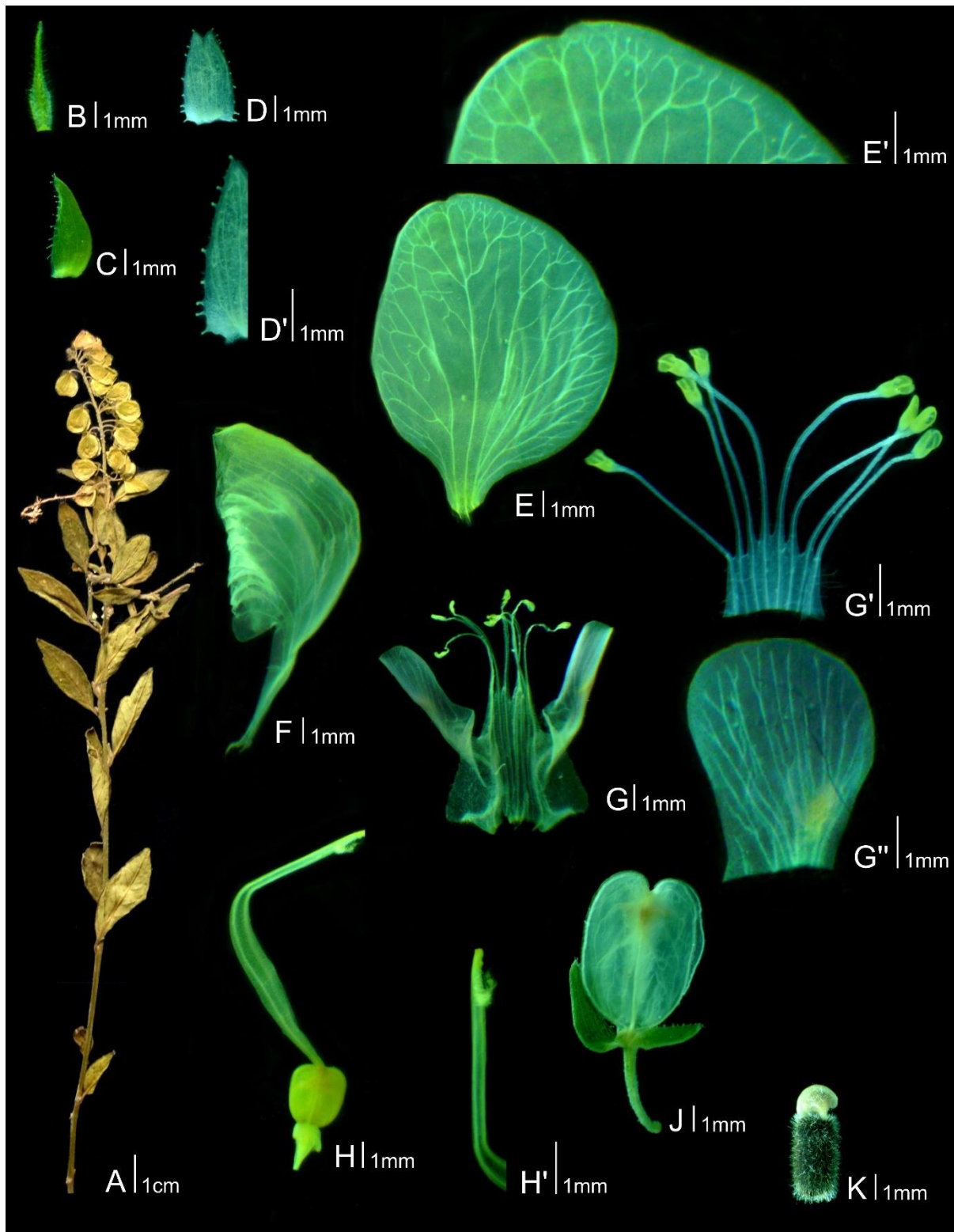


Figure 19. *Asemeia monninoides* (Kunth) J. F. B. Pastore & J. R. Abbott. (A–H'. *A. Cabral 156*, CTBS. J–K. *M. Mota & J. F. B. Pastore 206*, CTBS). —A. Habit. —B. Bract. —C. Adaxial sepal. —D. Abaxial sepals. —D'. Detail of the margin of the abaxial sepals. —E. Inner sepal. —E'. Margin detail of inner sepal. —F. Keel. —G. Lateral petals with androecium. —G'. Free filaments. —G''. Apex detail of lateral petals. —H. Gynoecium. —H'. Stigma detail. —J. Capsule. —K. Seed.

Distribution. *Asemeia monninioides* occurs in Brazil, Colombia and Venezuela.

Nomenclatural Notes. *Polygala urbani* and *Polygala lindeni* were initially described with these spelling, i.e. ending in ‘-i’ instead ‘-ii’. These epithets were modified by Pastore & Abbott to “urbanii” and “lindenii”. We consider that Chodat (1893) implicitly used latinized forms of the names Urban and Linden, as “Urbanus” and “Lindenus”, respectively, considering that the entire *Monographia Polygalacearum* was written in Latin. (see Recommendation 60C of ICN, Turland et al. (2018). Thus, we assert that Chodat’s original spelling of these names is grammatically correct and should not be automatically corrected as proposed by Pastore & Abbott (2012).

None of the specimens cited by Chodat “prov. Minas Geraes uni legit Prof. Pizzaro (Cabin. de Bot. et Zool. fac. de Rio, n° 86, n° 10) for *Polygala urbani* or eventual duplicates, were found. Thus, we consider that the original material was destroyed during the WWII or eventually, lost in the fire which destroyed part of the Chodat’s original herbarium in the University of Geneva in 24–25 December of 1898. Furthermore, we could not locate any specimen identified before 1893 (which could represent not cited original material) as “*Polygala urbani*”. Thus, a neotype is selected here from Ouro Preto, where it is known that Prof. Pizzaro collected specimens, also with morphology consistent with the Macbride’s photo (negative 13052) and original Chodat’s description for *P. urbani*.

Additional Notes. *Asemeia monninioides* is morphologically similar to *A. parietaria* and can be recognized by the wider apex of lateral petals (6–7.9 mm in *A. monninioides* vs 4.2–4.5 mm in *A. parietaria*), apex of leaves (acute in *A. monninioides* vs acuminate in *A. parietaria*). See further comments under *A. parietaria*.

Additional Specimens Examined. BRAZIL. **Bahia:** Abaíra, Tijuquinho, na descida dentro uma mata de capoeira, 5 Feb. 2014, R. M. Harley et al. 56966 (CEN, HUESB, HUEFS). Abaíra, Tijuquinho, na descida, dentro de uma mata de capoeira, 5 Feb. 2014, R. M. Harley et al. 56973 (CEN, HUEFS). Águas Altas. BR 116, próximo a Águas Altas, margem esquerda da BR, 15°54'01"S, 41°25'01"W, 16 Feb. 2022, M. J. Falcão et al. 222 (RB). Amargosa, Serra do Timbó, com acesso pelo Morro Pelado, 13°06'09"S, 39°40'39"W, 750–835 m alt., 18 Nov. 2007, A. M. Amorim 7061 (CEPEC, NY, RB). Barra da Estiva, Serra do Sincorá. ca. 6km N of Barra da Estiva not far from Rio Preto, 29 Jan. 1974, R. M. Harley 15662 (US). Ibicoara, Capão da Volta, Fazenda passagem do Sr. Zazá, 12 Nov. 2022, M. L. Guedes et al. 32979 (ALCB). Ibicoara, Distrito de Cascavel. Estrada de Chão em direção a

Água Fria, 16 Feb. 2002, *T. S. Nunes* 874 (HUEFS, UEC). Ibicoara, povoado de Água Fria, 16 Feb. 2002, *T. S. Nunes* 886 (HUEFS, UEC). Jacobina, Serra do Ouro, ca. 5 Km do Hotel Serra do Ouro, próximo à córrego, 6 June 2001, *T. S. Nunes* 329 (HUEFS, UEC). Maracás, entre Iriuruçú e Maracás. 13°28'53"S 40°15'59"W, 22 Jan. 1965, *R. P. Belém & J. M. Mendes* 237 (US). Maracás, estrada para o Cruzeiro, ca. 1,5 Km após Cruzeiro, 13°24'47"S, 40°24'27"W, 982 m alt., 19 July 2012, *E. Melo* 11335 (HUEFS, RB). Maracás, Fazenda Caboclo, ca. 16 km da cidade, 27 Feb. 2000, *R. P. de Oliveira* 345 (CEN, HUEFS). Mucugê, Chapada Diamantina, Capão do Correio, 11 Dec. 2003, *N. Roque et al.* s/n (ALCB). Piatã, na beira da rodovia BA-148, que liga Abaíra com Piatã, 5 km antes de Piatã, 4 Feb. 2014, *R. M. Harley et al.* 56946 (HUESB, HUEFS). Porto Seguro, estrada de Trancoso, BA-001. RPPN Fazenda Boa Esperança, 16 Oct. 2017, *M. R. V. Zanatta et al.* 2485 (UB). Porto Seguro, estação Pau Brasil - CEPLAC, EPB6 - Na saída do Arrastão do Saco, estrada do Município Estação Vera Cruz, 6 May 2002, *L. de P. Almeida* 95 (CEN). Porto Seguro, rodovia para povoado de Trancoso, Km 5 depois de Arraial d'Ajuda, 5 Nov. 1983, *R. Callejas et al.* 1692 (US). Porto Seguro, BA ca. 6-7 km na estr. que liga Arraial d'Ajuda à Trancoso, 16°33'07"S 39°08'26"W, 12 Dec. 1991, *S. C. de Sant'Ana et al.* 66 (MO, US). Santa Cruz de Cabralia, estrada Arraial d'Ajuda para Trancoso, BR 367, 37 Km do entroncamento para Porto Seguro, entrada a esquerda no sentido Trancoso, ca. 3 Km do asfalto, 9 Jan. 2002, *T. S. Nunes et al.* 828 (HUEFS, UEC). Santa Terezinha, Serra da Jibóia, 30 Nov. 2007, *J. F. B. Pastore* 2375 (CEN, HUEFS). Santa Terezinha, Serra da Jibóia, 31 Mar. 2001, *M. M. da Silva et al.* 508 (HUEFS, UEC). Santa Terezinha, Serra da Jibóia, 19 Oct. 2000, *N. R. Cruz et al.* 35 (HUEFS, UEC). **Distrito Federal:** Brasília, Fercal, 12 Apr. 1961, *E. P. Heringer* 8209 (US). Brasília, Córrego Landim, 20 km N of Brasília, 16 Dec. 1965, *H. S. Irwin et al.* 11330 (IAN, MO, SP, US). FERCAL, 29 Mar. 2006, *J. B. de A. Bringel-Jr* 323 (CEN). Brazlândia. Rodovia, 10 Jan. 2007, *J. F. B. Pastore* 1738 (CEN, HUEFS). Chapada da Contagem, 3 June 2004, *J. F. B. Pastore et al.* 940 (CEN). Fazenda Grotão, atrás do CPAC, 8 Mar. 2006, *A. S. Rodrigues* 264 (CEN). **Espírito Santo:** Alfredo Chaves, Vila São Bento de Urânia, Faz. Zechini, 5 May 1982, *G. Martineli et al.* 8166 (US). Colatina, Alto Moacir, Propr. Lalau, 20 Mar. 2007, *V. Demuner et al.* 3245 (HUEFS, MBML). Domingos Martins, Rio Jacu, 8 Feb. 1973, *G. Hatschbach & L. Z. Ahumada* 31377 (US). Marilândia, Alto Liberdade, Pedra do Cruzeiro, Propr. Aguilar, 18 Apr. 2006, *L. F. S. Magnago et al.* 869 (CTBS, HUEFS, MBML). Liberdade (Água Viva, Pedra do Cruzeiro), propr.: Aguilar A. Lorenccini, 21 Mar. 2007, *V. Demuner et al.* 3303 (HUEFS, MBML). Santa Teresa, Alto Santo Antônio, Prop. de

Vago, fundo de vale, captação de água, 3 May 2009, *A. P. Fontana et al. 5970* (CTBS). Santa Teresa, Vale do Canaã, 8 July 2005, *A. P. Fontana et al. 1524* (HUEFS, MBML). Santa Teresa, Vale do Canaã, 15 Aug. 1985, *H. Q. Boudet-Fernandes 1408* (MBML). Santa Teresa, Vale do Canaã, 13 Dec. 1985, *H. Q. Boudet-Fernandes 1740* (MBML). Santa Teresa, Córrego do Espanhol, 2 May 1984, *J. M. V. Oliveira 84* (HUEFS). Santa Teresa, Reserva Biológica de Nova Lombardia, divisa em frente à sede velha, 19 Feb. 2002, *L. Kollmann 5579* (HUEFS, MBML). Santa Teresa, Pé da Serra, 2 May 1984, *R. M. Pizziolo 33* (HUEFS, MBML). Santa Teresa, Vale do Canaã, 8 May 1984, *W. Boone 119* (MBML). São Mateus, km 6 da Rodovia BR-381, ligando São Mateus à Nova Venécia, 4 Dec. 1994, *J. R. Pirani et al. 3341* (US). São Roque do Canaã, Alto Misterioso, 19 Mar. 2004, *C. N. de Fraga et al. 1166* (MBML). **Goiás.** Alexânia, cerca de 300 m a Oeste da BR-060, na direção Corumbá/GO. (Estrada de terra à 500 m da ponte sobre o rio Corumbá), 18 Feb. 2003, *G. Pereira-Silva et al. 7137* (CEN). Cristalina, 1,5 km após a fazenda do Sr. Edileno (após a ponte sobre o rio Preto) sentido Palmital - BR 251. Na bifurcação à esquerda, 14 May 2002, *A. Amaral-Santos et al. 1128* (CEN). Formosa, Rod. BR-020, próx. à JK, 8 Jan. 1977, *G. Hatschbach et al. 39340* (US). Formosa, Creek margin. Cerrado, Rio Paraná, ca. 35km N of Formosa, 47°32'5.23"O 15°20'6.10"S, 30 Mar. 1966, *H. S. Irwin et al. 14263* (IAN, SP, US). Formosa, Wooded creek margin, Córrego Estrema, ca. 35km N.E. of Formosa, 15°27'30"S 47°06'09"W, 21 Apr. 1966, *H. S. Irwin et al. 15243* (IAN). Formosa, Indaiá, 5 May 2003, *J. F. B. Pastore 588* (CEN). Jaraguá, 4 Jan. 1982, *E. P. Heringer 18509* (US). Niquelândia, 22 I 1958, *A. Macedo 4399* (US). São João da Aliança, Riacho, ca. 3 Km S of São João de Aliança, 14°43'46"S 47°32'29"W, 14 Mar. 1971, *H. S. Irwin et al. 31715* (IAN, US). São João da Aliança, 3 km by road S of São João da Aliança, 14°43'47"S 47°32'29"W, 23 Mar. 1973, *W. R. Anderson et al. 7829* (US). **Mato Grosso do Sul:** Corumbá, erra Urucum. Planalto Residual do Urucum. Acesso Urucum Mineração. Campo cerrado., 12 Feb. 2003, *I. R. R. Silva 259* (UEC). **Minas Gerais:** Almenara, região de Limoeiro, próximo a Pedra Grande, acesso pela MG 406, de Almenara para Pedra Azul, 21 Feb. 2014, *C. Snak 1124* (HUEFS, MBM). Araponga, 23 Nov. 1979, *W. N. Vidal et al. 518* (VIC). Belo Horizonte, Estação Experimental de Agricultura, 24 July 1942, *H. L. de Mello-Barreto 13025* (IAN, US). Botumirim, córrego da Benta, próximo à Cachoeira do Bananal, 15 Nov. 2018, *M. L. Brotto & J. Cordeiro 3095* (MBM). Caeté, Base of Serra da Piedade, ca. 35 km E of Belo Horizonte, road to Caeté, 19°49'16"S 43°39'48"W, 13 Jan. 1971, *H. S. Irwin et al. 30272* (IAN, US). Caeté, 12 Feb. 1973, *G. Hatschbach, G & L. Z. Ahumada 31476* (MBM, NY).

Cantoni, Serra do Cabral. 2 km W of Cantoni, 17°43'12"S 44°23'36"W, 8 Mar. 1970, *H. S. Irwin et al.* 27154 (US). Capitão Enéas, rod. BR 122, 5 Km ao norte do trevo para Capitão Enéas, 16°33'32"S 43°39'57"W, 3 Apr. 1992, *G. Hatschbach et al.* 56513 (US). Carangola, 20°43'S, 42°01'W, 390 m alt., 08 Apr. 1988, *L. S. Leoni* 135 (GFJP, RB). Conceição do Rio Verde, pr. Conceição do Rio Verde, 21°52'47"S 45°05'17"W, 16 June 1957, *G. F. J. Pabst* 4122 (US). Cristália, Nova Redenção, Bem Querer, 16°11'15"S 43°08'44"W, 10 Feb. 1991, *G. Hatschbach et al.* 54994 (HUEFS, US). Cruzília, estrada de terra entre Cruzília e Carrancas, 21 Feb. 2015, *J. F. B. Pastore* 5077 (CEN, CTBS, HUEFS). Diamantina, ca. 18 km E of Diamantina, 18°05'11"S 43°28'45"W, 14 Mar. 1970, *H. S. Irwin et al.* 27491 (US). Diamantina, ca. 18 km E of Diamantina, 18°05'11"S 43°28'45"W, 14 Mar. 1970, *H. S. Irwin et al.* 27498 (NY, UB, US). Felisberto Caldeira, Curtidor, 18°01'49"S 43°19'03"W, 16 Feb. 1973, *G. Hatschbach & L. Z. Ahumada* 31667 (US). Fervedouro, Parque Estadual da Serra do Brigadeiro, 21 Dec. 2016, *A. Cabral et al.* 156 (CTBS, SPF). Grão Mogol, 15 km west of Grão Mogol, road to Cristália, 16°41'47"S 42°51'53"W, 20 Feb. 1969, *H. S. Irwin et al.* 23613 (US). Januária, Rio Pandeiros, 52 km by road W of Januária near road to Serra das Araras, 15°29'26"S 44°52'40"W, 21 Apr. 1973, *W. R. Anderson et al.* 9346 (MO, NY, UB, US). Joaquim Felício, Serra do Cabral. Gallery and cut-over cerrado, ca. 5km E of Parada das Batistas, MG-1, 17°40'59"S 44°07'59"W, 11 Mar. 1970, *H. S. Irwin et al.* 27388 (IAN, US). Juiz de Fora, Morro do Imperador, 21 Feb. 1975, *A. Chase* 8565 (US). Morro do Imperador, 24 Feb. 1985, *A. Chase* 8624 (US). Mariana, Camargos, 10 Nov. 2018, *F. F. F. Mazziere & P. Bonin Jr.* 3846 (MBM). Mariana, 6 Oct. 2018, *L. F. S. Marinero & E. C. Naudin* 877 (MBM). Pimenta, estrada Pimenta - Santo Hilário, 13 Feb. 1998, *R. Goldenberg et al.* 483 (HUFU, UPCB). Morro do Pilar, Palácio, Serra do Cipó, km 135 (150 km N of Belo Horizonte), 19°16'55"S 43°34'27"W, 20 Feb. 1968, *H. S. Irwin et al.* 20580 (IAN, MO, US). Rio Pardo de Minas, Vereda Funda. Próximo À casa do Sr. João. Próximo ao córrego, 16 Dec. 2008, *W. R. Sevilha et al.* 5203 (CEN). Santa Luzia, Fazenda da Chicaca, 25 Oct. 1945, *V. Assis* 6 (SP, US). Serro, ca. 21 km N of Serro on road (MG 2) to Diamantina, 25 Feb. 1968, *H. S. Irwin et al.* 20872 (SP, US). Serro, Rod. MG-2 entre Serro e Datas, 19 Jan. 1972, *G. Hatschbach & L. Smith* 28897 (US). São Thomé das Letras, 05 Feb. 1973). *G. Hatschbach et al.* 31314 (MBM, NY, US). Teófilo Otoni, rodovia BR-116, entre Teófilo Otoni e Padre Paraíso, Km 696, 8 Mar. 1977, *G. J. Shepherd et al.* 4382 (HUEFS, SP, UEC). Tiradentes, 10 Oct. 1992, *A. F. Carvalho* 191 (CEN, VIC). Uberlândia, Reservatório de Miranda, Cerca de 20km do centro de Uberlândia, 21 Nov. 2003, *A. P. M. Santos et al.* 203 (HUFU). Unai,

margem da rodovia BR251, perto da ponte sobre o rio Cafundó, 20 Jan. 1984, *B. A. S. Pereira* 903 (US). **Rio de Janeiro:** Carangola, 2 Mar. 1965, *E. P. Pereira* 9687 (US). Petrópolis, Organ Mountains, vicinity of Petropolis, 20 Dec. 1928, *L. B. Smith* 1537 (MO, US). Rio de Janeiro, São Sebastião do Alto. Fazenda Barra Mansa, 15 July 1980, *J. P. P. Carauta et al.* 3618 (US). Jardim Botânico, 8 Nov. 1932, *H. L. de Mello-Barreto* 3171 (US). **São Paulo:** Limeira, 24 Jan. 1955, *A. C. Brade* 21431 (US). **Tocantins:** Novo Jardim, Divisa entre Bahia e Tocantins, 14 Jan. 2007, *J. F. B. Pastore et al.* 2413 (CEN, HUEFS). **Pará:** Almeirim, Mte Dourado, várzea próxima ao matadouro, *M. J. P. Pires et al.* 758 (US). COLOMBIA. **Cundinamarca:** Guaduas, Guaduas a Palmar (Quebrada Honda) y carretera a Guaduoero, 5°11'36"N 74°31'58"W, 6 Nov. 1945, *H. García-Barriga* 11770 (US). **Huila:** Guadalupe, Iter latino-americanum, 1°54'48.67"N 75°44'39.14"W, 6 July 1926, *S. V. Juzepczuk* 5702 (US). **Santander:** California, Eastern Cordillera. Dept. Santander: Vicinity of California, 7°20'55"N 72°56'49"W, 11 Jan. 1927, *E. P. Killip & A. C. Smith* 16862 (US). Charta, Eastern Cordillera. vicinity of Charta, 7°16'48"N 72°58'04"W, 1 Feb. 1927, *E. P. Killip & A. C. Smith* 18878 (US). Suratá, Eastern Cordillera. Vicinity of Suratá, 07°21'49"N 72°58'51"W, 4 Jan. 1927, *E. P. Killip & A. C. Smith* 16467 (G, US). VENEZUELA. **Mérida:** Campo Elías, Jají, la Isla, Chorrera de las Gonzáles, 8°34'31.70"N 71°20'36.42"O, 11 Jan. 1967, *S. López-Palacios* 1916 (US).

13. *Asemeia monticola* (Kunth) J. F. B. Pastore & J. R. Abbott, Kew Bull. 67: 809. 2012.

Polygala monticola Kunth., Nov. Gen. Sp. 5: 405. 1821. *Polygala monticola* Kunth var. *obovata* Chodat, Mém. Soc. Phys. Genève 31, 2(2): 71. 1893. *Polygala americana* var. *monticola* (Kunth) Kuntze, Revis. Gen. Pl. 1: 48. 1891. TYPE: Venezuela. "Crescit in aridis montis Tumiriquiri, alt. 700 hex. (Nova Andalusia.)", 13 Sep. 1799, *Humboldt & Bonpland* 308 (lectotype, designated here, P [bc] 00221201!; isolectotype, B-Willd. [bc] B-W13018010!).

Polygala mollis Kunth, Nov. Gen. Sp. 5: 406. 1821. *Asemeia mollis* (Kunth) J. F. B. Pastore & J. R. Abbott, Kew Bull. 67: 808. 2012. TYPE: Venezuela. Bolivar: Carichana 'fluminis Orinoci prope Carichanam', s.d. *Humboldt & Bonpland* 1039 (lectotype, designated here, P-00221200!, isolectotype B-Willd. [13017] p.p. the 'β' specimen on the sheet).

Polygala monticola Kunth var. *cuneata* Chodat, Mém. Soc. Phys. Genève 31, 2(2): 71. 1893. TYPE: Guyana. Pirara, *Schomburgk II* 290 (543B) (lectotype, designated here, P [bc]

02576933!, isolectotypes BM [no barcode], G [bc] 00189510!) [not numbered], K [bc] 000264955!).

Polygala montana Willd. *in Sched.*

Polygala pubescens Willd. *in Sched.* Figure 20.

Herb 10 cm tall, branches pubescent. *Leaves* chartaceous; petiole 2 mm long., pubescent; blade $1.6 - 2.4 \times 0.5 - 0.7$ mm, elliptic, apex obtuse to acute, base obtuse to acute, margin entire, ciliated pubescent in both surfaces. *Racemes* rachis 3 – 5 cm long., lax, pubescent, bracts $1.6-1.7 \times 0.8-0.9$ mm deltoid, apex acuminate, outer surface sparsely strigose, inner surface glabrous, margin densely ciliated, caducous; pedicel 2.6 mm long. sparsely puberulous, curved. *Flower*, except the pedicel 5.3 mm long.; outer sepals ovate, without yellow glands forming spots on the surfaces, apex, adaxial sepal 2.2×0.8 mm, glabrous both surfaces, margin without glands, ciliated, abaxial sepals 2.3×1.5 mm, apex, glabrous in both surfaces, margin without glands, ciliated; inner sepals 5.3×4 mm, glabrous in both surfaces, margin not ciliated; Keel, cuculus 3×3.8 mm, outer surface glabrous, inner surface pubescent at the base, ciliated; claw 2 mm long., sparsely ciliated; lateral petals 4.6 mm, outer surface glabrous, inner surface pubescent in the lower half; filament sheath 3.4 mm long., outer surface glabrous, inner surface pubescent at the basal portion, free filaments 2.2 mm long., glabrous; rudimentary petals absent; style 5.6 mm long., bent in the middle at ca. 90° angle, with a semi-circle of trichomes in the pre-stigmatic region, stigma hooked-like; ovary 1×0.9 mm, globose, glabrous, without disc in the ovary base. *Capsule* 4.5×3.6 mm, elliptic, glabrous. Seeds not seen.

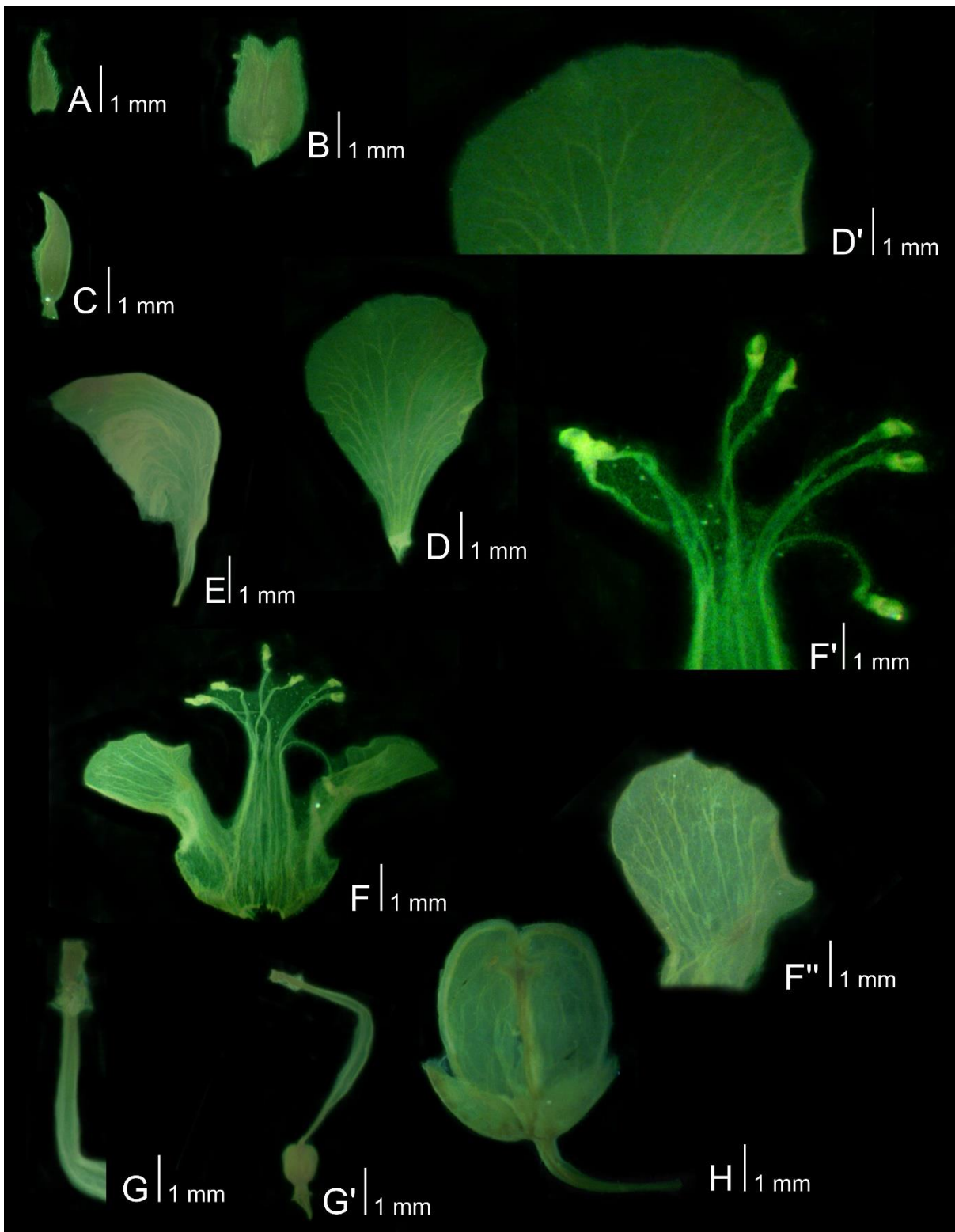


Figure 20. *Asemeia monticola* (Kunth) J. F. B. Pastore & J. R. Abbott. (A–F''). *G. T. Prance 3430*, INPA. *H. D. F. Austin 6985*, INPA). —A. Habit. —B. Bract. —C. Adaxial sepal. —D. Abaxial sepals. —D'. Detail of the margin of the abaxial sepals. —E. Inner sepal. —E'. Margin detail of inner sepal. —F. Keel. —G. Lateral petals with androecium. —G'. Free filaments. —G''. Apex detail of lateral petals. —H. Gynoecium. —H'. Stigma detail. —J. Capsule. —K. Seed.

Distribution. *Asemeia monticola* occurs in the northern states of Brazil, Amapá, Pará, Roraima, and also Maranhão, also in Guyana, Colombia and Venezuela. The species is reported to occur in Bolivia by Wood & Beck (2013). Figure 21.

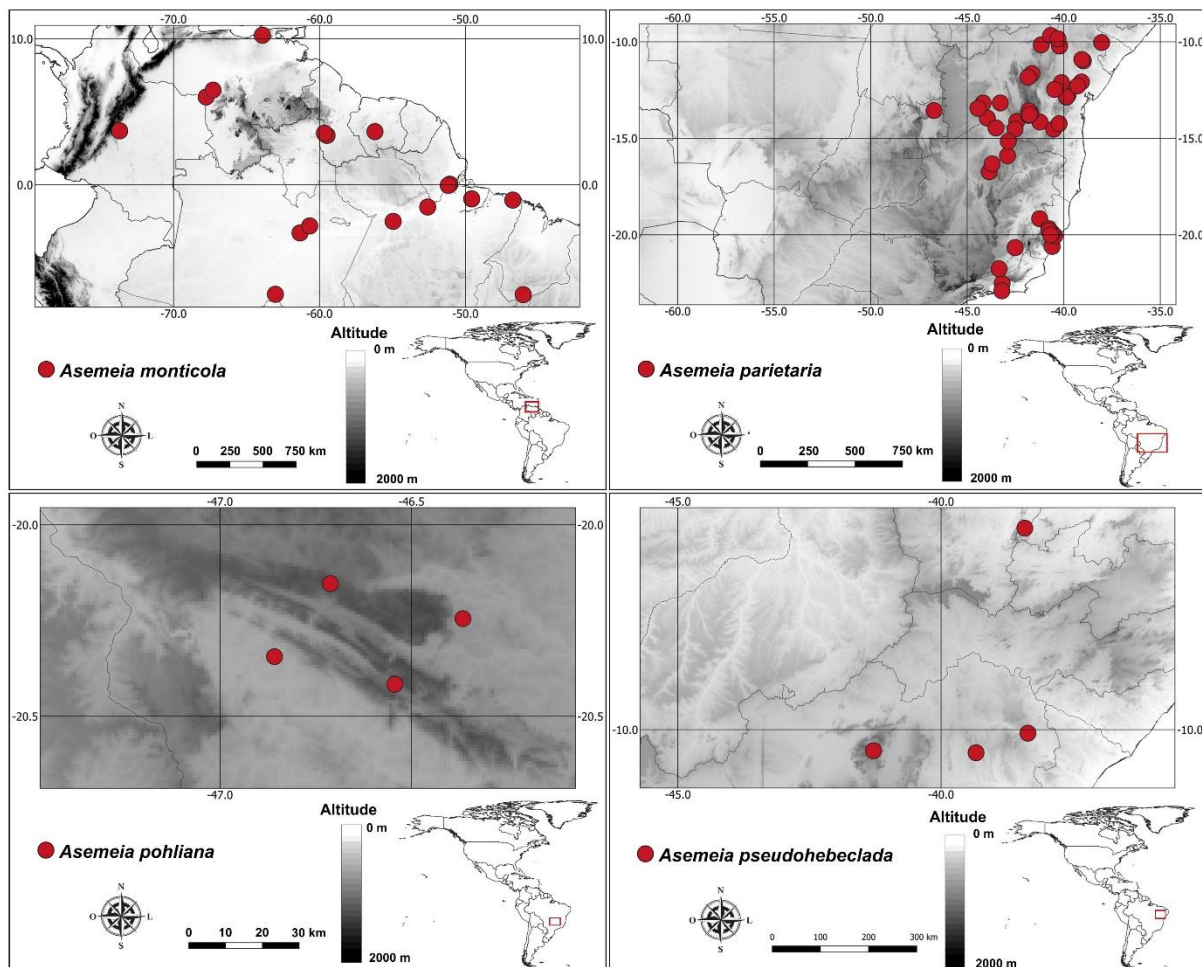


Figure 21. Distribution map of *Asemeia monticola* (Kunth) J. F. B. Pastore & J. R. Abbott, *A. parietaria* (Chodat) J. F. B. Pastore & J. R. Abbott, *A. pohliana* (A. St.-Hil. & Moq.) J. F. B. Pastore & J. R. Abbott and *A. pseudohebeclada* (Chodat) J. F. B. Pastore & J.R. Abbott.

Nomenclatural Notes. The lectotype of *Polygala monticola* is chosen based in the Humboldt and Bonpland's herbarium in P, the specimen kept the Kunth's original notes.

We could not find any specimen noted as "*Polygala monticola* var. *cuneata*", the specimen chosen as lectotype in P, "Schomburgk 290".

Additional Notes. This species is characterized by the hirsute indumenta distributed in the stems and leaves and fleshy roots, which closely resemble *A. hirsuta*. Both species can be recognized by the racemes often longer and flowered in *A. monticola*.

The type of *A. mollis* is a morphotype with short racemes and broader leaves originated from the margins of the Orinoco River between Venezuela and Colombia, whereas the type

of *A. monticola* from Venezuela, has narrow leaves and longer racemes. When more material is examined we found a gradient between these extremes, and we identify only a variable polymorphic species. Therefore, *A. mollis* is considered here synonym of *A. monticola*.

Additional Specimens Examined. BRAZIL. **Amapá:** Macapá, 15 July 1951, *R. L. Fróes & G. A. Black 27391* (CEN, IAN); Santana, Beria da estrada adentro de Vila Amazonas da ICOMI, 7 Oct. 1979, *D. F. Austin 6991* (MG, NY). **Amazonas:** Manaus, Jan. 1851, *R. Spruce 1270* (P). Humaitá, Humaitá-Labrea km 10, Rio Madeira, 28 Nov. 1966, *G. T. Prance 3430* (IAN, INPA, NY). **Maranhão:** Balsas, projeto geral de Balsas., 12 Nov. 1996, *R. C. Oliveira 443* (CEN). **Pará:** Almeirim, Sítio arqueológico “Jaburu do Rio Paru” (PA-AM-06). Confluência dos rios Amazonas com o Paru do Oeste. Área pertencente ao Sr. Sydney Rosas., 11 May 2005, *L. C. B. Lobato 3204* (HUEFS, MG); Bragança, Mirante de São Benedito, 01°02'55”S, 46°44'59”W, 17 Dec. 2009, *E. S. Oliveira & E. C. Pardal 231* (HBRA); Ilha de Marajó; Rio Camará. Retiro Pau Grande. Fazenda Sta. Rita., 1 Mar. 1950, *R. Lima 87* (CEN, IAN, NY); Santarém, Alter do chão., 15 Jan. 2004, *J. F. B. Pastore & E. Sukanuma 734* (CEN). **Roraima:** Alto Alegre, Ilha de Maracá, on road between SEMA Estação and Boa Vista, 14 km from Island, 03°18'N, 61°20'W, 17 June 1986, *M. J. G. Hopkins et al. 829* (INPA, MG); Boa Vista-Caracarai road, 20 km north of Rio Mucajai., 2 Aug. 1974, *G. T. Prance 21622* (INPA, NY, U). COLOMBIA. **Meta:** San Martín, 1/2 km NE of San Martín, 1 Feb. 1944, *F. J. Hermann 11164* (US). **Vichada:** Puerto Carreño, Reserva Bojonawi, Estación La Sabana, 30 Apr. 2007, *F. Castro 3418* (UDBC). Comisaría del Vichada: carretera a Puerto Carreño: alrededores de Carijén, 14 mar. 1971, *E. Polidoro Pinto & C. Sartre 1221* (COL, P). GUYANA. **Rupununi:** Mora savanna, near Toroebaroe Creek, 03°23'N, 59°29'W, 145 m alt., 21 Nov. 1987, *M. J. Jansen-Jacobs et al. 1113* (U, US). SURINAME: Upper Sipaliwini, near camp IX, 3 Dec. 1935, *H. E. Rombouts 303* (U). VENEZUELA. Amazonas: Atabapo, San Fernando de Atabapo, 27 Sep. 1886, *M. Chaffanion 3* (P)

14. *Asemeia parietaria* (Chodat) J. F. B. Pastore & J. R. Abbott, *Kew Bull.* 67: 809. 2012.

Polygala parietaria Chodat, *Mém. Soc. Phys. Genève* 31: 50. 1893. TYPE: Brazil.

“Habitat vicin. Rio de Janeiro. Glaziou 12433 v. s. in Hb. Deless., Hb. Berol.”. [Minas Gerais, Apiahy], *A. Glaziou 12433* (lectotype P designated by Abbott & Pastore (2012:

809); second step designated here P [bc] 02570214!, isolectotypes, B†, B photo F! neg. Macbride 13043, K [bc] 000264948!, or P [bc] 02570215!). Figure 22.

Herb, 40 cm tall, branches. *Leaves* carthaceous; petiole 2–3 mm long., pubescent; blade 27–61 × 12–25 mm, ovate to elliptic, apex acuminate, base obtuse to rounded, margin entire, adaxial surface, abaxial surface. *Racemes*, rachis 3–7 cm long., bracts 1.3–1.4 × 0.4–0.7 mm, ovate, apex acuminate, outer surface pubescent, inner surface glabrous, margin, deciduous; pedicel 3–4 mm long. pubescent, straight. *Flower*, except the pedicel 8 mm long., membranaceous; outer sepals, without yellow glands forming spots on the surfaces, apex, adaxial sepal 2.3–3.2 × 1.8–2.6 mm, apex rounded, outer surface puberulous, inner surface glabrous, esparsely ciliated at the base, with glands, ciliated, abaxial sepals 2.4 × 1.2 mm, apex acute, outer surface puberulous, inner surface glabrous, margin with glands, ciliated at the base; inner sepals 4.9–5.7 × 3.5–4.5 mm, margin not ciliated; Keel, cuculus 2.9–3.5 × 3–3.3 mm, trilobate, glabrous on both surfaces; claw 2.5–3 mm long., sparsely ciliated; lateral petals ca. 4.2 mm, outer surface pubescent near the base, inner surface pubescent in the lower half portion; filament sheath 3.1–3.3 mm long., outer surface sparsely at the half basal portion, inner surface pubescent at the basal portion, free filaments 2.2–3.3 mm long., glabrous; rudimentary petals present; style 5.6–6.4 mm long., bent in the middle at ca. 90°, with a semi-circle of trichomes in the pre-stigmatic region, stigma hooked-like; ovary 1 × 0.8–1 mm, globose to oblong, glabrous, without conspicuous disc at the base of the ovary. *Capsule* 4–4.8 × 3–4.3 mm, globose to oblong, glabrous. Seed 2.3–2.6 × 1.6–1.7 mm, oval, pubescent, caruncle 0.9–1 × 1.3–1.4 mm long., sparsely puberulous, corneous, appendaged, with dorsal and two lateral appendages.

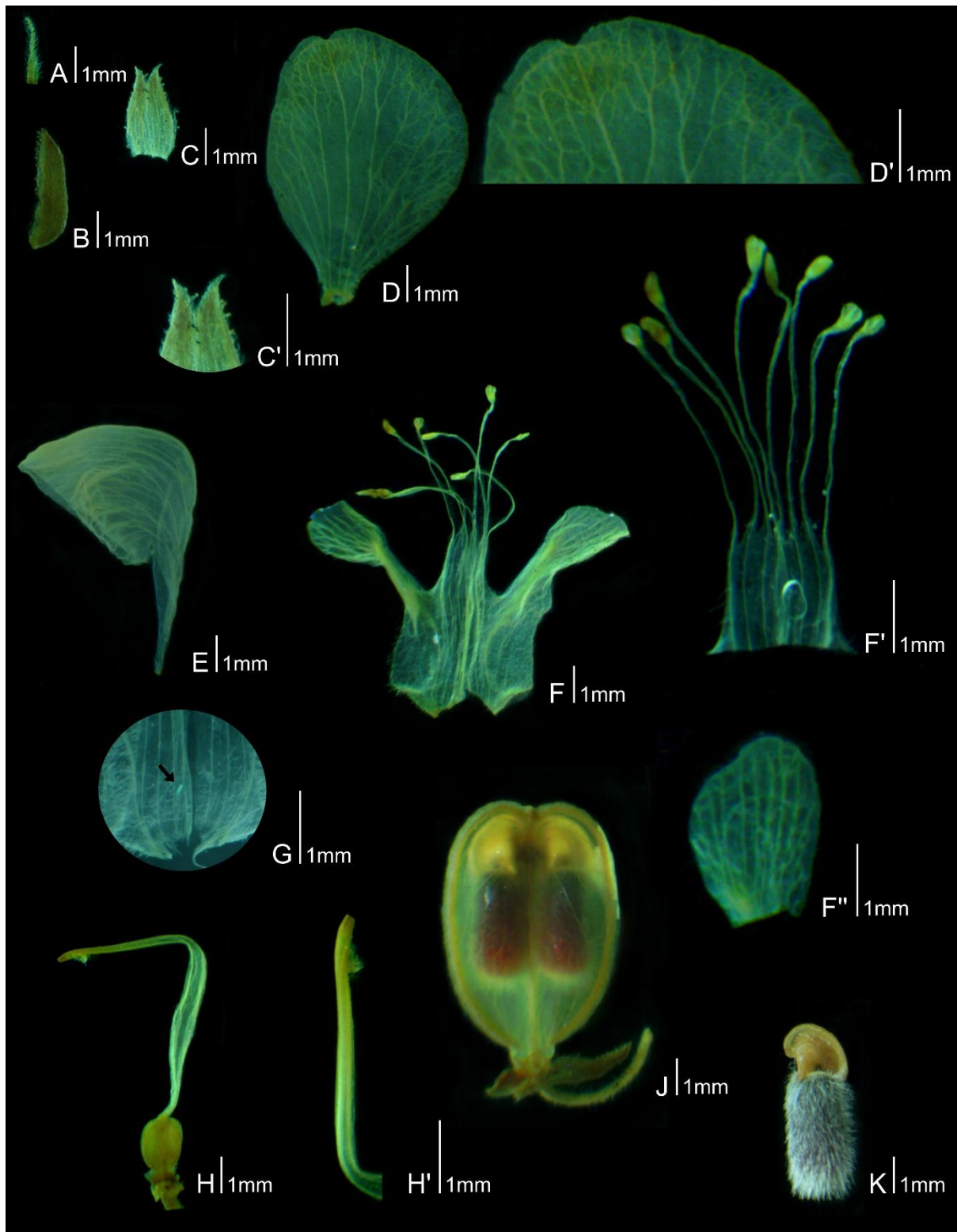


Figure 22. *Asemeia parietaria* (Chodat) J. F. B. Pastore & J. R. Abbott. (*G. Hatschbach et al.* 62949, CTBS). —A. Bract. —B. Adaxial sepal. —C. Abaxial sepals. —C'. Margin detail of abaxial sepals. —D. Inner sepal. —D'. Margin detail of inner sepal. —E. Keel. —F. Lateral petals with androecium. —F'. Free filaments. —F''. Apex detail of lateral petals. —G. Rudimentary petals (black arrow). —H. Gynoecium. —H'. Stigma detail. —J. Capsule. —K. Seed.

Distribution. *Asemeia parietaria* is distributed in the southwest of Brazil, Bahia and Goiás states. Figure 21.

Nomenclatural Notes. The original material, Glaziou 12433, was not located in Delessert herbarium (G), and the specimen in B was lost during World War II. Consequently, the lectotype designated by Pastore & Abbott (2012) remains suitable. Nevertheless, we have identified two specimens in P of Glaziou 12433, one of which is now selected as the lectotype. Although Glaziou 12433 was previously documented as being collected in Rio de Janeiro (Chodat 1893), Glaziou (1908) attributed its origin to "Aphiahy" [Aphiaí] in the state of Minas Gerais.

Additional Notes. *Asemeia parietaria* is morphologically similar with *A. monninoides*, however these species can be distinguished from each other by the ovate, membranaceous and acuminate leaves and lengthy pedicels characteristic of *A. parietaria*. While in most cases, both species are easily distinguished, specimens with morphological overlap have been observed. The instable position of *Asemeia monninoides* members on the phylogenetic analyses (Mota et al. in prep.) of plastid (grouping with *A. parietaria* and *A. extraaxillaris* members) and nuclear (grouping with the *A. decumbens* complex members) suggest the possibility of a hybrid origin for this species, potentially involving *A. parietaria* and the *A. decumbens* complex. It is noteworthy that the specimen *S. Honda et al. 1192* (CTBS), which presents overlapping morphological features of *A. monninoides* and *A. parietaria* has paralogous copies for the nuclear ribosomal internal transcribed spacer (nrITS), which is a rare event within this group. The nrITS sequence recovered for this species suggest the presence of both "A. parietaria" and "A. monninoides" type of nrITS pattern in an overlapping fashion. While, this observation may hint at the existence of putative hybrids, it is crucial further comprehensive studies before conclusions can be drawn. In the current, we recognize here both *A. monninoides* and *A. parietaria* as distinct species, notwithstanding the occasional occurrence of specimens with morphological overlaps in their diagnostic characteristics.

Additional Specimens Examined. **Bahia:** Abaíra, 14 Feb. 1992, *L. P. de Queiroz 2615* (HUEFS, UEC); Barro Alto, Comunidade de Lagoa Funda, fazenda Lagoa Branca., 11 Apr. 2001, *T. S. Nunes 298* (HUEFS, UEC); Bom Jesus da Lapa, ca 10 km E na estrada para Morrão, entrando a ca. 14 km N de Bom Jesus da Lapa na estrada para Ibotirama, área de caatinga com brejo e lagoa temporária., 9 Feb. 2000, *L. P. de Queiroz et al. 5758* (CTBS, HUEFS); Bom Jesus da Serra, Próximo a área com afloramento de Serpentinó, 17 Jan.

2009, *A. A. Conceição* 3085 (HUEFS); Brumado, 21 Feb. 2007, *J.F.B. Pastore & E. Sukanuma* 1757 (CEN, HUEFS, HUESB, MBM, RB, SPF, UB). Caetit , Estrada para Brejino das Ametistas. Caatinga, 29 Apr. 2001, *C. Correia et al.* 57 (CTBS, HUEFS); Carna ba, Apr.1994, *M. Sobral* 7635 (HUEFS); Correntina, 25 km E de Correntina, numa trilha a direita da estrada para Sta Maria da Vitoria., 20 Jan. 2008, *R. M. Harley* 55745 (HUEFS); Delfino, Estrada para Boa Vista., 25 Mar. 2004, *A. C. Pereira* 41 (HUEFS); Ia u, Morro da garrafa., 22 Feb. 1997, *E. Melo* 2034 (HUEFS); Ipecaet , 14 Aug. 1985, *L. R. Noblick* 4310 (HUEFS); Itatim, Encosta com rocha exposta. Bosques de solo retido., 25 Jan. 1997, *E. Melo* 1931 (HUEFS); Iui , Distrito de S o Domingos. Fazenda S o Domingos, 10 Dec. 2009, *E. Melo et al.* 7418 (CTBS, HUEFS); Jaguarari, Vale do Morro Redondo, 25 June 2005, *A. Rapini* 1216 (HUEFS); Juazeiro, Distrito de Massaroca. Caatinga., 13 June 2009, *E. Melo et al.* 6364 (CTBS, HUEFS); L cinio de Almeida, Distrito de S o Domingos. Fazenda S o Domingos., 10 Dec. 2009, *E. Melo* 7407 (HUEFS); Manoel Vitorino, 21 Apr. 2009, (HUEFS); Milagres, Serra do Jatob ., 3 Mar. 2018, *A. C. M. Campos et al.* 28 (HURB); Morro do Chap u, S o F lix do Coribe, Serra Altamira. Fazenfa Lagoa Pequena., 9 Jan. 2008, *A. L. C rtes* 55 (HUEFS); Rio de Contas, Estrada Real, ao S da cidade em dire o de Livramento, 25 Jan. 2008, *R. M. Harley* 55834 (HUEFS); Rui Barbosa, Serra do Orob . Fazenda Santa Maria (Bom Jardim)., 20 Dec. 2004, *L. P. de Queiroz* 9975 (HUEFS); S o Gabriel, Fazenda Boa Sorte., 4 Apr. 2009, *R. F. Machado* 176 (HUEFS); S o F lix do Coribe, S tio Novo. Mata de Vale entre morros de calc rio. Caminho para Olho d' gua., 11 Jan. 2008, *R. F. Souza-Silva* 301 (HUEFS); Tanha u, rodovia Brumado - Itau u., 21 Feb. 2007, *J. F. B. Pastore* 1757 (CEN, HUEFS); Tucano, povoado Bizamum, ca. 23 km de Tucano., 6 June 2004, *D. Cardoso* 93 (HUEFS). **Goi s:** S o Domingos, Mata   beira da estrada., 12 Mar. 2004, *A. Amaral-Santos et al.* 2355 (CEN). **Minas Gerais:** Capit o En as, Rod. BR-122, Fazenda Calif rnia, 9 Mar. 1998, *G. Hatschbach et al.* 67561 (CTBS, MBM); Monte Azul, Serra do Espinha o, subida via Montevideiu, 14 Jan. 1997, *G. Hatschbach et al.* 65704 (CTBS, MBM); Montes Claros, Caminho para S o Pedro das Gar as, 3 Feb. 2004, *J. F. B. Pastore* 804 (CEN).

15. *Asemeia pohliana* (A. St.-Hil. & Moq.) J. F. B. Pastore & J. R. Abbott, Kew Bull. 67: 810. 2012. *Polygala pohliana* A. St.-Hil. & Moq., Ann. Soc. Sci. Orl ans 9: 54. 1828. TYPE: Brazil. Minas Gerais [Serra da Canastra], s.d. [Mar. 1819], *A. Saint-Hilaire cat. C1 385* (holotype, P [bc] 00506149!). Figures 18E, 23.

Herb 5–20 cm tall, branches pubescent. *Leaves* carthaceous; petiole 1.8–3.2 mm long., hirsute; blade 19.2–25.5 × 5.8–11.5 mm, ovate to elliptic, apex acute, base acute to rounded, margin entire, densely ciliated, sparsely hirsute in both surfaces, more densely in the main vein in the abaxial surface. *Racemes*, rachis 1.2–2.7 cm long., subax, hirsute, bracts 1.3 × 0.6 mm deltoid, apex acuminate, outer surface pubescent, inner surface glabrous, margin ciliated, deciduous; pedicel 3.2–4.4 mm long. sparsely hirsute, curved. *Flower*, except the pedicel 6–6.1 mm long., membranaceous; outer sepals, without yellow glands forming spots on the surfaces, apex, adaxial sepal 2.5–3.3 × 2.2 mm, apex rounded, glabrous on both surfaces, without glands, ciliated, abaxial sepals 2.2–3 × 1.7–2.2 mm, apex rounded, glabrous on both surfaces, margin without glands, ciliated; inner sepals 6.3–7 × 6–6.6 mm, glabrous on both surfaces, margin not ciliated; Keel, cuculus 3.2–3.9 × 3.8–4.2 mm, trilobate, glabrous, except for the basal margin of the cuculus pubescent; claw 2.3 mm long., ciliated to sparsely ciliated; lateral petals 4.6–5 × 1.8–2 mm, outer surface glabrous, inner surface pubescent and ciliated in the lower half; filament sheath 3.3–3.5 mm long., outer surface glabrous, inner surface densely pubescent in the lower half, free filaments 2.9–3.9 mm long., glabrous; rudimentary petals absent; style 6–5.7 mm long., bent in the middle at ca. 90°, pubescent around the stigma, stigma hooked-like; ovary 1–1.6 × 0.9–1.4 mm, globose, glabrous, without conspicuous disc at the base of the ovary. *Capsule* not seen.

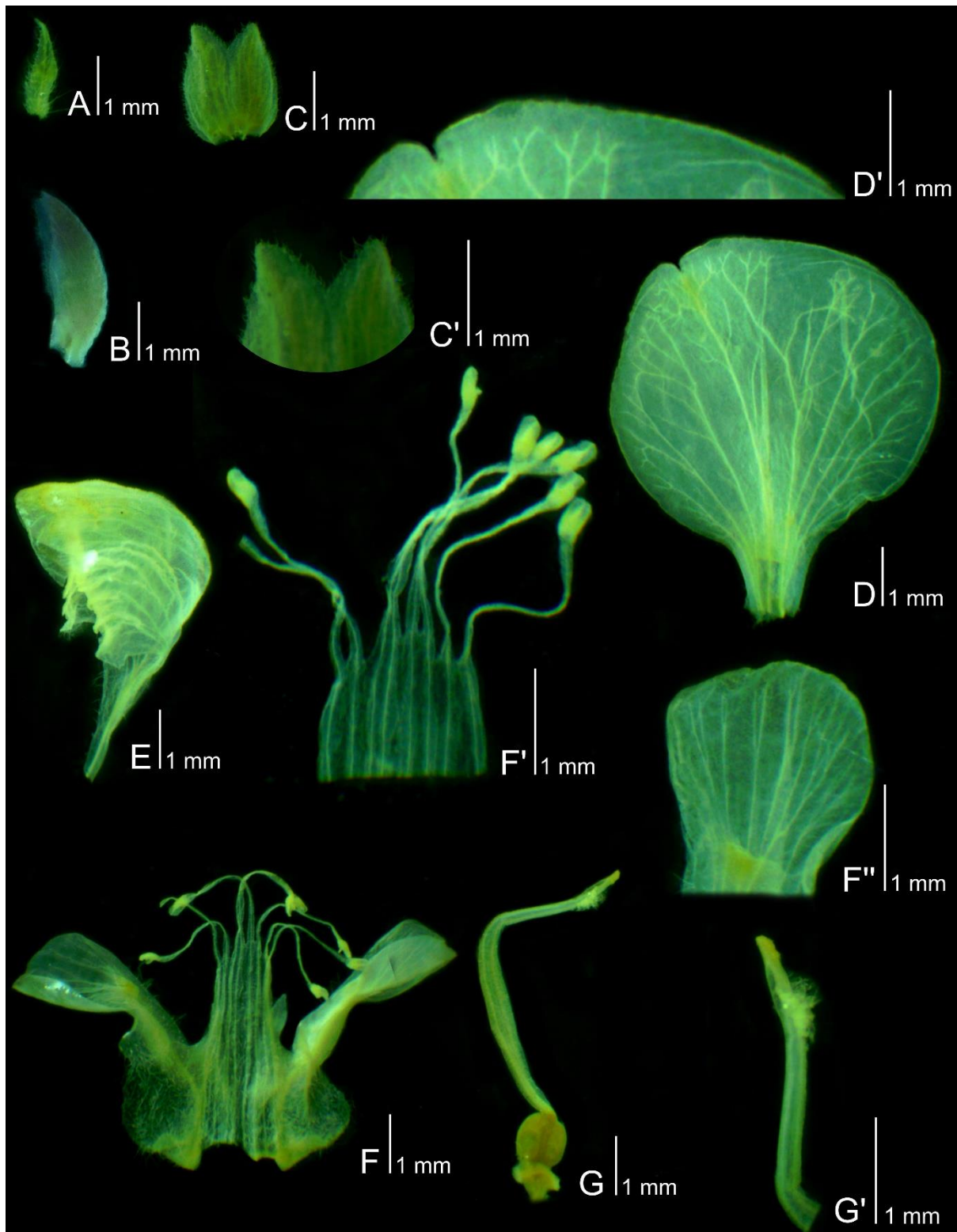


Figure 23. *Asemeia pohliana* (A. St.-Hil. & Moq.) J. F. B. Pastore & J. R. Abbott (*Y. Kavalciuki et al.* 2, CTBS). —A. Bract. —B. Adaxial sepal. —C. Abaxial sepals. —C'. Margin detail of abaxial sepals. —D. Inner sepal. —D'. Margin detail of inner sepal. —E. Keel. —F. Lateral petals with androecium. —F'. Free filaments. —F''. Apex detail of lateral petals. —G. Gynoecium. —G'. Stigma detail.

Distribution. *Asemeia pohliana* is endemic to the Serra da Canastra in Minas Gerais.

Figure 21.

Additional Notes. *Asemeia pohliana* A. St.-Hil. & Moq. has hairy trichomes and a similar appearance to *A. hirsuta*. As a result, some researchers, such as Bennett (1874), Bernardi (2000), and Aguiar et al. (2008), have considered or continued to consider *A. pohliana* as a synonym of *A. hirsuta*. However, Pastore & Abbott (2012) examined the original material as well as other specimens from Serra da Canastra (located in the state of Minas Gerais) and found differences in the shape of the leaves and the size of the flowers. Moreover, while both species live in the same area, there are no intermediate specimens. As a result, both species are considered distinct.

Additional Specimens Examined. BRAZIL. **Minas Gerais:** Delfinópolis, Serra Preta, Fazenda José Onório, 18 Oct. 2006, R. Romero et al. 7913 (CTBS, HUFU); Delfinópolis, Canastra - Serra da Babilônia, entre Delfinópolis e São Roque de Minas, estrada calçada da Serra, 10 Feb. 2012, J. F. B. Pastore 3971 (HUEFS); São Roque de Minas, Parque Nacional da Serra da Canastra, Estrada para Sacramento. Próximo a Garagem das Pedras, 20 Mar. 1995, J. N. Nakajima et al. 927 (HUFU); São Roque de Minas, Parque Nacional da Serra da Canastra. Altos da cachoeira Casca d'Anta, 30 Oct. 2011, Y. Kavalciuki et al. 2 (CTBS, SPF).

16. *Asemeia pseudohebeclada* (Chodat) J. F. B. Pastore & J. R. Abbott. Kew Bull. 67: 810. 2012. *Polygala pseudohebeclada*, Mém. Soc. Phys. Genève 31, 2(2): 66, 1893. Chodat. TYPE: Brazil. Bahia, Monte Santo, "Habitat in Brasiliae prov. Bahia, terra de M. Sauto (Mart. v.s. in Hb. Monac)", *Martius Obs.* 2311 (lectotype, designated here, M [bc] 153059!; isoelectotype, M [bc] 153058!). Figure 24.

Herb to subshrub, 15–40 cm tall, branches densely pubescent to velutine. *Leaves* chartaceous; petiole 1.2–1.9 mm long., densely pubescent to velutine; blade 9–32 × 3.2–7 mm, linear, elliptic to oblong, apex acute to acuminate, rarely rounded, base acute to rounded, margin entire, ciliated pubescent to densely pubescent in both surfaces. *Racemes* rachis 2.0–10.6 cm long., subax, pubescent to densely pubescent, bracts 1.5–2.5 × 0.4–0.8 mm ovate, apex acuminate, both surfaces puberulous to pubescent, margin ciliated, caducous; pedicel 1.7–3 mm long. glabrous to sparsely puberulous, straight to curved. *Flower*, except the pedicel 5–7.3 mm long., membranaceous; outer sepals, without yellow glands forming spots on the surfaces, adaxial sepal 3.5 × 2.8 mm, apex rounded, glabrous on both surfaces, margin

without glands, ciliated, abaxial sepals 3.3×2.2 mm, apex acute, glabrous on both surfaces, margin without glands, ciliated; inner sepals 9×7.4 mm, glabrous on both surfaces, margin ciliated in the lateral margins; Keel, cuculus 5.6×4.8 mm, glabrous on both surfaces, ciliated at the base; claw 2.7 mm long., ciliated; lateral petals 6.3×1.8 mm, outer surface glabrous, inner surface puberulous in the lower half, ciliated at the base; filament sheath 5.2 mm long., outer surface glabrous, inner surface pubescent at the half basal portion, free filaments 4.6 mm long., glabrous; rudimentary petals absent; style 9–9.3 mm long., bent in the middle at ca. 90° , with a semi-circle of trichomes in the pre-stigmatic region, stigma hooked-like; ovary 1.2×1 mm, oblong, glabrous, without conspicuous disc at the base of the ovary. *Capsule* 6×3.2 – 3.5 mm, oblong, glabrous. Seeds 3.3×1.8 , caruncle, oblong, pubescent, caruncle 1.1×1.3 mm long., sparsely puberulous, corneous, appendaged, with dorsal and two lateral appendages.

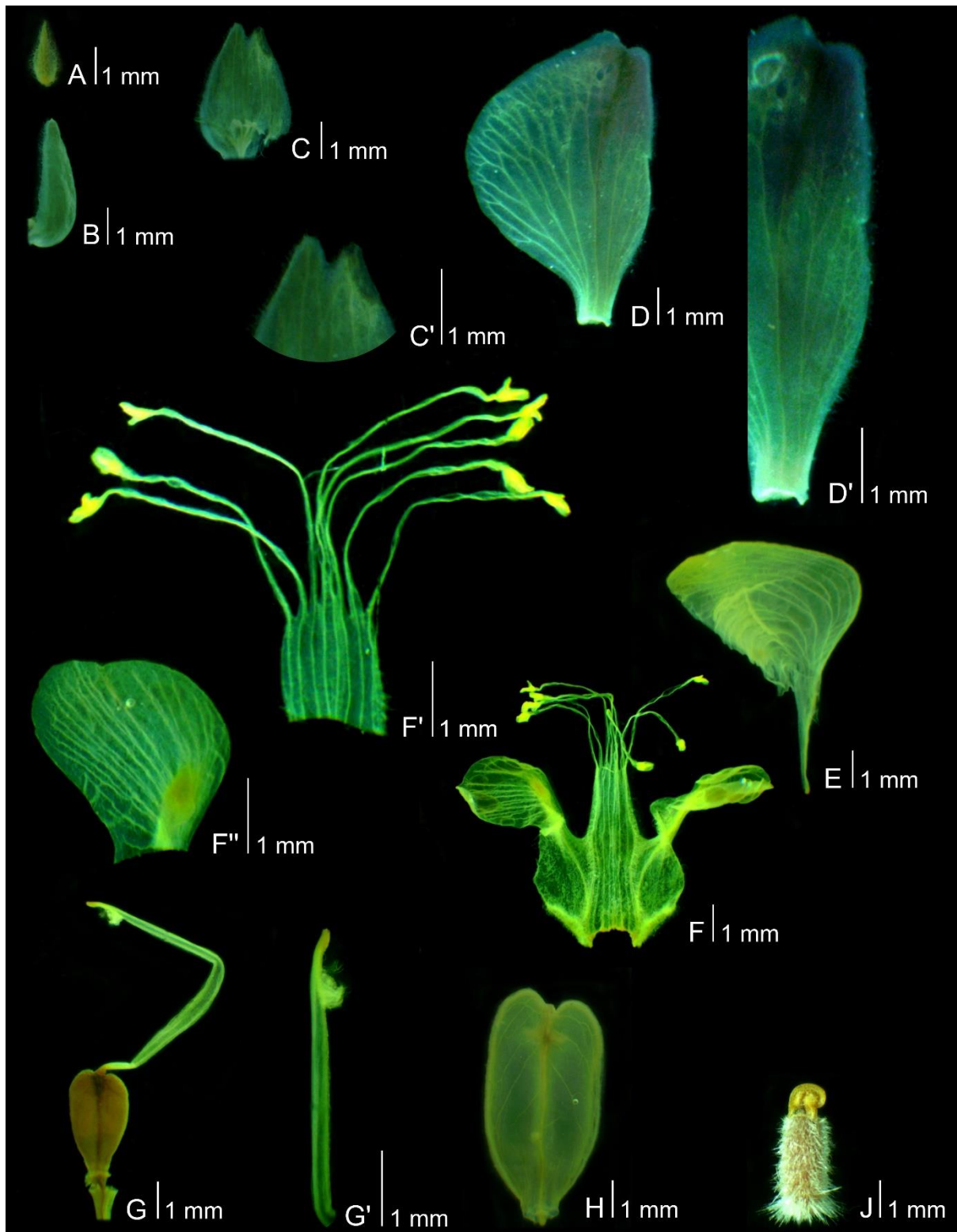


Figure 24. *Asemeia pseudohebeclada* (Chodat) J. F. B. Pastore & J. R. Abbott. (A, E–J. *G. C. Sessegolo et al.* 7, CTBS. B–D'. *R. M. Harley* 16790, CTBS). —A. Bract. —B. Adaxial sepal. —C. Abaxial sepals. —C'. Margin detail of abaxial sepals. —D. Inner sepal. —D'. Margin detail of inner sepal. —E. Keel. —F. Lateral petals with androecium. —F'. Free filaments. —F''. Apex detail of lateral petals. —G. Gynoecium. —G'. Stigma detail. —H. Capsule. —J. Seed.).

Distribution. *A. pseudohebeclada* occurs in the north of Bahia and Rio Grande do Norte states, Brazil. Figure 21.

Additional Notes. *Asemeia pseudohebeclada* is closely related to *A. ignatii* but can be distinguished by several characters. These include differences in leaf shape (linear in *A. ignatii* vs elliptic to oblong in *A. pseudohebeclada*), racemes (lax in *A. ignatii* vs sublax in *A. pseudohebeclada*), style length (7–7.2 mm in *A. ignatii* vs 9–9.3 in *A. pseudohebeclada*).

Additional Specimens Examined. BRAZIL. **Bahia:** Boquira, Serra Geral. Serra do Brejo Grande, 11 Mar. 1998, *G. Hatschbach et al.* 67614 (CTBS, MBM); Delfino, 8km. N.W. of Lagoinha (5.5km. S.W. of Delfino) on the road to Minas do Mimoso, 5 Mar. 1974, 41°17'W, 10°24'S, 850 m alt., 5 Mar. 1974, *R. M. Harley* 16790 (CEPEC, CTBS, MO, NY, U); Jeremoabo, Nordeste, APA Serra Branca Faz. Nova Esperança, 15 Jan. 2006, *G. C. Sessegolo et al.* 7 (ALCB, CTBS, MBM); Monte Santo, subida para Igreja ao lado da escada. Caatinga., 10°26'19"S, 39°20'9"W, 27 Feb. 2000, *A. M. Giuliatti et al.* 1860 (CTBS, HUEFS, UEC). **Rio Grande do Norte:** Doutor Severiano, ca. 15 km de São Miguel, 6°10'38"S, 38°23'93"W, 691 m alt., 19 Apr. 2015, *E. O. Moura et al.* 375 (ALCB, CTBS, UFRN).

17. *Asemeia tobatiensis* (Chodat) J. F. B. Pastore & J. R. Abbott, *Kew Bull.* 67: 810. 2012.

Polygala tobatiensis Chodat, *Bull. Herb. Boissier* 7: 10. 1907. TYPE: Paraguay.

Tobaty, *E. Hassler* 3980 (lectotype, designated in Pastore & Abbott (2012: 810): G [bc] 00228697!; isolectotypes, BM [bc] 000549969!, BR!, G [bc] 00228698!, G [bc] 00228699!, G [bc] 00228700!, GH [bc] 00007657, K [bc] 000264959!, MO [bc] O524115!, NY [bc] 259821!, P [bc] 00708653!, P [bc] 00733480!, P [bc] 00733481! P [bc] P00733482! S-R-10259, UC [bc] 930430). Figure 25.

Subshrub 20–60 tall, branches puberulous. Leaves carthaceous; petiole 2–2.4 mm long., puberulous; blade 15.4–31 × 3–14 mm, linear to elliptic, apex acute, base acute, margin ciliated, adaxial surface glabrous, abaxial surface puberulous to sparsely puberulous in both surfaces. *Racemes*, rachis 6.6–11.3 cm long., lax, puberulous, bracts 2.1–2.2 × 0.7 mm ovate, apex acute, margin ciliated, caducous; pedicel 1.7–2.8 mm long. puberulous, straight. Flower, except the pedicel 4.9–5.3 mm long., membranaceous; outer sepals, adaxial sepal 3 × 2.2 mm, apex rounded, glabrous on both surfaces, without glands, ciliated, abaxial sepals 3 × 2 mm, apex acute, glabrous on both surfaces, margin without glands, ciliated; inner sepals 7 × 5.7 mm, glabrous on both surfaces, margin not ciliated; Keel, cuculus 3.4 × 4 mm, trilobate,

glabrous, except for the basal margin of the cuculus pubescent; claw 2.4 mm long., densely ciliated; lateral petals 4.6×2.6 mm, outer surface pubescent near lower surface, inner surface pubescent at the lower half; staminal sheath 3.9 mm long., outer surface pubescent in a middle vertical line, and near the lower margin, inner surface glabrous, ciliated on the lateral margins, free filaments 2.9 mm long., glabrous; rudimentary petals present; style 6.2 mm long., bent in the middle at ca. 90° , pubescent around the stigma, stigma hooked-like. Capsule $4.8\text{--}5 \times 3.2$ mm. Seeds 3.1×1.9 mm, oblong, caruncle 1.2×1.4 mm long., sparsely pubescent, corneous, appendaged, with dorsal and two lateral appendages.

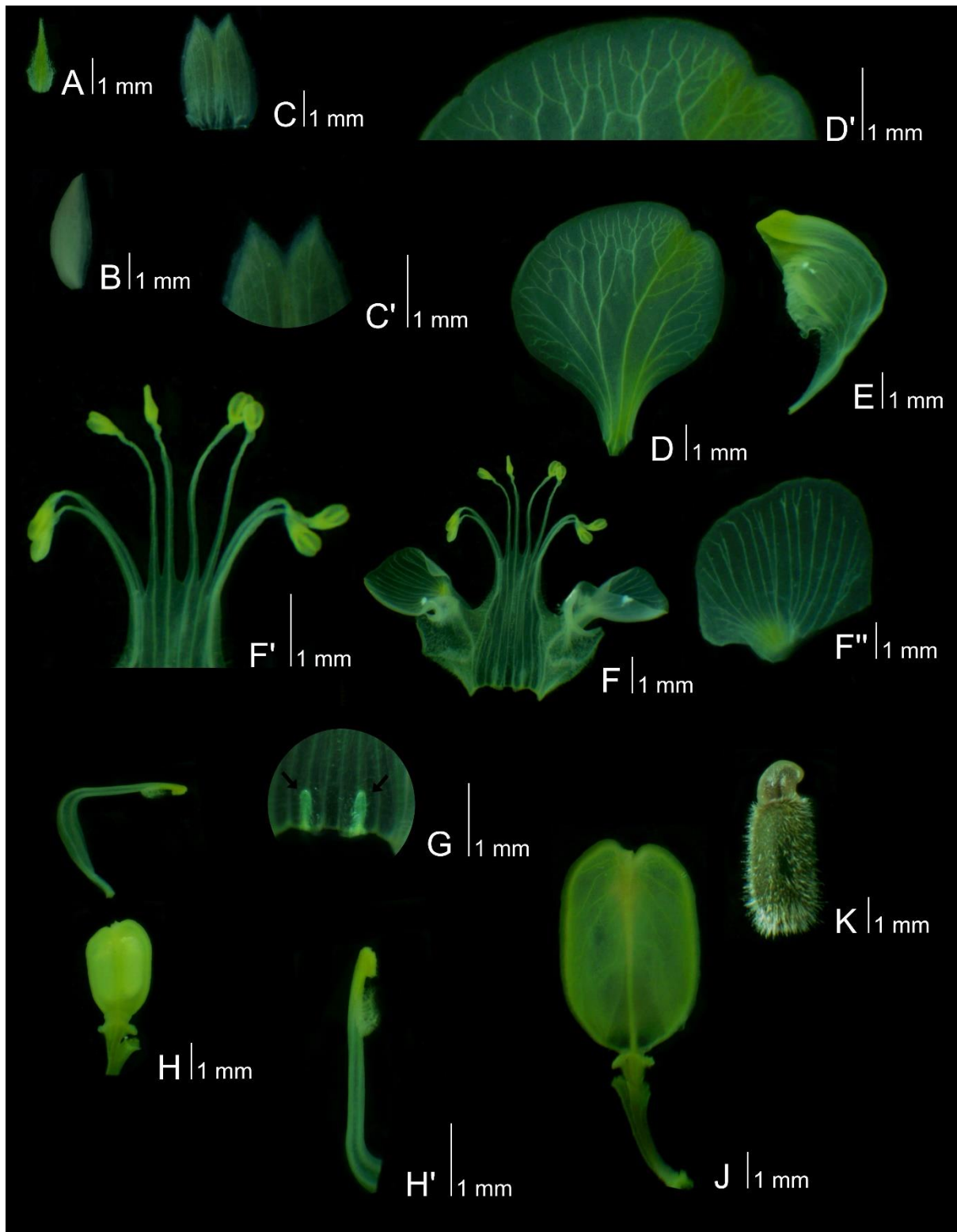


Figure 25. *Asemeia tobatensis* (Chodat) J. F. B. Pastore & J. R. Abbott. (*M. Martinez s.n.*, CTBS-3367). —A. Bract. —B. Adaxial sepal. —C. Abaxial sepals. —C'. Margin detail of abaxial sepals. —D. Inner sepal. —D'. Margin detail of inner sepal. —E. Keel. —F. Lateral petals with androecium. —F'. Free filaments. —F''. Apex detail of lateral petals. —G. Rudimentary petals (black arrow). —H. Gynoecium. —H'. Stigma detail. —J. Capsule. —K. Seed.

Distribution. Asemeia tobatiensis is endemic to Paraguay. Figure 26.

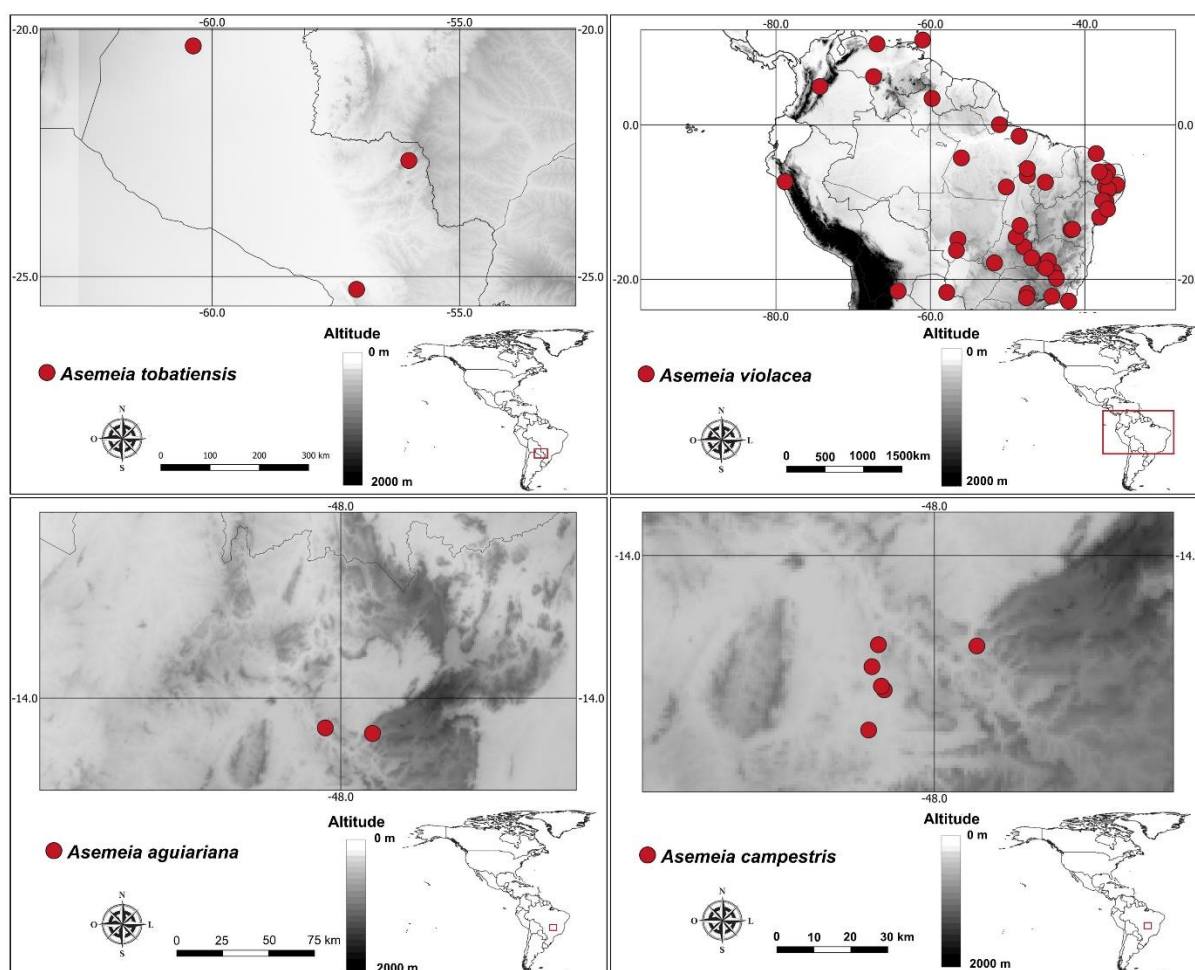


Figure 26. Distribution map of *Asemeia tobatiensis* (Chodat) J. F. B. Pastore & J. R. Abbott, *A. violacea* (Aubl.) J. F. B. Pastore & J. R. Abbott, *A. aguiariana* J.F.B.Pastore & M.Mota and *A. campestris* J.F.B.Pastore & M.Mota.

Additional Notes. *Asemeia tobatiensis* seems to be part of the *Asemeia decumbens* complex, and eventually could be regarded just as a morphotype of *Asemeia decumbens*. However, we have chosen to classify it as a distinct species, mainly because it is reasonably distinguishable on herbarium specimens that were examined. Additionally, its distribution is limited to Paraguay. Therefore, we choose to recognize this as species until *Asemeia decumbens* complex can be comprehensively studied.

The overall aspect of *Asemeia tobatiensis* resembles that of *Asemeia rhodoptera* (a member of *Asemeia* subgen. *Asemeia* sect. *Hebeclada*) without persistent bracts. This appearance led Bernardi (2000) to consider *Polygala tobatiensis* (and *P. rhodoptera*) as synonyms of *Polygala hebeclada*. However, when considering the general flower morphology and its phylogenetic position (Mota et al. in prep.), *A. tobatiensis* appears to be

closely related to the *Asemeia decumbens* complex. *Asemeia tobatiensis* can be distinguished by a set of characters: external sepals lacking glands on their margins, lax racemes, and the rounded apex of internal sepals (wings).

Additional Specimens Examined. PARAGUAY. **Alto Paraguay:** Mayor Pablo Lagerenza, Parque Nacional Defensores del Chaco, Cerro Leon, 20°20'S, 60°23'W, 17 Nov. 1992, *L. Ramella et al.* 3050 (G). Pablo Lagerenza, 20°20'S 60°20'W, 14 Apr. 1989, *L. Ramella* 2725 (G). **Amambay:** Cerro Corá, peñasco Guaiguy Hog, 9 Nov. 1980, *J. F. Casas & J. Molero* 4029 (NY, G). **Cordillera:** Tobaty, Cerros de Tobaty, s.d., *Hassler* 6292 (NY, G); Tobaty, Cerro Tobaty, Aug. 1967, *A. Schinini* 2098 (G); Tobaty, Cerro Tobaty, Sep. 1971, *A. Schinini* 3954 (G); Tobaty, Cerro Tobaty, Mar. 1972, *A. Schinini* 4395 (G, P); Tobaty, Cerro Tobaty, Nov. 2016, *M. Martinez s.n.* (CTBS).

18. *Asemeia violacea* (Aubl.) J. F. B. Pastore & J. R. Abbott, *Kew Bull.* 67: 811. 2012.

Polygala violacea Aubl. *Hist. Pl. Guiane* 735. 1775. TYPE: French Guyana. Cayenne, 1775, *Fusée-Aublet s.n.* (lectotype, designated in Marques (1979: 176): BM [bc] 000027097!; isolectotype, LINN-HS [bc] 1176.31).

Polygala angustifolia Kunth, *Nov. Gen. Sp.* 5: 405. 1823. TYPE: (non *Polygala angustifolia* Gilib., 1782 opus utique oppressa) Venezuela. Bolivar, Carichana, “Crescit ad flumen Orinoci, prope Carichanam (exsicata)”, March – April, 1800, *A.J.A. Bonpland & F.W.H.A. von Humboldt* 1157 (holotype, P [bc] P00679682!; isotype B-Willd. [13024] n.v. photo, Macbride 13024).

Polygala camporum Benth, *J. Bot. (Hooker)* 4: 100. 1841. TYPE: Guyana. “Dry savannahs of the Rio Branco; Schomburgk, n. 816-Gardner’s n. 2044, from Piauhy, is probably the same species; and 1452, from Ceara”, *Schomburgk I 816* (lectotype, designated in Pastore & Abbott (2012: 811): BM [bc] BM001006189!, isolectotypes, CGE!, P [bc] P00733577!, US [bc] US00108919!).

Polygala americana Mill. var. *angustifolia* f. *viridula* (Kunth) Kuntze, *Revis. Gen. Pl.* 1: 48. 1891. TYPE: Venezuela. Distrito Capital: Caracas “Caracas”, 1894, O. Kuntze 1695 (holotype, NY [bc] 00856784).

Polygala monticola Kunth var. *brizoides* (A. St.-Hil. & Moq.) Steyerm., *Fieldiana, Bot.* 28: 300. 1952. *Polygala brizoides* A. St.-Hil. & Moq. (Saint-Hilaire & Moquin-Tandon 1828: 54). TYPE: Brazil. Minas Gerais, Aldeia de São Pedro, “Nascitur in sylvis caduis prope Aldea de S. Pedro in provincia Rio de Janeiro”, Sep. 1818, *A. Saint-Hilaire Cat.*

B2 77 (lectotype, P [bc] 00065196!, selected by Pastore & Abbott (2012); isolectotype, P [bc] 00065197!).

Polygala angustifolia Kunth var. *linearifolia* Chodat, Mém. Soc. Phys. Genève 31 (2), 2: 53. 1893. TYPE: Brazil. Ceará. “Brasilia, Prov. Ceara: Gardn., n° 816. In Antillis: St-Thomas, in fruticetis umbrosis (eggers Fl. Exscc. In. occ., n° 582”, *G. Gardner 816*. TYPE: (lectotype, selected in Pastore & Abbott (2012) BM!; isolectotypes, CGE!, P!, US!).

Polygala orobus Chodat, Mém. Soc. Phys. Genève 31, 2(2): 51, t. 15. 1893. TYPE: Brazil. Bahia, “Hab. Bahia in umbrosis: Salzmann”, *P. Salzmann s.n.* (lectotype, selected in Pastore & Abbott (2012: 811): G [bc] 00227246!, isolectotypes: CGE!, FI!, G [bc] 00189507, K!, P [bc] 02548741!, W-316370!).

Polygala huberiana Chodat, Bull. Herb. Boissier 3: 122. 1895. TYPE: Colombia. Alto de San Francisco, “Hab. Alto de San Francisco, in valle alta flum. Cauca Nov. Granata” 22 Apr. 1876, *E. F. André 2884* (holotype, K [bc] 000590912!). Figures 18F, 27.

Herb, 25–80 cm tall, branches pubescent. Leaves membranaceous; petiole 2–2.2 mm long., pubescent; blade 20.4–32.3 × 6.8–18.8 mm, linear to lanceolate, apex acute, base acute to obtuse, margin entire, ciliated-adpressed, adaxial surface sparsely puberulous, abaxial surface puberulous. Racemes, rachis 2.1–5.9 cm long., subax, pubescent, bracts 1.4 × 0.5 mm ovate, apex acuminate, outer surface pubescent, inner surface glabrous, margin ciliated, caducous; pedicel 1.5 mm long. pubescent, straight. Flower, except the pedicel 3.6–3.9 mm long., membranaceous; outer sepals, adaxial sepal 2–2.5 × 1.1–1.5 mm, apex rounded, glabrous on both surfaces, with glands, ciliated to sparsely ciliated at the apex to ciliated, abaxial sepals 1.6–2.1 × 1–1.2 mm, apex acute, glabrous on both surfaces, margin with glands (sometimes sparsely), ciliated; inner sepals 4–4.7 × 2.8–3.7 mm, glabrous on both surfaces, margin undulate, not ciliated; Keel, cuculus 2.5–2.9 × 2.1–3 mm, trilobate, glabrous on both surfaces; claw 1.3–2 mm long., glabrous to sparsely ciliated; lateral petals 3.3–3.9 × 1.5–1.7 mm, pubescent at the lower half on both surfaces, ciliated at the base; staminal sheath 2.3–2.6 mm long., outer surface glabrous to sparsely puberulous, inner surface pubescent at the half basal portion, free filaments 1.7–1.9 mm long., glabrous; rudimentary petals absent; style 3.8–4.3 mm long., bent in the middle at ca. 90°, pubescent around the stigma, stigma hooked-like; ovary 0.9–1 × 0.8–1 mm, obovate, glabrous, without conspicuous disc at the base of the ovary. Capsule 3.7–4.1 × 2.7–2.9 mm, oblongo, glabrous. Seeds 2–2.2 × 1.3 mm,

oblong, caruncle 0.9×1 mm long., sparsely pubescent to pubescent, corneous, appendaged, with dorsal and two lateral appendages.

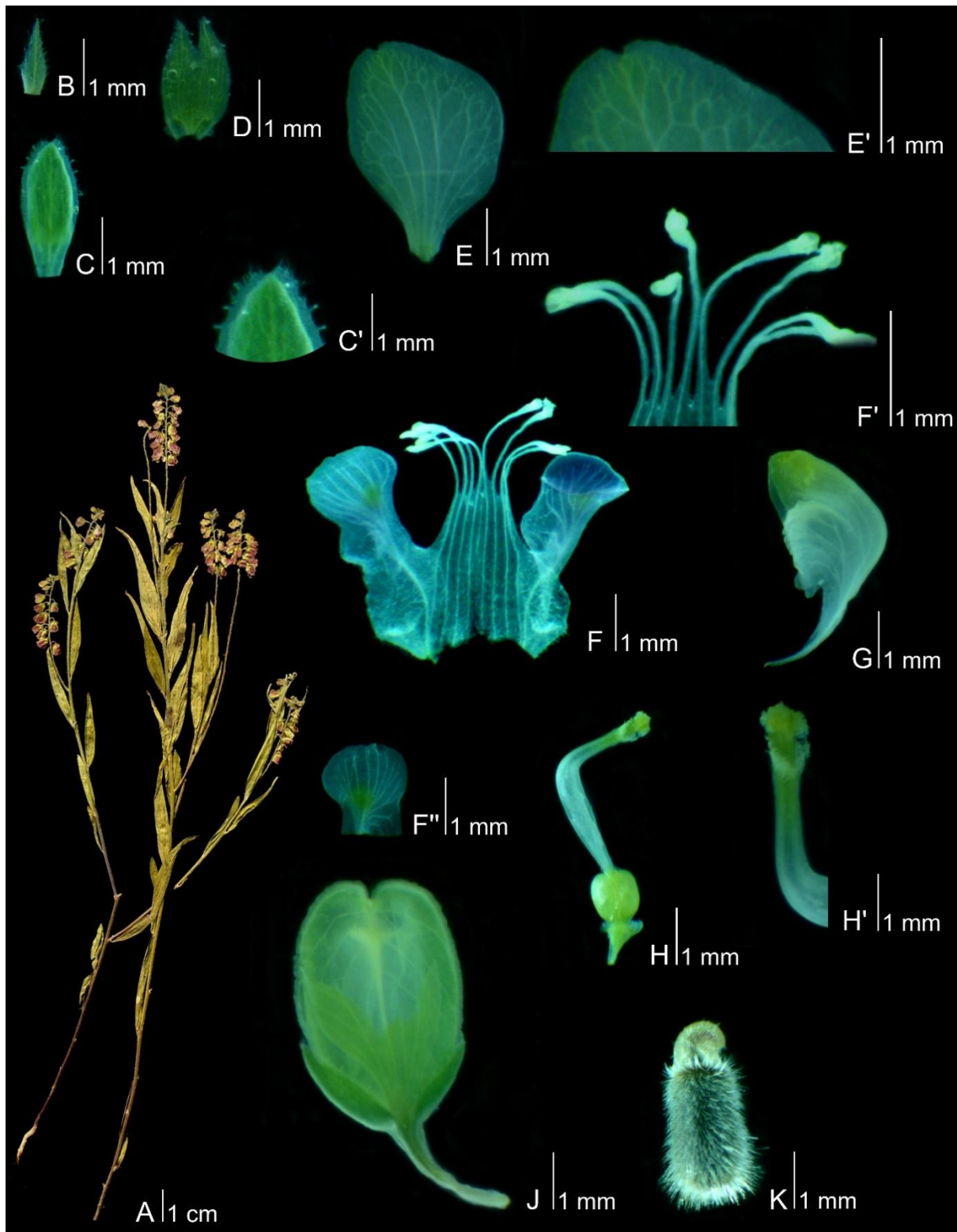


Figure 27. *Asemeia violacea* (Aubl.) J. F. B. Pastore & J. R. Abbott. (A. *M. Mota et al.* 205, CTBS. B, F–F''. *M. Mota & J. F. B. Pastore* 234, CTBS, C–E, G–K. *J. F. B. Pastore & M. Mota* 5483, CTBS). —A. Habit. —B. Bract. —C. Adaxial sepal. —C'. Margin detail of adaxial sepal. —D. Abaxial sepal. —E. Inner sepal. —E'. Margin detail of inner sepal. —F. Lateral petals with

androecium. —F'. Free filaments. —F''. Apex detail of lateral petals. —G. Keel. —H. Gynoecium. —H'. Stigma detail. —J. Capsule. —K. Seed.

Distribution. *Asemeia violacea* is widely distributed from South Mexico to Paraguay. This species is also considered as ruderal, being frequently collected in antropic areas. Figure 26.

Nomenclatural Notes. *Polygala violacea*, the first described member of the genus *Asemeia*, was documented by Aublet in 1775 from French Guyana. Although the illustration and diagnosis were adequate for species recognition, an unusual mistake was made in the description and illustration of the flower's features. The depiction of the plant's flowers included an unrealistic detail of a crested keel, and the description reinforced this error by stating that the plant had crested flowers. This discrepancy may have arisen due to the fact that a keel without a crest was an unknown characteristic within the genus *Polygala* at the time. Later, Vahl (1791), recognized this mistake and described a new species called '*P. violacea*', noting its distinction from Aublet's *P. violacea* due to the absence of crest. It is worth mentioning that Vahl (1791) often rejected Aublet's names and replaced them with his own. In the case of *P. violacea*, Vahl assigned the same epithet to another closely related species (*A. martiana*). Regrettably, Vahl's decision led to a historical confusion on the nomenclature of these species. Willdenow (1802) also rejected Aublet's names and, in an effort to resolve the issue with *P. violacea*, recognized two species. As a result, Willdenow (1802) provided a new name, *Polygala cinerea* Willd., for *P. violacea* Aubl., while retaining the name *P. violacea* for the Vahl's species. Certainly, this situation contributed to Poiret's later confusion, who accepted the name *P. violacea* Aublet, but mistakenly applied it to the Vahl's *P. violacea* Vahl (= *A. martiana*). De Candolle (1824) also accepts *P. cinerea* Willd. and *P. violacea* Vahl. Later, Saint-Hilaire (1828) accepts and follows the concept of de Candolle (1824) for *Polygala violacea* Vahl, but described a new species, *P. bryzoides* (= *A. violacea* Aublet). Bentham (1841) described a new species, *P. camporum* similar to *P. violacea* (now synonym of), omitting the author 'Vahl,' but it is evident from the description that the Bentham's circumscription for *P. violacea* is the same as proposed by Vahl (1791). Bennett (1874), in *Flora brasiliensis*, also accepted *P. violacea* Vahl but uses this name to identify specimens that are currently identified as *A. monninoides* (Kunth) J. F. B. Pastore & J. R. Abbott. Chodat (1893) treated *P. violacea* Aubl. as a synonym of *P. violacea* Vahl., but published a number of names now considered synonyms of *A. martiana*. Marques (1979), for the *Flora do Rio de Janeiro*, analyzed the original specimens of *Polygala violacea* Aubl.

deposited in the BM herbarium and, finally, corrected the original description to include flowers not crested. In addition, Marques (1979) reestablished the priority of *P. violacea* Aubl. and pointed out its differences from *P. martiana*, popularizing the use of these names. Bernardi (2000) presented a broad and somewhat confusing delimitation for these species, providing an excessive number of synonyms for *P. violacea* and *P. mollis*. In general, this delimitation is unsatisfactory and abandoned by the later authors. Aguiar et al. (2008) follow Marques' (1979) delimitation, recognizing three varieties in *P. martiana*. Pastore & Abbott (2012) present a generic delimitation for the subgenus *Hebeclada* (Chodat) S. F. Blake, and for this they recognized three species: *A. violacea* (Aubl.) J. F. B. Pastore & J. R. Abbott, *A. martiana* (A. W. Benn.) J. F. B. Pastore & J. R. Abbott, and *A. ovata* (Poir.) J. F. B. Pastore & J. R. Abbott. The latter taxonomic delimitation is followed here with exception of the name *A. decumbens* which was applied for specimens treated as *A. ovata* (= *Hebecarpa ovata*) by Pastore & Abbott (2012).

Additional Notes. *Asemeia violacea* is a polymorphic species, with linear to largely lanceolate leaves. However, the small flowers (3.6–3.9 mm, which are the smallest flowers in the genus) is the most important character to recognize this species.

Bernardi (2000) recognized *Asemeia grandiflora* complex, *Asemeia extraaxillaris* complex members, as well as *Polygala glabra* and *P. monticola*, as synonyms of *Polygala violacea* s.lat. This decision resulted in a large list of synonyms for *A. violacea*. Nevertheless, when the Bernardi's (2000) treatment was confronted with our morphological and phylogenetic studies (Mota in prep.), it became clear that this approach, i.e *Polygala violacea* lat.s., is not consistent.

Additional Specimens Examined. SOUTH AMERICA, s.l., *J. Pavon* s.n. (G). BOLIVIA. **Yungas**: Coripati, 20 Mar. 1894, *M. Bang* 2096 (G). BRAZIL. **Acre**, Rio Branco, Jan. 1909, *E. Ule* 7909 (G). **Ceará**, 1840, *G. Gardner* 1452 (G, P, P - syntypes of *P. camporum*). **Minas Gerais**, 1838, *P. Claussen* 277 (P). **Pará**: Marajó, *Jobert* 394 (P). Santharém, Nov. 1849–Mar. 1850, *R. Spruce* 1851 (G). **Pernambuco**: Tapera, 18 July 1932, *B. Pickel* 2457 (P). **Piauí**, 1840, *G. Gardner* 2044 (P). São Paulo, Itú, Feb.–Mar. 1834, *L. Riedel* 1976 p.p. (G mixed with specimens of *A. hebeclada*, G [bis]). COLOMBIA, Santa Marta, 1898–1901, *H. H. Smith* 577 (G). COSTA RICA, **Cartago**: Concaras, July 1919, *C. H. Lankester* 335 (G). **Puntarenas**, Parrita, Surubres, Jul. 1890, *P. Biolley* 2660 (G). GUATEMALA. **Vera Paz**: Inter Tocary & San Jerónimo, Aug. 1870, *G. Bernoulli* 998 (G). GUYANA, Apr. 1842, *R. H. Schomburgk* 543 (P). HONDURAS, **Comayagua**,

Ritternhouse's hacienda, 1050 m alt., 30 June 1936, *T. G. Yuncker et al.* (G). JAMAICA, "King's House Ground", 28 Feb. 1917, *W. Harris 12705* (G). PARAGUAY. "Chaco Septentrionalis", 1907, *K. Friebriug 1485* (G). "Fluminis Apa", Nov. 1901–1902, *E. Hassler 7918* (G, P, P). **Alto Paraguay**. Cerro Pedreira, 50–60 km N. Fuerte Olimpo, 30 Mar. 1980, *L. Bernardi 20412* (G). PERU. **Chachapoyas**: Chachapoyas "Chachapoyas", *A. Matheus s.n.* (G). **San Martín**: Tarapoto, 1855–1856, *R. Spruce 4957* (G, G [bis]). TRINIDAD & TOBAGO. **Trinidad**: Guinton, 14 Jan. 1908, *W. E. Broadway 2180* (G). *St. Ann's*, 28 Oct. 1923, *W. E. Broadway 5091* (G). VENEZUELA. **Aragua**: Tovar, 1854–1855, *A. Fendler 239* (G). 1854–1855, *A. Fendler 241* (G). **Distrito Capital**: San Lazaro near Caracas, 4 Sep. 1921, *H. Pittier 9745* (G). VIRGIN ISLAND (UNITED STATES). **Saint Thomas**, Aug. 1881, *H. F. A. von Eggers 582* (G, P, P [bis], P [ibid.] - syntypes of *P. angustifolia* Kunth var. *linearifolia* Chodat); Saint Thomas, 1841, *R. Finlay 52* (P).

Asemeia subgenus **Asemeia** section **Hebeclada** (Chodat) M. Mota & J. F. B. Pastore, comb. nov. *Polygala* sect. *Hebeclada* Chodat, Arch. Sci. Phys. Nat., 3, 25: 698. 1891.
Polygala subgen. *Hebeclada* (Chodat) S. F. Blake Contr. Gray Herb. 47: 59 1916.
 TYPE: *Polygala hebeclada* DC. (= **Asemeia hebeclada** (DC.) J. F. B. Pastore & J. R. Abbott) (Species 19–28)

IDENTIFICATION KEY TO *ASEMEIA* SUBGEN. *ASEMEIA* SECTION *HEBECLADA*

- 1a. Margin of outer sepal without glands....22. *Asemeia eglandulosa* J. F. B. Pastore & M. Mota
- 1b. Margin of outer sepal with glands.....2
- 2a. Bracts deciduous.....3
- 3a. Petiolate, 1.5 mm long.....20. *Asemeia campestris* J. F. B. Pastore & M. Mota
- 3b. Sessile leaves.....26. *Asemeia marquesiana* (J. F. B. Pastore & T. B. Cavalc.) J. F. B. Pastore & J. R. Abbott
- 2b. Bracts persistents.....4
- 4a. Erect or sub-erect flowers (straight pedicels).....5
- 5a. Leaves narrow-elliptic to oblanceolate, rachis 7.5–19 cm long, lax
23. *Asemeia hebeclada* (DC.) J. F. B. Pastore & J. R. Abbott
- 5b. Leaves oval, rachis 2.5–3 cm, congested.....
-24. *Asemeia impensa* (Wurdack) M. Mota & J. F. B. Pastore

- 4b. Reflexed flowers (curved pedicels).....6
- 6a. Small leaves, short and linear, plants aphyllous or subaphyllous.....7
- 7a. Pedicel straight, racemes sublux.....
.....28. *Asemeia subaphylla* J. F. B. Pastore & M. Mota
- 7b. Pedicel curved, racemes lax.....
.....25. *Asemeia lindmanniana* (Chodat) J. F. B. Pastore & J. R. Abbott
- 6b. Long and linear or elliptic leaves, not aphyllous or subaphyllous.....8
- 8a. Apex of the keel (the yellow part) well-developed, leaves linear.....
.....21. *Asemeia coracoralinae* M. Mota & J. F. B. Pastore
- 8b. Apex of the keel (the yellow part) short, not prominent, leaves elliptic to ovate.....9
- 9a. Flowers 3–4 mm long, internal sepals (wings) glabrous.....27.
Asemeia rhodoptera (Mart. ex A.W.Benn.) J. F. B. Pastore & J. R. Abbott
- 9b. Flowers 6 mm long, internal sepals (wings) ciliated at the third lower margin.....19. *Asemeia aguiariana* J. F. B. Pastore & M. Mota

19. *Asemeia aguiariana* J. F. B. Pastore & M. Mota, Syst. Bot. 46: 82. 2021. TYPE: Brazil. Goiás: Colinas do Sul, entorno da cidade, 14°13'16"S, 47°53'26"W, 15 Mar. 2017, *J. F. B. Pastore & R. M. Harley 1875* (holotype, HUEFS-117692!; isotypes, CEN [bc] 64894!, UB [bc] 157114!). Figures 18G, 28.

Subshrub, 0.5–1 m tall, branches pubescent. *Leaves* chartaceous; petiole 2–2.5 mm long., pubescent; blade 24–40 × 3–6 mm, narrow elliptic to elliptic, apex acute to acuminate, base acute, margin entire, adaxial surface estrigose, abaxial surface pubescent. *Racemes*, peduncle 1–1.5 cm long., rachis 7–20 cm long., lax, pubescent, bracts 1.4 × 0.8 mm, ovate, apex acuminate, outer surface pubescent, inner surface sparsely puberulous, to pubescent in both surfaces, margin with sparsely glands, ciliated, persistent; pedicel 3–3.5 mm long. glabrous, curved. *Flower*, except the pedicel 6 mm long., membranaceous; outer sepals apex, adaxial sepal 2.8 × 1.9–2 mm, apex rounded, glabrous on both surfaces, margin with glands, not ciliated, abaxial sepals 2.3 × 2 mm, apex rounded, glabrous on both surfaces, margin with glands, ciliated no apex; inner sepals 6.5 × 5.9 mm, orbicular, glabrous on both surfaces, margin ciliated; Keel, cuculus 3 × 3.5 mm, trilobate, glabrous, except for the basal margin of

the cuculus pubescent; claw 2 mm long., ciliated; lateral petals 4.1×2.8 mm, outer surface glabrous, inner surface pubescent in the lower half, ciliated in the middle and lower third portion; staminal sheath 2 mm long., outer surface puberulous at the base, inner surface pubescent at the half basal portion, ciliated in the middle and basal portion to pubescent at the base in both surfaces, free filaments 2.1 mm long., glabrous; rudimentary petals absent \times mm.; style 6.3 mm long., bent in the middle at ca. 90° , pubescent around the stigma, stigma hooked-like; ovary 2×1.8 mm, oblong, glabrous, with conspicuous disc in the ovary base. *Capsule* 5×3.5 mm, glabrous. Seeds 4×1.5 mm, oblong, caruncle 1.2 mm long., glabrous, corneous, appendaged, with dorsal and two lateral appendages.

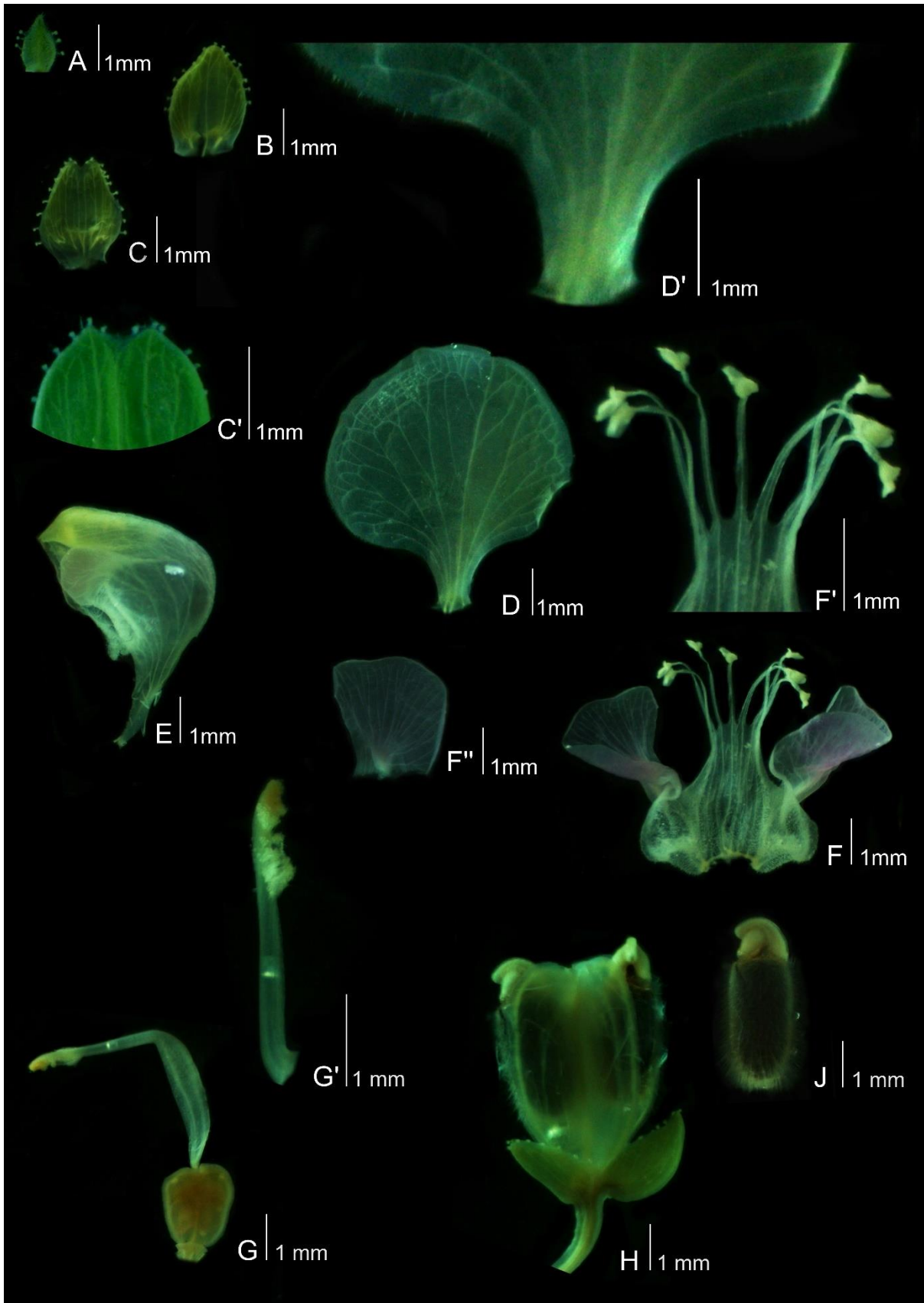


Figure 28. *Asemeia aguiariana* J. F. B. Pastore & M. Mota. (A–J. J. F. B. Pastore & R. M. Harley 1875, CTBS). —A. Bract. —B. Adaxial sepal. —C. Abaxial sepals. —C'. Margin detail of abaxial sepals. —D. Inner sepal. —D'. Margin detail of inner sepal. —E. Keel. —F. Lateral petals with

androecium. —F'. Free filaments. —F''. Apex detail of lateral petals. —G. Gynoecium. —G'. Stigma detail. —H. Capsule. —J. Seed.

Distribution. *Asemeia aguiariana* is endemic to the northeastern region of Goiás state and the Distrito Federal in Brazil. This species can be found in *cerrado* and *campo rupestre* habitats with sandy soils. Figure 26.

Additional Notes. *Asemeia aguiariana* is a recently described species by Mota & Pastore (2021). Specimens of *A. aguiariana* were misidentified as *A. rhodoptera* in herbaria due to their overall similar appearance, as elliptic leaves and curved pedicels. However, these species can be distinguished by the size of the flowers (ca. 6 mm long in *A. aguiariana* vs ca. 4 mm long in *A. rhodoptera*), inner sepals shape (orbicular in *A. aguiariana* vs suborbicular in *A. rhodoptera*), inner sepals indument (ciliated at the third lower margin in *A. aguiariana* vs glabrous in *A. rhodoptera*), and by the rudimentary petals (present *A. aguiariana* vs absent in *A. rhodoptera*).

Additional Specimens Examined. BRAZIL. **Goiás:** Alto Paraíso de Goiás, São Jorge, 20 June 2003, *J. F. B. Pastore et al.* 652 (CEN); Alto Paraíso de Goiás, Chapada dos Veadeiros, São Jorge caminho para Mirante—GO, 11 Apr. 2004, *A. S. Rodrigues & F. S. Chesini* 196 (CEN, CTBS); Alto Paraíso de Goiás, estrada de São Jorge para Colinas do Sul, 14°13'16"S, 47°53'26"W, 14 Mar. 2007, *J. F. B. Pastore et al.* 1853 (CEN, HUEFS).

Distrito Federal: Brasília: Poço Azul / APA de Cafuringa. Descida à esquerda do estacionamento, 27 Jan. 2004, *J.F.B. Pastore et al.* 736 (CEN, CTBS, UB).

20. *Asemeia campestris* J. F. B. Pastore & M. Mota. *Syst. Bot.* 46: 83. 2021. TYPE: Brazil.

Goiás: Niquelândia, 14°20'15"S, 48°07'33"W, 21 Feb. 2019, *M. Mota & J. F. B. Pastore* 176 (holotype, CTBS-4205). Figures 18H, 29.

Herb, 60 cm tall, branches puberulous. *Leaves* chartaceous; petiole 1.5 mm long., pubescent; blade 4–7 × 0.6 mm, linear, apex acuminate, base acute, margin entire, pubescent in both surfaces. *Racemes*, peduncle 1–3 cm long., rachis 7–9 cm long., puberulous, bracts 1.5 × 0.6 mm, deltoid, apex acute, outer surface pubescent, inner surface pubescent at the upper half, margin without glands, ciliated, caducous; pedicel 3–5 mm long. glabrous, curved. *Flower*, except the pedicel ca. 8 mm long., membranaceous; outer sepals, adaxial sepal 3.3–3.7 × 1.5–1.8 mm, apex rounded, glabrous on both surfaces, margin with glands, not ciliated, abaxial sepals 2.3–2.8 × 1.5–1.6 mm, apex, glabrous on both surfaces, margin

with glands, sparsely ciliated at the apex; inner sepals 7.1–7.6 × 6.2–6.6 mm, glabrous on both surfaces, margin not ciliated; Keel, cuculus 6.1–6.9 × 4.5–5.1 mm, trilobate, glabrous on both surfaces; claw 2 mm long., ciliated; lateral petals 6–6.5 × 3 mm, apex, outer surface pubescent at the lower third, inner surface pubescent lower half, ciliated at the base; staminal sheath 3.2 mm long., outer surface sparsely puberulous at the lower third, inner surface pubescent and ciliated at the lower half, free filaments 4.5–4.7 mm long., glabrous; rudimentary petals absent; style 8.5–8.6 mm long., arched, pubescent around the stigma, stigma hooked-like; ovary 1–1.2 × 1 mm, globose, glabrous, with a disc in the ovary base. *Capsule* not seen.

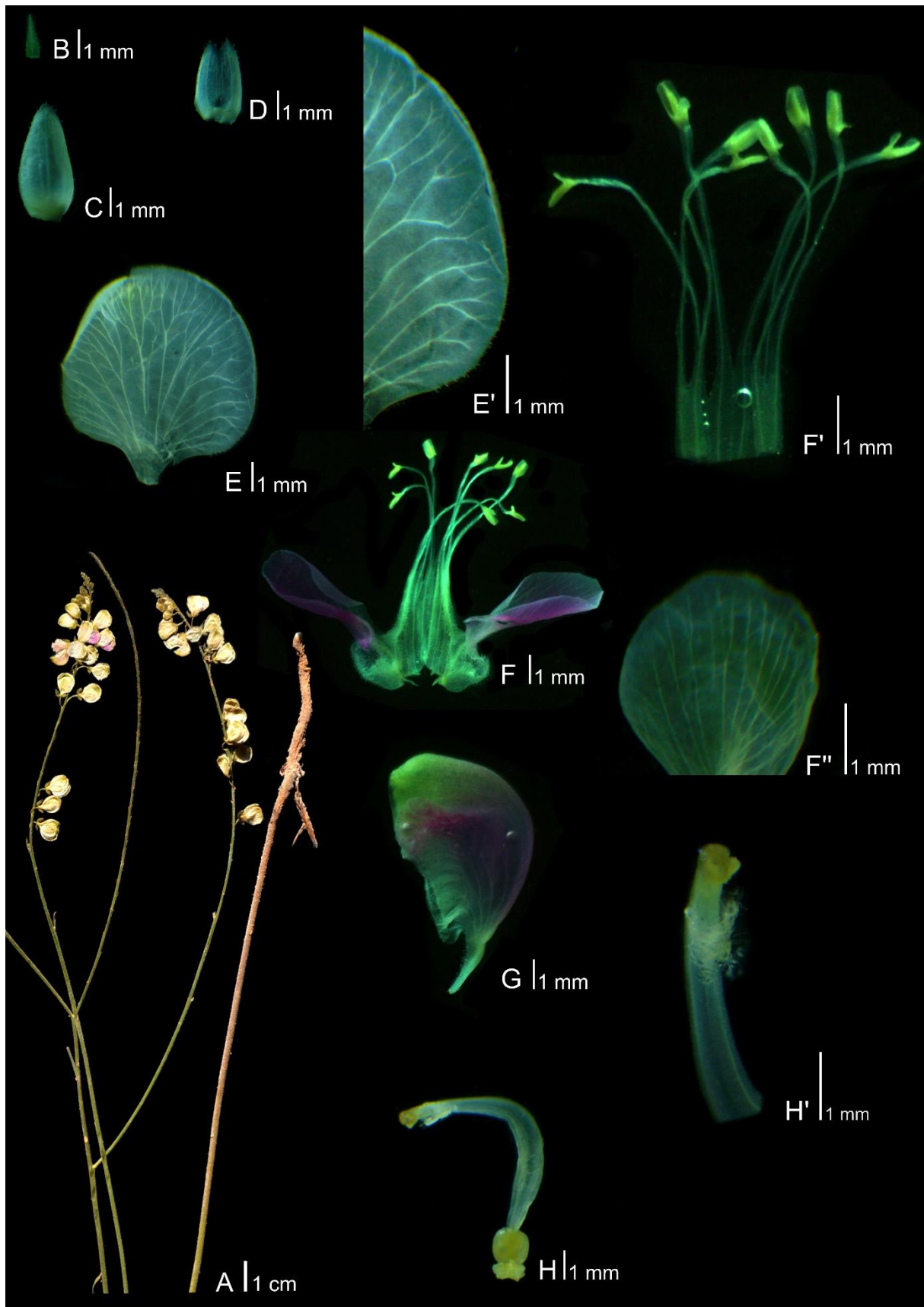


Figure 29. *Asemeia campestris* J. F. B. Pastore & M. Mota. (A. *M. Mota et al.* 228, CTBS. B–H'. *M. Mota & J. F. B. Pastore* 176, CTBS). —A. Habit. —B. Bract. —C. Adaxial sepal. —D. Abaxial sepals. —E. Inner sepal. —E'. Margin detail of inner sepal. —F. Lateral petals with androecium. —

F'. Free filaments. —F''. Apex detail of lateral petals. —G. Keel. —H. Gynoecium. —H'. Stigma detail.

Distribution. *Asemeia campestris* is endemic to the northeastern region of Goiás, Brazil. Figure 26.

Additional Notes. *Asemeia campestris* is a recently described species (Mota & Pastore 2021) which is easily recognized by its conspicuous and relatively large flowers varying between 6–8 mm long. Also, *A. campestris* can be recognized by its small leaves and deciduous bracts, which are unusual in *Asemeia* subg. *Asemeia* sect. *Hebeclada*.

Additional Specimens Examined. BRAZIL. **Goiás:** Colinas do Sul, Rodovia Colinas do Sul a Niquelândia, km 20, 18 Feb. 2000, *G. Hatschbach et al.* 70377 (CTBS, MBM); Colinas do Sul, Rodovia Colinas do Sul a Niquelândia, 14°13'38"S, 47°53'35.2"W, 477 m alt., 18 Feb. 2021, *M. Mota et al.* 228 (CTBS, MBM); Niquelândia, estrada de terra entre Niquelândia e Colinas do Sul, 14°19'41"S, 48°07'59"W, 5 Jan. 2006, *J. F. B. Pastore & E. Suganuma 1400* (CEN, CTBS); Niquelândia, GO-237, entroncamento Muquém-Colinas do Sul, 5 km, 14°26'18"S, 48°09'54"W, 5 Apr. 2006, *T. B. Cavalcanti & G. Pereira-Silva 3735* (CEN, CTBS); Niquelândia, Rodovia GO-237 de Niquelândia a Colinas do Sul, ca. de 70 km de Niquelândia, 16 Mar. 2012, *J. B. A. Bringel Jr. & H. J. C. Moreira 946* (CEN, CTBS, UB).

21. *Asemeia coracoralinae* M. Mota & J. F. B. Pastore, *Kew Bull.* 78: 161. 2023. TYPE:

Brazil. Goiás: Goiás (municipality), Serra Dourada, 16°04'57"S, 50°11'14"W, 983 m alt., 20 Feb. 2021, *M. Mota et al.* 237 (holotype, CTBS-6000!). Figures 30, 31A–B.

Herb, 0.40–1 m tall, branches tomentose. Leaves membranaceous; petiole 2.5 mm long., pubescent; blade 32–42 × 3 mm, linear to elliptic, apex acute, base obtuse, margin entire, ciliated, adaxial surface tomentose, abaxial surface tomentose. Racemes, peduncle 2.7 cm long., rachis 7.5–12 cm long., lax, tomentose, bracts 1.6 × 1 mm ovate, apex acuminate, pubescent in both surfaces, margin without glands, ciliated, persistent; pedicel 4.4 mm long. glabrous, straight. Flower, except the pedicel 5.9 mm long., membranaceous; outer sepals ovate, apex, adaxial sepal 2.8 × 3.8 mm, apex, glabrous on both surfaces, margin with glands, except in the base, not ciliated, abaxial sepals 2.5 × 2 mm, apex, glabrous on both surfaces, margin with glands, not ciliated; inner sepals 5.6 × 5 mm, glabrous on both surfaces, margin ciliated in the lateral sides; Keel, cuculus 3.8 × 4.2 mm, trilobate, glabrous, except for the

basal margin of the cuculus pubescent; claw 2 mm long., ciliated; lateral petals 4.5 mm, outer surface pubescent near the base, inner surface pubescent at the lower half; staminal sheath 3.4 mm long., outer surface sparsely pubescent at the base, inner surface pubescent at the basal half, free filaments 3.4 mm long., glabrous; rudimentary petals present, glabrous both, ciliated; style 6.4 mm long., bent in the middle at ca. 90°, pubescent around the stigma, stigma hooked-like; ovary 0.8 × 0.9 mm, globose, glabrous, with a disc in the ovary base. Capsule 5.4 × 3.2 mm, glabrous. Seeds 3.5 × 1.9 mm, oblong, caruncle 0.9 mm long., sparsely glabrous, corneous, appendaged, with dorsal and two lateral appendages.

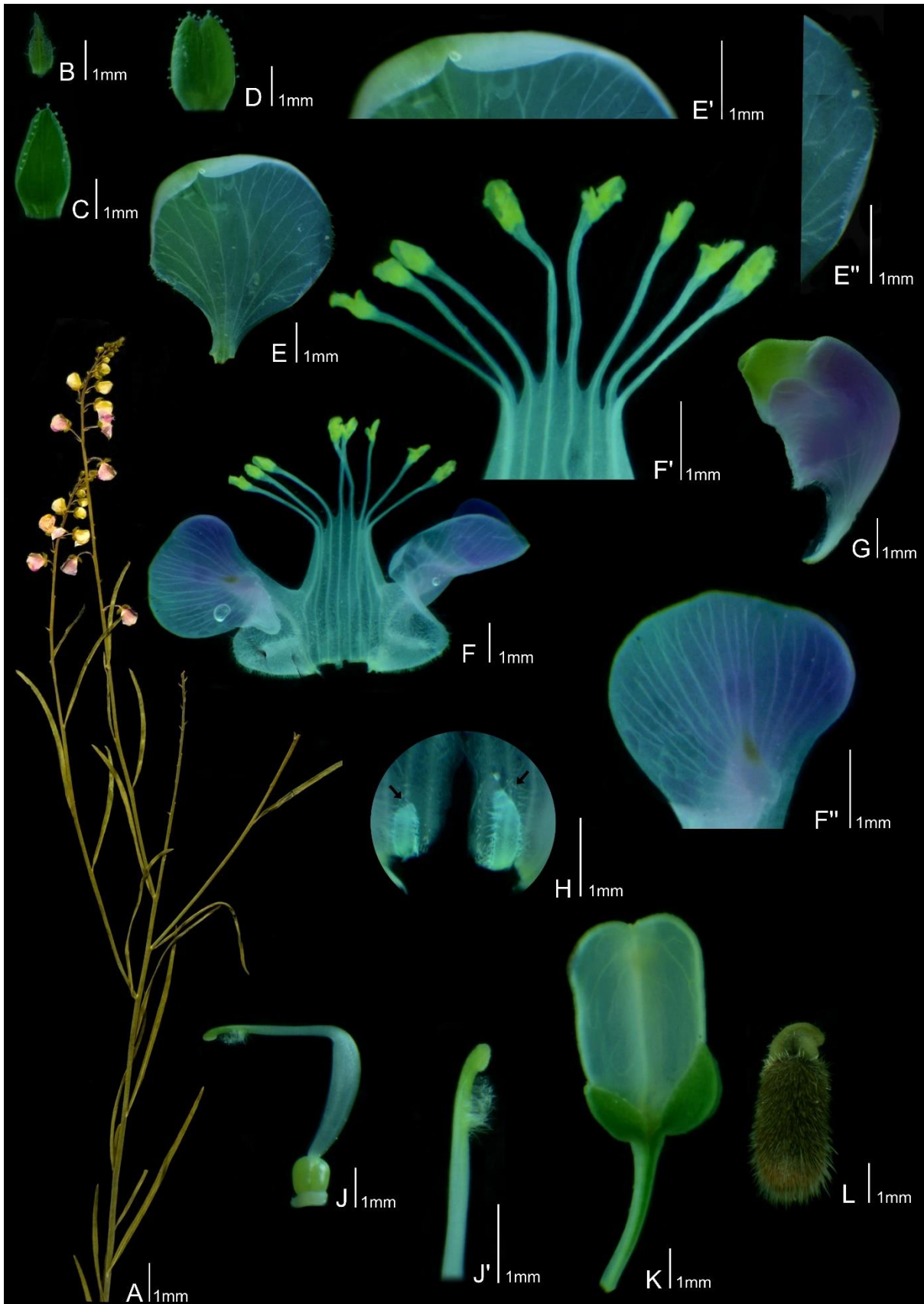


Figure 30. *Asemeia coracoralinae* M. Mota & J. F. B. Pastore. (*M. Mota et al.* 237, CTBS). —A. Habit. —B. Bract. —C. Adaxial sepal. —D. Abaxial sepals. —E. Inner sepal. —E', E''. Margin detail of inner sepal. —F. Lateral petals with androecium. —F'. Free filaments. —F''. Apex detail of lateral

petals. —G. Keel. —H. Rudimentary petals (black arrow). —J. Gynoecium. —J'. Stigma detail. —K. Capsule. —L. Seed.

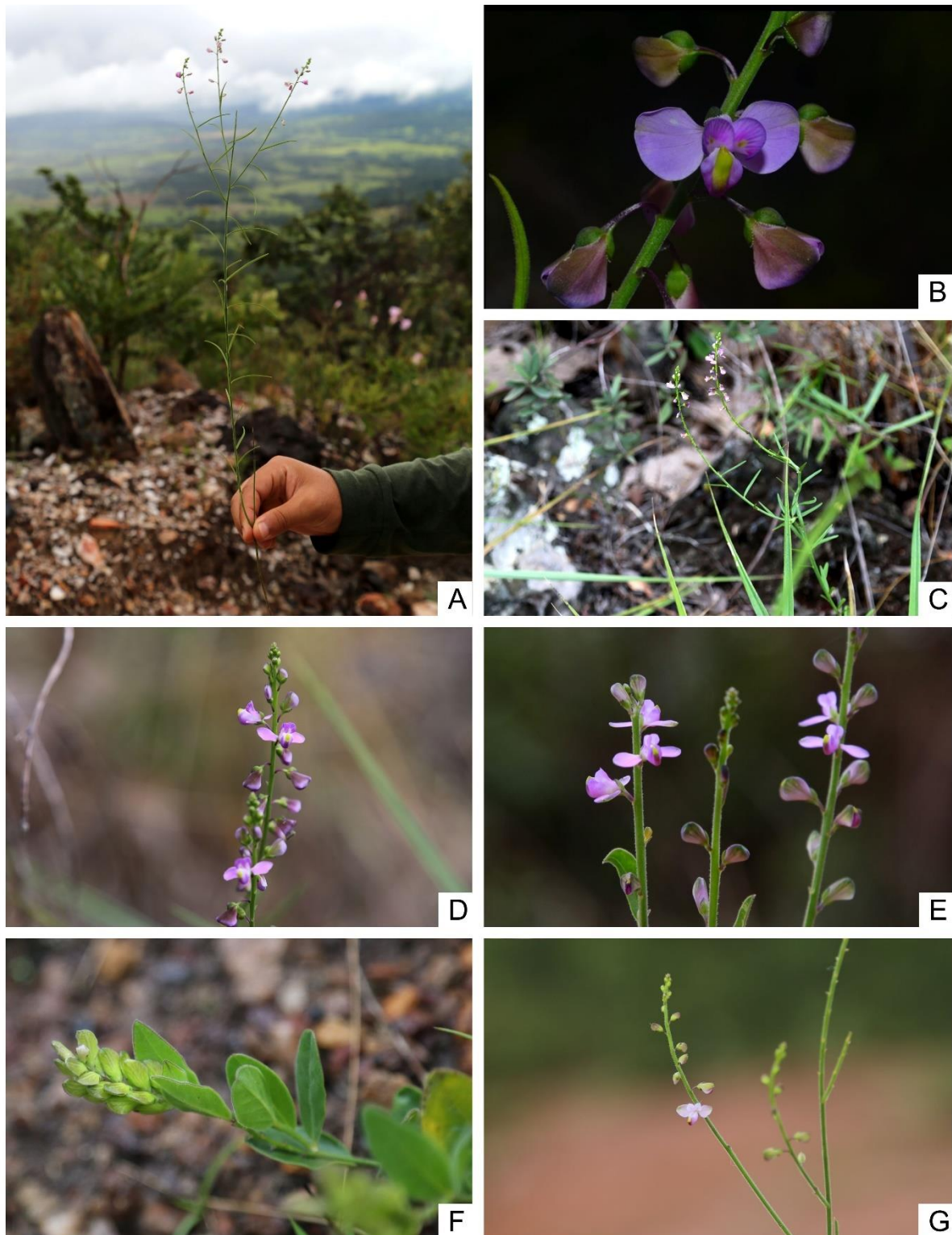


Figure 31. —A, B. *Asemeia coracoralinae* M. Mota & J. F. B. Pastore. —C, D. *Asemeia eglandulosa* J. F. B. Pastore & M. Mota. —E. *Asemeia hebeclada* (DC.) J. F. B. Pastore & J. R. Abbott. —F. *Asemeia impensa* (Wurdack) M. Mota & J. F. B. Pastore. —G. *Asemeia lindmaniana*

(Chodat) J. F. B. Pastore & J. R. Abbott. Photos: A, B by A. S. Soares; C, D, F, G by M. Mota; E by H. Moreira.

Distribution. *Asemeia coracoralinae* is endemic to Serra Dourada range, Goiás city, Goiás state, in sandstone soil. Figure 32.

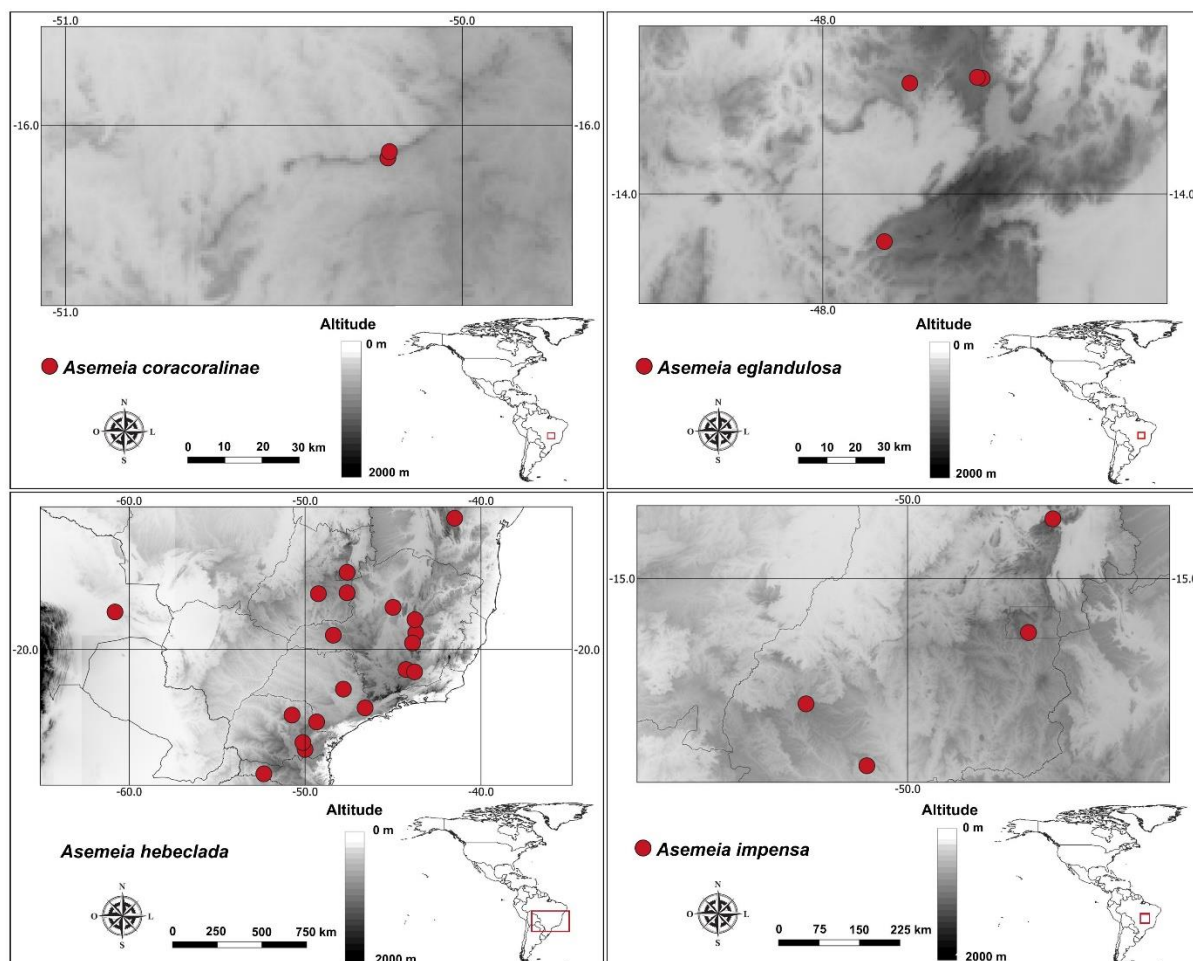


Figure 32. Distribution map of *Asemeia coracoralinae* M. Mota & J. F. B. Pastore, *A. eglandulosa* J. F. B. Pastore & M. Mota, *A. hebeclada* (DC.) J. F. B. Pastore & J. R. Abbott and *A. impensa* (Wurdack) M. Mota & J. F. B. Pastore.

Additional Notes. Herbarium specimens of *Asemeia coracoralinae* are usually found misidentified as *A. rhodoptera*. However, *Asemeia coracoralinae* differs from *A. rhodoptera* in the pedicel length (ca. 4 mm long in *A. coracoralinae* vs 2–3 mm long in *A. rhodoptera*), bract shape (ovate, apex acuminate in *A. coracoralinae* vs ovate or deltoid, apex acute in *A. rhodoptera*), and flower size (ca. 4.9–5.9 mm in *A. coracoralinae* vs 4 mm in *A. rhodoptera*). However, molecular phylogenetic analyses revealed that *A. coracoralinae* is not closely related to *A. rhodoptera* but to *A. hebeclada* and *A. aguiariana* (Mota et al. in prep.).

Additional Specimens Examined BRAZIL. **Goiás:** Goiás Velho, Serra Dourada, ca. 20 km, SE of Goiás Velho - GO 18 Jan. 1966, *H. S. Irwin et al.* 11729 (K, MO, NY, US); Goiás,

above Serra Dourada, ca 6 km NE of Mossâmedes, 16°04'S, 50°11'W, 7 Feb. 1980, *J. H. Kirkbride Jr. 3315* (US); Goiás Velho, Parque Estadual de Serra Dourada 26 July 2004 *J. F. B. Pastore et al. 1060* (CEN, CTBS).

22. *Asemeia eglandulosa* J. F. B. Pastore & M. Mota. *Syst. Bot.* 46: 85. 2021. TYPE: Brazil. Goiás: Cavalcante, Estrada de terra para RPPN Serra do Tombador, 47°29'02"W, 13°37'31"S, 23 Feb. 2019, *M. Mota & J. F. B. Pastore 175* (holotype, CTBS-4204!). Figures 31C–D, 33.

Herb, 30–80 cm tall, branches pubescent. *Leaves* membranaceous; petiole 1–1.5 mm long., pubescent; blade 13–27 × 1.5–2 mm, linear, apex acute, base acute, margin entire, adaxial surface pubescent, abaxial surface sparsely pubescent. *Racemes* cm long., rachis 7–15 cm long., pubescent, bracts 1 × 0.5 mm, deltoid, apex acuminate, outer surface pubescent, inner surface sparsely pubescent, margin ciliated, persistent; pedicel 2.5 mm mm long. glabrous, curved. *Flower*, except the pedicel 4–5 mm long., membranaceous; outer sepals, adaxial sepal 1.1 × 6 mm, apex rounded, glabrous on both surfaces, margin without glands, sparsely ciliated, abaxial sepals 2 × 2 mm, apex rounded, glabrous on both surfaces, margin without glands, sparsely ciliated; inner sepals 6 × 4.5 mm, glabrous on both surfaces, margin ciliated; Keel, cuculus 3 × 3.8 mm, trilobate, glabrous, except for the basal margin of the cuculus pubescent; claw 1.7 mm long., sparsely ciliated; lateral petals 5 × 2.5 mm, outer surface glabrous, inner surface pubescent at the third lower portion, ciliated at the base and lateral margin; staminal sheath 3 mm long., outer surface glabrous, inner surface sparsely pubescent at the base, ciliated at the base, free filaments 2 mm long., glabrous; rudimentary petals present; style 6 mm long., bent in the middle at ca. 90°, stigma hooked-like, pubescent around the stigma; ovary 1.5 × 1.2 mm, oblong, glabrous, with conspicuous disc at the base of the ovary. *Capsule* not seen.

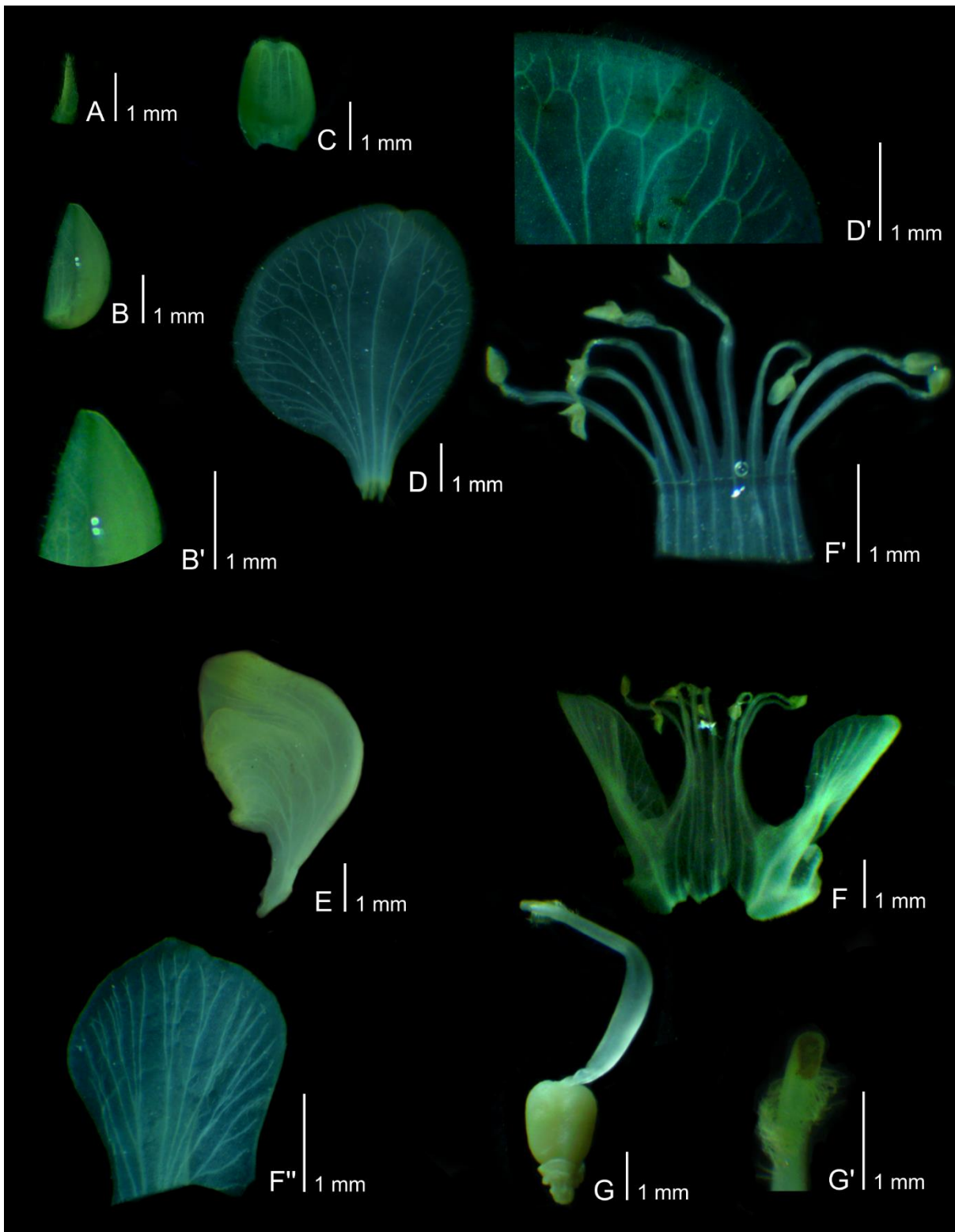


Figure 33. *Asemeia eglandulosa* J. F. B. Pastore & M. Mota. (*M. Mota & J. F. B. Pastore* 175, CTBS). —A. Bract. —B. Adaxial sepal. —B'. Margin detail of inner sepal. —C. Abaxial sepals. —D. Inner sepal. —D'. Margin detail of inner sepal. —E. Keel. —F. Lateral petals with androecium. —F'. Free filaments. —F''. Apex detail of lateral petals. —G. Gynoecium. —G'. Stigma detail.

Distribution. *Asemeia eglandulosa* is endemic to Chapada dos Veadeiros National Park, Goiás state, Brazil. Figure 32.

Additional Notes. *Asemeia eglandulosa* can be distinguished from the other species of the subgenus *Asemeia* section *Hebeclada* by the absence of glands on the margin of the external sepals, which is a common trait observed in the section.

Additional Specimens Examined. BRAZIL. **Goiás:** Cavalcante, Fazenda Renascer, Ponte de Pedra, 7 Mar. 2003, *J. F. B. Pastore 489* (UEC); Cavalcante, 6 May 2002, *J. F. B. Pastore 19* (CEN, UEC); Cavalcante, 6 May 2002, *J. F. B. Pastore 21* (CEN, UEC); entrada para a comunidade Kalunga do engenho, Vão do Moleque, -13.62572° S, -47.48519° W, 26 Feb. 2017, *J. F. B. Pastore & M. Mota 5314* (CTBS); Parque Nacional da Chapada dos Veadeiros, ca. 1 km da sede do Parque Nacional da Chapada dos Veadeiros, 7 Nov. 1987, *J. R. Pirani et al. 1739* (K, SPF, UEC, US).

23. *Asemeia hebeclada* (DC.) J. F. B. Pastore & J. R. Abbott, *Kew Bull.* 67: 807. 2012.

Polygala hebeclada DC., *Prodr.* 1: 331. 1824. TYPE: Brazil. “In Brasilia”, *Ferreira* (?) *s.n.* (holotype, P [bc] 00065195!).

Polygala hyssopifolia A. St.-Hil. & Moq., *Consp. Polyg. Bras. Mer.* 12; *Fl. Bras. Mer.* ii. 43. 1828 (Saint-Hilaire & Moquin-Tandon 1828: 55 – 56). TYPE: Brazil. Minas Gerais, São João Del Rey, 23 Feb. 1822, *Saint-Hilaire D 337* (lectotype, designated by Pastore & Abbott (2012: 807), P [bc] 00112262!). Figures 31E, 34.

Herb, 17–60 cm tall, branches pubescent. Leaves carthaceous; petiole 2 mm long., pubescent; blade 14–30 × 1.5–3 mm, narrow–elliptic to oblanceolate, apex acute to acuminate, base acute, margin entire, puberulous to pubescent on both surfaces. *Racemes*, peduncle 1.5–3 cm long., rachis 7.5–19 cm long., sublax, pubescent, bracts 1.3–2.1 × 0.5–0.6 mm ovate, apex acute, outer surface pubescent, inner surface sparsely pubescent, margin ciliated, persistent; pedicel 2 mm long., straight. Flower, except the pedicel 7 mm long., membranaceous; outer sepals, apex, adaxial sepal 2.5 × 1.2 mm, apex, glabrous on both surfaces to outer surface pubescent-adpressed, inner surface glabrous, margin with glands, ciliated, abaxial sepals 2–2.2 × 2 mm, apex, margin with glands, ciliated at the apex; inner sepals 6.1–7.2 × 4.2–5.5 mm, margin ciliated on the sides; Keel, cuculus 3.5–4.9 × 2.9–4 mm, trilobate, glabrous, except for the basal and lateral margin of the cuculus ciliated; claw 1.9–2 mm long., ciliated; lateral petals 4.2–5.3 × 2.1–2.7 mm, pubescent in the third lower in

both surfaces; staminal sheath 3.1 pubescent and ciliated at the lower half on both surfaces, free filaments 2.5 mm long., glabrous; rudimentary petals present; style 6 mm long., bent in the middle at ca. 90°, pubescent around the stigma, stigma hooked-like; ovary 1.5 × 1.5 mm, globose, glabrous, with conspicuous disc in the ovary base. Capsule 5.1 × 2.9 mm, oblong, glabrous. Seeds 2.4 × 1.5 mm, oblong, caruncle 1 × 1 mm long., pubescent, corneous, appendaged, with glands.

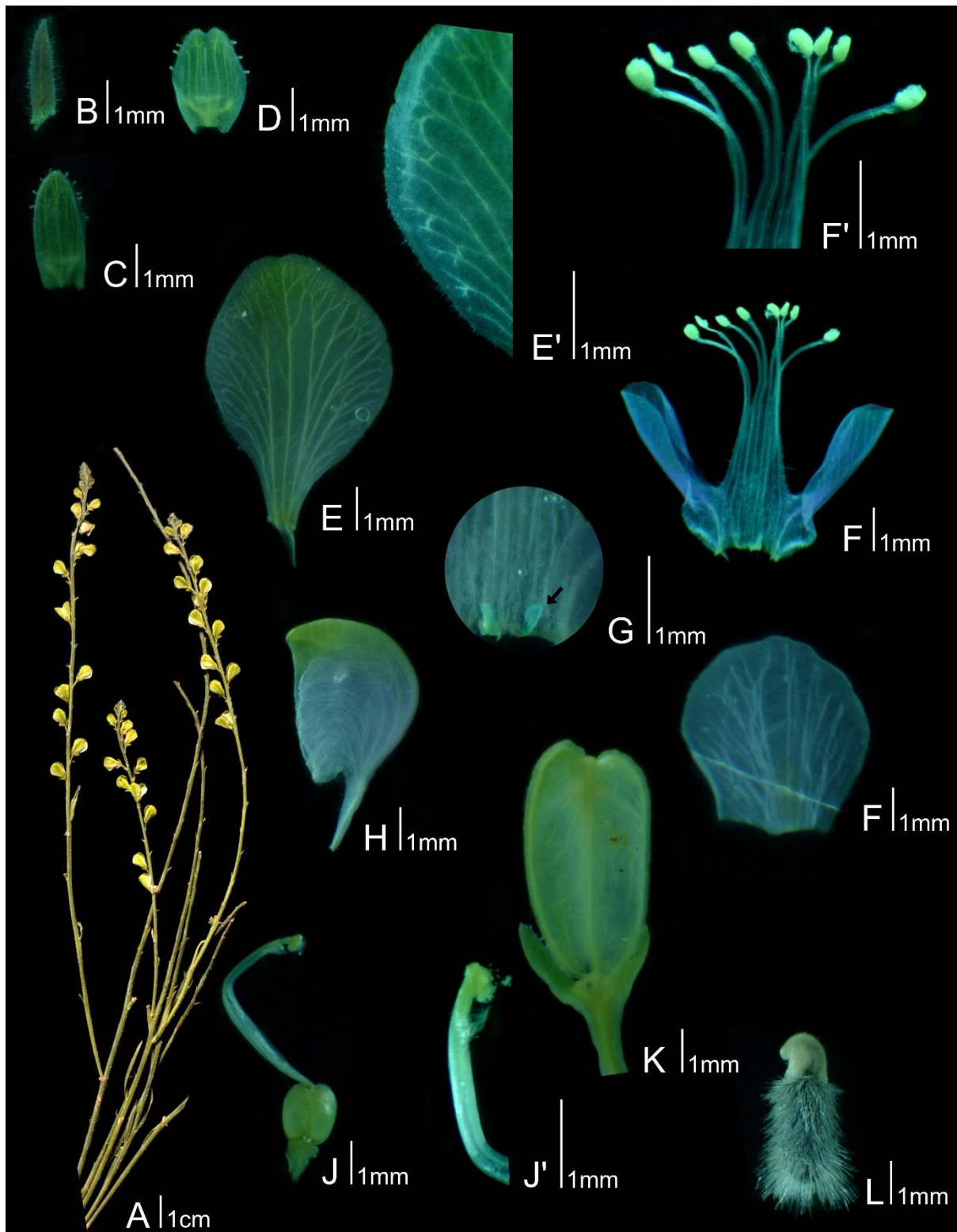


Figure 34. *Asemeia hebeclada* (DC.) J. F. B. Pastore & J. R. Abbott. (*M. Mota et al.* 202, CTBS). —A. Habit. —B. Bract. —C. Adaxial sepal. —D. Abaxial sepals. —E. Inner sepal. —E'. Margin detail of inner sepal. —F. Lateral petals with androecium. —F'. Free filaments. —F''. Apex detail of lateral petals. —G. Rudimentary petals (Black arrow). —H. Keel. —J. Gynoecium. —J'. Stigma detail. —K. Capsule. —L. Seed.

Distribution. *Asemeia hebeclada* exhibits a wide distribution across several states in Brazil, including Bahia, Distrito Federal, Goiás, Minas Gerais, Mato Grosso, Paraná, and São Paulo. Additionally, this species has also been recorded in Santa Cruz, Bolivia. Figure 32.

Nomenclatural Notes. The holotype of *Asemeia hebeclada* has a pale blue original label which indicates origin from ‘Herbarium Lusitanicus’ collection in Paris. This set of specimens were brought during the Napoleonic War from Lisbon to Paris in 1808 (Pastore et al. 2021), including Brazilian specimens from the Friar Conceição-Vellozo, Vellozo de Miranda and A. R. Ferreira. Considering the original distribution of *A. hebeclada*, the specimen could be from Mato Grosso state being collected by A. R. Ferreira, or more likely, from the south of Minas Gerais state being collected by Vellozo de Miranda.

Additional Notes. The species forms part of a complex group alongside *Asemeia lindmaniana* and *Asemeia rhodoptera*. However, while the typical forms of these species differ, they also exhibit intermediate morphotypes that blur the morphological boundaries between them. This has led to different interpretations among authors regarding the taxonomic relationship between *Asemeia hebeclada* and *A. rhodoptera*. While some authors considered *Asemeia hebeclada* as synonymous with *Asemeia rhodoptera* (Chodat 1893; Marques 1979; Bernardi 2000), others recognized their distinction (Wurdack 1974; Aguiar et al. 2008; Pastore & Cavalcanti 2009).

Additional Specimens Examined. **BOLIVIA. Santa Cruz:** Chiquitos, On hill with El Arco and La Cueva to the East of Santiago de Chiquitos, s.d., *J. Wood* 20705 (CTBS, K). **BRAZIL. Bahia:** Palmeiras, Parque nacional Chapada Diamantina, Morro dos Ventos, 12°31’26”S, 41°29’48”W, 940 m alt., 12 Jan. 2012, *G. Almeida-Silva & F. G. Moreira* 101 (HUEFS). **Distrito Federal:** Brasília Immediately south of Brasília, 975 m alt., 8 Dec. 1965, *H. S. Irwin* 11118 (NY, UB, US). **Goiás:** Aparecida de Goiânia, Chácara Jatobá, divisa com Hidrolândia, 5 Jan. 2007, *J. F. B. Pastore* 1715 (CEN, FUEL, HUEFS); Cristalina, Beira da estrada, 29 Nov. 2007, *J. F. B. Pastore* 2282 (HUEFS). **Minas Gerais:** Barbacena, Estrada Pte. do Coeme, 21°16’12”S, 43°46’35”W, 1067 m alt., 8 Feb. 2021, *M. Mota & J. F. B. Pastore* 202 (CTBS); Diamantina, Serra do Pasmarr, 18°17’53”S, 43°45’16,4”W, 1251 m alt., 24 Feb. 2010, *I. M. Franco et al.* 51 (CTBS); Gouveia, Torre repetidora de TV, 15 Nov. 2010, *J. Cordeiro et al.* 3951 (CTBS, MBM); Lagoa Santa, Rodovia entre Lagoa Santa e Serra do Cipó–Alto do Palácio, 17 Feb. 2014, *J. F. B. Pastore* 5039 (CTBS, HUEFS); Santana do Riacho, RPPN Brumas do Espinhaço e Ermo do Gerais, 19°02’58”S, 43°42’34”W, 26 Nov. 2012, *J. Ordones et al.* 2070 (CTBS, BHZB); São João Del Rey, 23

Feb. 1822, *A. Saint-Hilaire D 337* (P); Uberlândia, Estação Ecológica do Panga, 23 Feb. 1995, *A. A. Barbosa 921* (CTBS); Uberlândia, estrada de Uberlândia-MG para Campo Florido-MG, 21 Aug. 1998, *G. M. Araújo 1664* (CTBS, HUFU); Várzea da Palma, estrada Várzea da Palma a Serra do Cabral, 13 Mar. 1999, *G. Hatschbach et al. 69005* (CTBS, MBM). **Mato Grosso:** Xavantina-Cachimbo road, E. of km 247.5, 8 Dec. 1967, *D. Philcox et al. 3442* (K). **Paraná:** Lapa, BR 427, 25°42'54"S, 49°46'34W, 22 June 2006., *R. Lüdtke 528* (ICN, LUSC); Ponta Grossa, ca. 20 km de Ponta Grossa. entre S.M. do Sul e Ponta Grossa, 15 Nov. 2016, *J. F. B. Pastore & M. Mota 5223* (CTBS); São Jerônimo da Serra, 28 Oct. 1999, *A. M. Mendonça et al. 29* (CTBS, FUEL); São José do Triunfo, entre São José do Triunfo e Palmeiras, campo ao lado da estrada, 15 Nov. 2016, *J. F. B. Pastore & M. Mota 5230* (CTBS). **São Paulo:** Botucatu, 18 km north of Botucatu (14 km east of San Manuel). Along the Sao Manuel-Piracicaba highway. Near ex-RR station, '13 de Maio', 22°45'S, 48°25'W, 550 m alt., 31 Dec. 1970, *I. S. Gottsberger 2206* (U); Itirapina, 16 Mar. 1999, *J. L. S. Tannus et al. 415* (CTBS, HRCB, UEC); Itararé, córrego da Água do Porco, 24 Sep. 1989, *C. A. M. Scaramuzza & V. C. Souza 561* (ESA); Mariporã, Juquerí, 15 Dec. 1897, *n.d.* (SP 13691).

24. *Asemeia impensa* (Wurdack) M. Mota & J. F. B. Pastore, stat. & comb. nov. *Polygala hebeclada* DC. var. *impensa* Wurdack, *Phytologia* 28: 11. 1974. *Asemeia hebeclada* (DC.) J. F. B. Pastore & J. R. Abbott var. *impensa* (Wurdack) J. F. B. Pastore & J. R. Abbott, *Kew Bull.* 67: 807. 2012. TYPE: Brazil. Goiás, Serra do Rio Preto, c. 8 km E of Cabeceiras, "collected in cerrado ca. 8 km east of Cabeceiras, Serra do Rio Preto, Goiás, Brazil", 18 Nov. 1965, *H. S. Irwin et al. 10449* (holotype, US [bc] 00108953!; isotypes: IAN [bc] 126489, MO-2530422!, NY [bc] 435722!, SP [bc] 004263, S [bc] S-08-18603, UB [bc] UB11670!, TEX [bc] 00371576, US [bc] 00108953, V [bc] 0067462F). Figures 31F, 35.

Herb, 16–20 cm tall, branches pubescent. *Leaves* chartaceous; petiole; subsessile; blade 17.5–28.3 × 13.6–16.9 mm, ovate to elliptic, apex obtuse to rounded, base rounded, margin entire, adaxial surface sparsely pubescent on both surfaces. Racemes peduncle, 3–4 cm long., rachis 2.5–3 cm long., pubescent, bracts 1.5 × 0.8 mm ovate, apex obtuse, outer surface pubescent, inner surface glabrous, margin ciliated, persistent; pedicel 2.5 mm long., straight. Flower, except the pedicel 7–8 mm long., membranaceous; outer sepals, adaxial sepal 3.6 ×

1.3 mm, apex obtuse, glabrous on both surfaces, without glands, not ciliated, abaxial sepals 2.6×2.1 mm, apex obtuse, glabrous on both surfaces, margin with sparse glands, ciliated; inner sepals 7.6×4.7 mm, glabrous on both surfaces, margin not ciliated; Keel, cuculus 5.4×3.8 mm, trilobate, glabrous, except for the basal margin of the cuculus pubescent; claw 1.4 mm long., ciliated; lateral petals 5×1.8 mm, glabrous on both surfaces, lower third margin ciliated; staminal sheath 4.1 mm long., glabrous on both surfaces, ciliated on the lateral sides, free filaments 3.5 mm long., glabrous; rudimentary petals present; style 7 mm long., arched, stigma hooked-like, pubescent around the stigma; ovary 1.3×1.2 mm, glabrous, without conspicuous disc at the base of the ovary. Capsule 5.4×3.8 mm, elliptic, glabrous. Seeds 3×1.6 mm, oblong, caruncle 1.1×1.3 mm long., sparsely pubescent, corneous, appendaged, with dorsal and two lateral appendages.

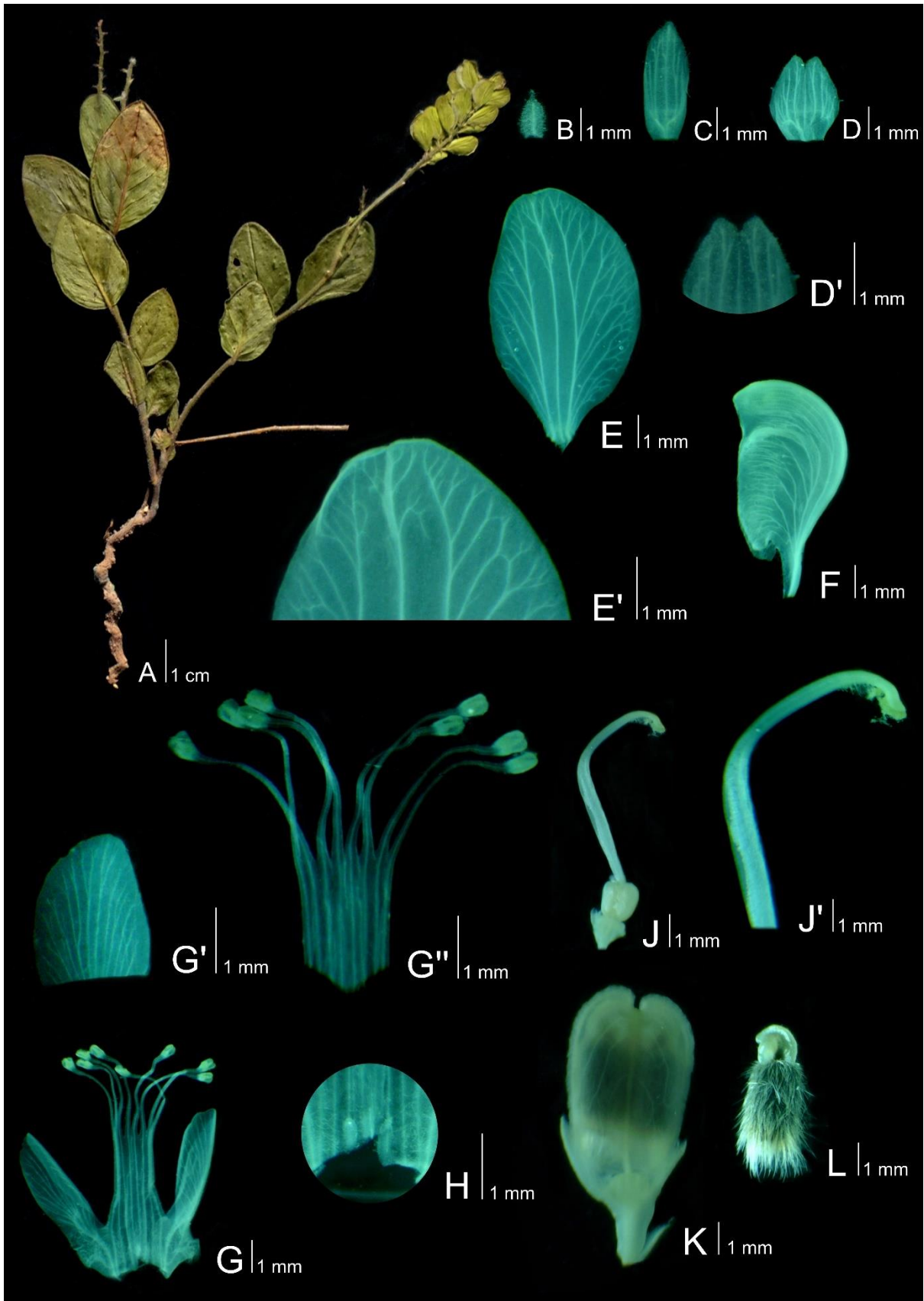


Figure 35. *Asemeia impensa* (Wurdack) M. Mota & J. F. B. Pastore. (*Mota et al.* 222, CTBS). — A. Habit. — B. Bract. — C. Adaxial sepal. — D. Abaxial sepals. — D'. Margin detail of abaxial sepals. — E. Inner sepal. — E'. Margin detail of inner sepal. — F. Keel. — G. Lateral petals with androecium. — G'. Detail of lateral petal. — G''. Detail of androecium. — H. Magnified detail of the keel. — J. Detail of the keel base. — J'. Magnified detail of the keel base. — K. Magnified detail of the keel base. — L. Magnified detail of the keel base.

—G'. Apex detail of lateral petals. —G''. Free filaments. —H. Rudimentary petals (black arrow). —J. Gynoecium. —J'. Stigma detail. —K. Capsule. —L. Seed.

Distribution. *Asemeia impensa* is endemic to Goiás State and Distrito Federal, in Cerrado areas. Figure 32.

Additional Notes. *Asemeia impensa* is similar to *A. hebeclada*, presenting similar keel. However, *Asemeia impensa* can be easily distinguished by the leaf shape (oval vs narrow-elliptic to oblanceolate in *A. hebeclada*), phyllotaxis (adpressed-imbricate vs inflexed in *A. hebeclada*) and rachis length (2.5–3 cm long. vs 7.5–19 cm long. in *A. hebeclada*). Furthermore, the inflorescences of *A. impensa* are densely clustered (congested) while those of *A. hebeclada* are more loosely arranged (sublax). It is worth mentioning that the placement of *A. impensa* as a variety of *A. hebeclada* was likely due to similarities observed in the androecium and the shape of the keel. However, based on the pronounced differences in various morphological traits, here we considered them separate species.

Additional Specimens Examined. BRAZIL. **Distrito Federal:** Brasília, Reserva Ecológica do IBGE, córrego Taquara, cerrado próximo à um brejo, beira de estrada, 16 Jan. 1984, R. C. Mendonça 296 (IBGE, US). **Goiás:** Alto Paraíso de Goiás, antenna, 13°57'16"S, 47°27'42.1"W, 1521 m alt., 14 Feb. 2021, M. Mota et al. 222 (CTBS); Serra do Caiapó, ca. 50 km S. of Caiapônia on road to Jataí, 17°12'S, 51°47'W, 26 Oct. 1964, H. S. Irwin et al. 7367 (NY, SP, UB, U, US)

25. *Asemeia lindmaniana* (Chodat) J. F. B. Pastore & J. R. Abbott, Kew Bull. 67: 807.

2012. *Polygala lindmaniana* Chodat, Bull. Herb. Boissier 4: 238. 1896. TYPE: Brazil. Mato Grosso, Chapada dos Guimarães, "In Matto Grosso: Santa Anna da Chapada, Loco suaperto arenoso sat sicco. G. A. Malme nº 1414 C.", 10 March 1894, G. O. A. Malme 1414c (first-step lectotype, designated by Pastore [2012: 807], S; second-step lectotype, designated here, S [bc] S-08-8327; isoelectotype, S [bc] S-08-8328).

Polygala pauciramosa J. F. B. Pastore & T. B. Cavalc., Brittonia 61(1): 62. 2009. TYPE: Brazil. Distrito Federal, Ceilândia, adjacência da barragem do rio Descoberto, 3 Feb. 2004, J. F. B. Pastore et al. 868 (holotype, CEN [bc] 00053953!; isotypes K!, NY [bc] 01163479!, P [bc] 00734019!, RB [bc] 00425943!, UB [bc] 88540!). Figures 31G, 36.

Herb, 0.5–1.2 m tall, branches pubescent. Leaves chartaceous; sessile, pubescent; blade 4–10 × 0.5–1 mm, linear, apex acute, base acute, margin entire, pubescent in both surfaces.

Racemes peduncle 1–1.8 cm long., rachis 4.5–15.5 cm long., lax, pubescent, bracts 1.2–1.5 × 0.5–0.6 mm, ovate, apex acute, puberulous in both surfaces, margin ciliated, persistent; pedicel 2–2.5 mm long. sparsely puberulous, curved. Flower, except the pedicel 4–5 mm long., membranaceous; outer sepals, apex, adaxial sepal 2–2.5 × 1 mm, apex rounded, glabrous on both surfaces margin with glands, ciliated at the apex, abaxial sepals 1.2–1.8 × 1.2–1.5 mm, apex rounded, glabrous on both surfaces, margin with glands, ciliated at the apex; inner sepals 4.5–5 × 2.2–3.7 mm, glabrous on both surfaces, margin with glands, not ciliated; Keel, cuculus 3 × 2.2 mm, trilobate, glabrous, except for the basal margin of the cuculus ciliated; claw 1.7 mm long., ciliated; lateral petals 3.3 × 2 mm, outer surface glabrous, inner surface pubescent and ciliated near the base; staminal sheath 3 mm long., pubescent at the basal portion in both surfaces, free filaments 2 mm long., glabrous; rudimentary petals absent × mm.; style 5.2 mm long., bent in the middle at ca. 90°, stigma hooked-like.; ovary 1 × 1 mm, oblong, glabrous, with conspicuous disc in the ovary base. Capsule 4.5 × 2.7 mm, glabrous. Seeds 3.1 × 1.1 mm, oblong, caruncle 1 × 1 mm long., sparsely puberulous, corneous, appendaged, with dorsal and two lateral appendages.

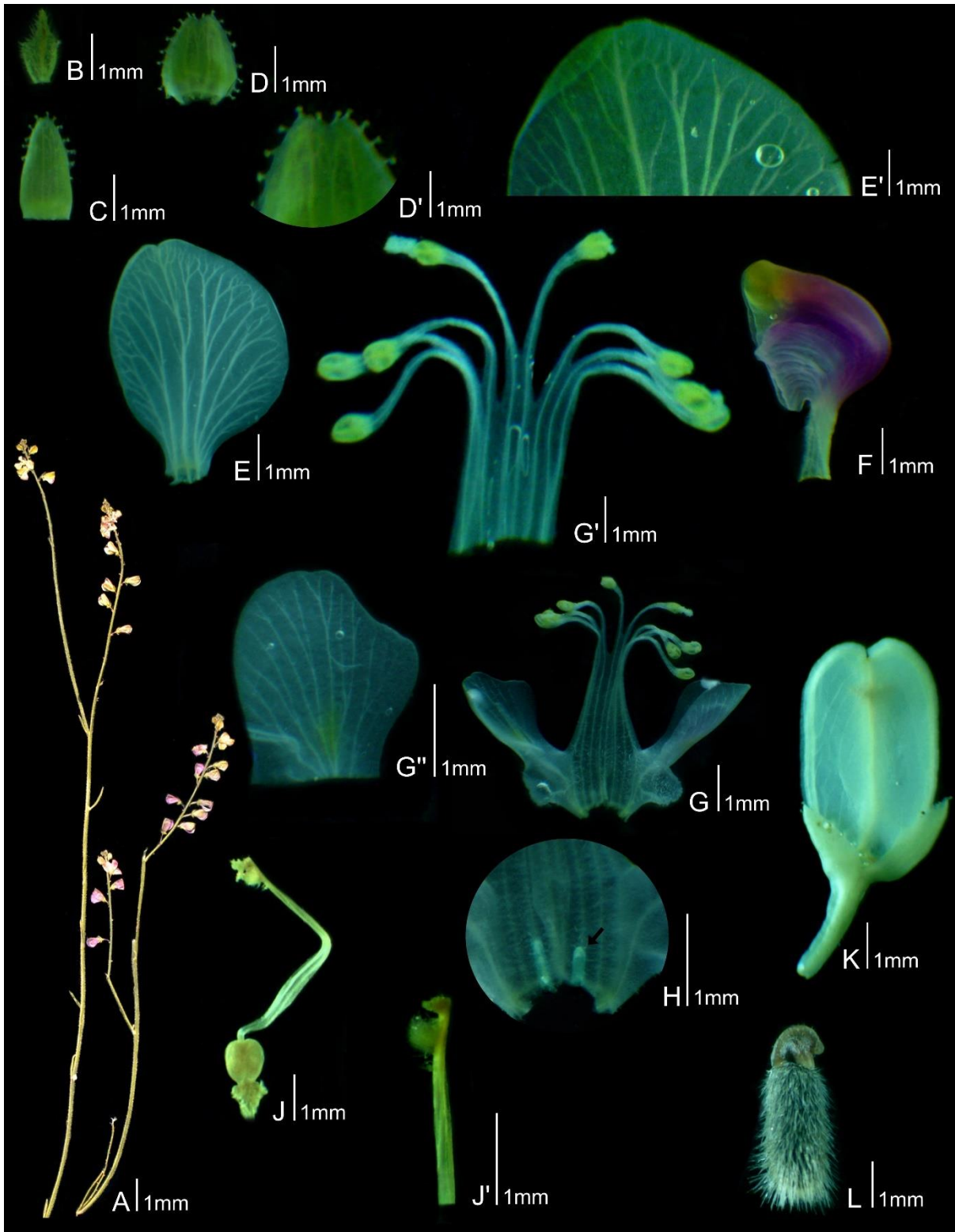


Figure 36. *Asemeia lindmaniana* (Chodat) J. F. B. Pastore & J. R. Abbott (A. M. Mota et al. 218, CTBS. B–F. *P. O. Rosa et al. 1783*, CTBS. G–J'. *G. Hatschbach et al. 70219*, CTBS. K–L. *M. Mota & J. F. B. Pastore 245*, CTBS. —A. Habit. —B. Bract. —C. Adaxial sepal. —D. Abaxial sepals. —D'. Detail of the margin of abaxial sepals. —E. Inner sepal. —E'. Margin detail of inner sepal. —F. Keel. —G. Lateral petals with androecium. —G'. Free filaments. —G''. Apex detail of lateral petals. —H. Rudimentary petals (black arrow). —J. Gynoecium. —J'. Stigma detail. —K. Capsule. —L. Seed.

Distribution. *Asemeia lindmaniana* is distributed in savannah areas of Distrito Federal, Goiás, Minas Gerais and Mato Grosso states, in Brazil. Figure 37.

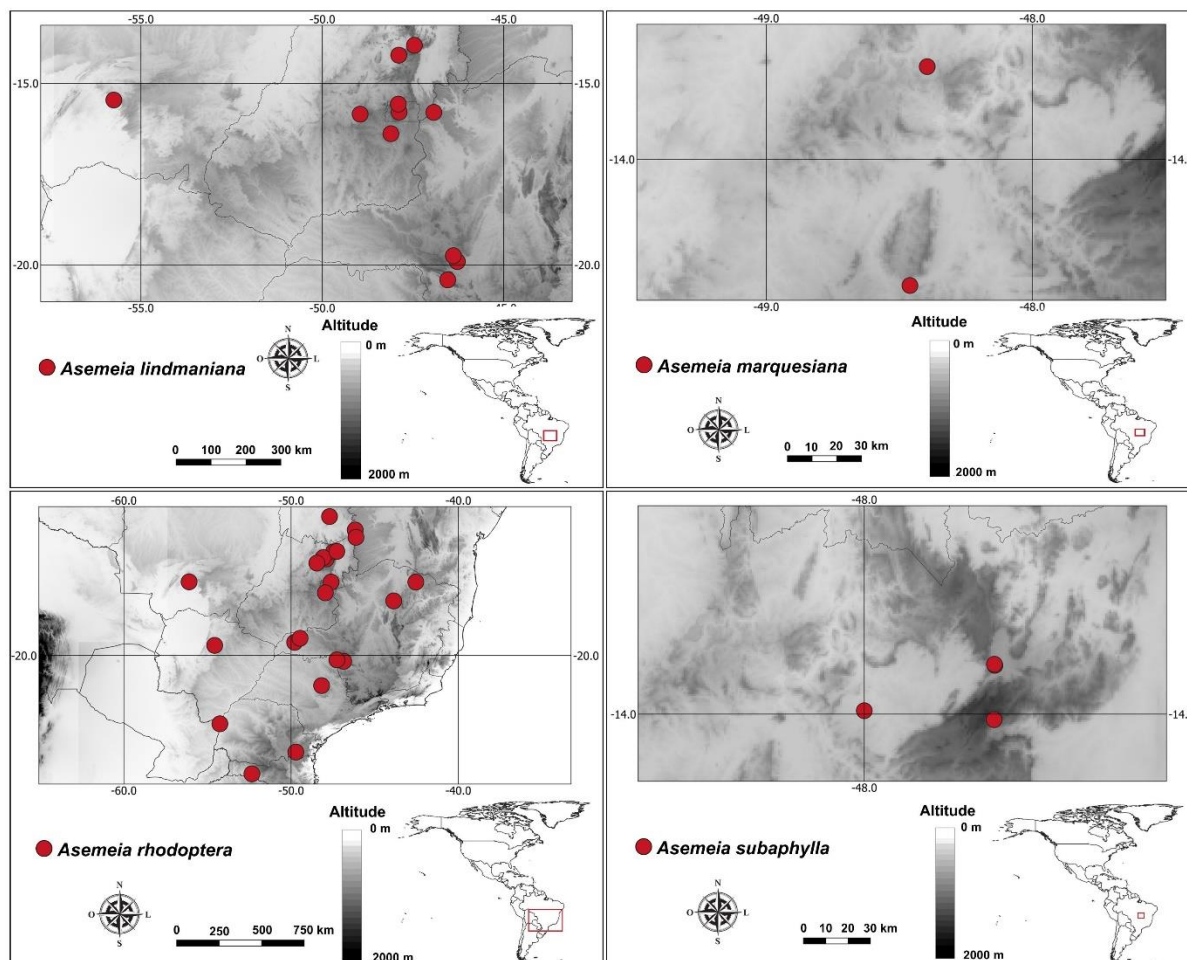


Figure 37. Distribution map of *Asemeia lindmaniana* (Chodat) J. F. B. Pastore & J. R. Abbott, *A. marquesiana* (J. F. B. Pastore & T. B. Cavalc.) J. F. B. Pastore & J. R. Abbott, *A. rhodoptera* (A. W. Benn.) J. F. B. Pastore & J. R. Abbott and *A. subaphylla* J.F.B.Pastore & M.Mota.

Nomenclatural Notes. Although Bernardi (2000) included *A. lindmaniana* as a synonym of *A. hebeclada*, these two species can be easily recognized by the petiole length (sessile in *A. lindmaniana* vs petiolate 2 mm in *A. hebeclada*), and leaves size (4–10 × 0.5–1 mm, linear in *A. lindmaniana* vs 14–30 × 1.5–3 mm, narrow–elliptic to oblanceolate in *A. hebeclada*).

Additional Specimens Examined. BRAZIL. **Distrito Federal:** Brasília, Estação Ecologica do Jardim Botânico de Brasília; Estrada depois da entrada da CAESB, lado esquerdo, 18 May 2016, *P. O. Rosa et al.* 1783 (CTBS, HEPH); DF, Sobradinho, 15°34'25"S, 47°54'20"W, 998 m, 13 Feb. 2021, *M. Mota et al.* 218 (CTBS). **Goiás:** Alto Paraíso de Goiás, ca. 15 km S de Alto Paraíso de Goiás pela GO-118, 14°18'23"S, 47°30'52.0"W, 21 Feb. 2019, 1053 m alt., *M. Mota* 171 (CTBS); Pirenópolis, Serra dos

Pireneus. Fazenda Solar dos Pireneus, 16 Feb. 2000, *G. Hatschbach et al.* 70219 (CTBS, MBM). **Minas Gerais:** Delfinópolis, Canastra Serra da Babilônia, entre Delfinópolis e São Roque de Minas. Topo da Serra Branca, 10 Feb. 2012, *J. F. B. Pastore et al.* 3995 (HUEFS); Delfinópolis, Canastra Serra da Babilônia. MG-438 Entre Ibiraci e Delfinópolis, 09 Feb. 2012, *J. F. B. Pastore et al.* 3939 (HUEFS); Minas Gerais, saída de Luziânia para São Miguel do Passa Quatro, próximo a posto, 16°23'21"S, 48°06'36"W, 857 m alt., 22 Feb. 2021, *M. Mota et al.* 242 (CTBS); MG, Pratinha, estrada, Pratinha-MG para São Roque de Minas-MG, 19°54'39"S, 46°16'45"W, 1237 m alt., 24 Feb. 2021, *M. Mota et al.* 245 (CTBS); Minas Gerais, Pratinha, Barranco na entrada da cidade vindo de Ibiá-MG, 19°44'58"S, 46°23'16"W, 24 Feb. 2021, *M. Mota et al.* 243 (CTBS).

26. *Asemeia marquesiana* (J. F. B. Pastore & T. B. Cavalc.) J. F. B. Pastore & J. R. Abbott, *Kew Bull.* 67: 808. 2012. *Polygala marquesiana* J. F. B. Pastore & T. B. Cavalc., *Novon* 18: 90. 2008. TYPE: Brazil. Goiás, Alto Paraíso, povoado de São Jorge, beira da estrada para Colinas do Sul, após 4 km de São Jorge, 16 Nov. 2007, *J. F. B. Pastore et al.* 2325 (holotype, CEN [bc] 00064745!; isotypes, HUEFS [bc] 000001101!, K [bc] 000264971!, MO [bc] 6128359!, NY [bc] 00990982!, RB [bc] 00542839!). Figures 38, 39A–B.

Herb, 20–40 cm tall, branches sparsely puberulous. *Leaves* sessile; blade 1–4 × 1–3 mm, linear, apex acute, base acute glabrous on both surfaces. Racemes rachis 3–15 cm long., lax, glabrous to sparsely puberulous, bracts 3 × 0.5 mm ovate, apex acute, glabrous on both surfaces, margin glabrous, caducous; pedicel 2–3 mm long. glabrous, curved. Flower, except the pedicel 6–8 mm long., membranaceous; outer sepals, adaxial sepal 3.6–3.9 × 3–3.2 mm, apex obtuse, glabrous on both surfaces, with glands, not ciliated, abaxial sepals 2.5–2.8 × 2.7–3 mm, apex obtuse, glabrous on both surfaces, margin with glands, not ciliated; inner sepals 5.2–6 × 5.1–6.5 mm, glabrous on both surfaces, margin with glands, not ciliated; Keel, cuculus 6 × 3.6–4.3 mm, trilobate, glabrous, except for the basal margin of the cuculus puberulous; claw 1.5–1.8 mm long.; lateral petals 5 × 2 mm, outer surface glabrous, inner surface puberulous in the basal half; staminal sheath 5 mm long., outer surface sparsely puberulous, inner surface pubescent at the lower half, free filaments 4 mm long., glabrous; rudimentary petals absent; style 8.2 mm long., bent in the middle at ca. 90°, pubescent around

the stigma, stigma hooked-like; ovary 1.2×1.1 mm, glabrous, with conspicuous disc at the base of the ovary. Capsule 5.5×3.8 mm, elliptic, glabrous. Seeds 2.8×1.6 mm, elliptic, caruncle 1.2×1.3 mm long., sparsely pubescent, corneous, appendage, with dorsal and two lateral appendages.

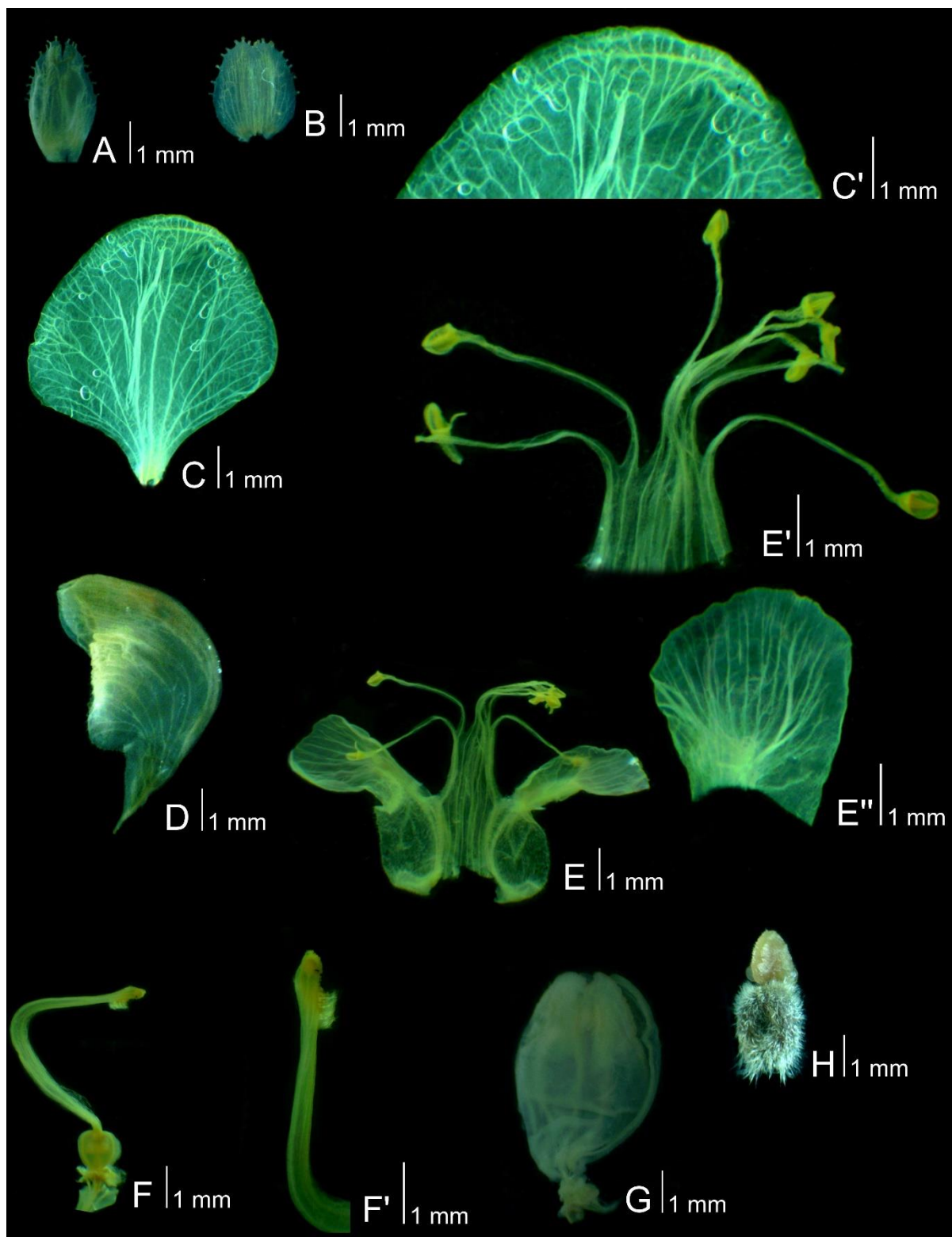


Figure 38. *Asemeia marquesiana* (J. F. B. Pastore & T. B. Cavalc.) J. F. B. Pastore & J. R. Abbott. (A–H. R. C. Forzza et al. 1676, CTBS). E. Teles 04/14, UFG).—A. Adaxial sepal. —B. Abaxial

sepals. —C'. Margin detail of abaxial sepals. —E. Inner sepal. —C'. Margin detail of abaxial sepals. —D. Keel. —E. Lateral petals with androecium. —E'. Free filaments. —E''. Apex detail of lateral petals. —F. Gynoecium. —F'. Stigma detail. —G. Capsule. —H. Seed.

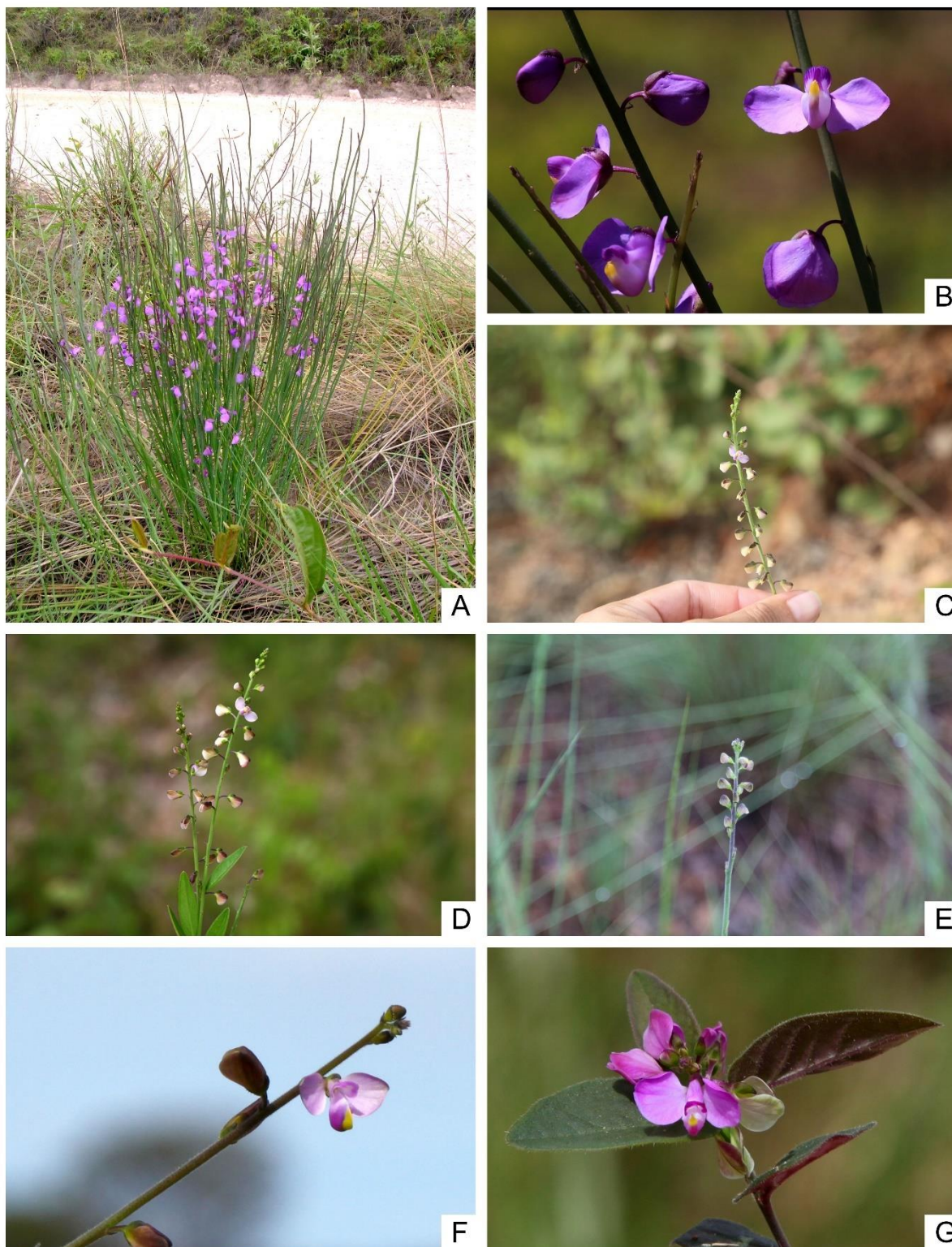


Figure 39. —A, B. *Asemeia marquesiana* (J. F. B. Pastore & T. B. Cavalc.) J. F. B. Pastore & J. R. Abbott. —C, D. *Asemeia rhodoptera* (A. W. Benn.) J. F. B. Pastore & J. R. Abbott. —E, F. *Asemeia*

subaphylla J. F. B. Pastore & M. Mota. —G. *Asemeia glabra* (A. W. Benn.) J. F. B. Pastore & J. R. Abbott. Photos: A by J. F. B. Pastore; C, E by M. Mota; B, D, F, G by H. Moreira.

Distribution. *Asemeia marquesiana* is endemic to the state of Goiás, in Brazil, occurring in cerrado areas. Figure 37.

Additional Notes. *Asemeia marquesiana* is easily recognizable and distinguishable from other species of the genus, as it has large flowers (6–10 mm), tiny leaves (1–4 × 1–3 mm), and caducous bracts. In the field, specimens are usually found without flowers, but fertile individuals can be found after burning.

Additional Specimens Examined. BRAZIL. **Goiás:** Alto Paraíso de Goiás, Estrada Alto Paraíso de Goiás–Colinas ca. 35 km de Alto paraíso, próximo a São Jorge, 14°10’S, 47°49’W, 2 Aug. 2000, R. C. Forzza et al. 1676 (CTBS, RB, SPF); Alto Paraíso de Goiás, Povoado de São Jorge, 4 Jan. 2003, J. F. B. Pastore & E. Sukanuma 218 (CEN); Cavalcante, estrada entre Cavalcante e Minaçú, 77 km de Cavalcante, 24 July 2014, M. F. Simon 2466 (CEN); Cavalcante, Reserva Natural Serra do Tombador, 21 Aug. 2017, H. L. Zirondi 33 (CEN); Niquelândia, 15 Nov. 2014, A. M. Teles 04/14 (UFG).

27. *Asemeia rhodoptera* (A. W. Benn.) J. F. B. Pastore & J. R. Abbott, Kew Bull. 67: 810.

2012. *Polygala rhodoptera* Mart. ex A. W. Benn. TYPE: Brazil. São Paulo, ‘Campis ad Ypanema’, “*Habitat per Brasiliam meridionalem haud infrequens, etiam in Guatemala. Legerunt eam Martius, Sello, Pohl 565, Blanchet 2581, Burchell 5947, Lindberg 206, Gardner 2052, 3580, 3581, Widgren 1068 et alii.*”, *Martius 565* (lectotype, designated by Pastore & Abbott (2012: 810), M [bc] 0153019!; isolectotype, BR! [bc] 0000008967848! [as Pohl 565]).

Polygala sickii A. C. Brade, Arch. Jard. Bot. Rio de Janeiro 13: 17. t.1. 1954. TYPE: Brazil. Mato Grosso, Rio dos Mortos, Xavantina, “*Brasilia. —Estado de Mato Grosso, Rio dos Mortos, Xavantina. Leg. Dr. H. Sick (B. 221) Fevereiro de 1947*”, Feb. 1947, H. Sick B221 (holotype, RB [bc] 592833!). Figures 39C–D, 40.

Herb, 30–75 cm tall, branches, pubescent. Leaves, membranaceous; petiole, 2–3, mm long., pubescent; blade, 16–37 × 3–7 mm, elliptic, apex, acute to rounded, base, acute, margin, entire, ciliated, adaxial surface, puberulous, abaxial surface, pubescent to puberulous in both surfaces. Racemes, rachis, 4.5–20 cm long., sublax, tomentose to pubescent, bracts,

1.2–1.5 × 0.6–0.7 mm, ovate, apex, acute, outer surface pubescent, inner surface estrigose to sparsely pubescent, margin, ciliated, persistent; pedicel, 2–3.0 mm long., glabrous, curved, Flower, except the pedicel, 4–7 mm long., membranaceous; outer sepals, ovate, apex, adaxial sepal, 1.9–2.8 × 1.2–1.5, mm, apex, obtuse, glabrous on both surfaces, margin with glands, not ciliated, abaxial sepals, 2–2.5 × 1.7–2.4 mm, apex, rounded, glabrous on both surfaces, margin, margin with glands, not ciliated, inner sepals, 6.5 × 5 mm, glabrous on both surfaces, margin, not ciliated; Keel, cuculus 2.7–4 × 3.1–4 mm, trilobate, glabrous, except for the basal margin of the cuculus pubescent; claw 2–2.5 mm long., ciliated to sparsely ciliated; lateral petals, 4.6–5 × 2.5 mm, outer surface glabrous, inner surface pubescent and ciliated in the lower third; filament sheath, 2.3–4 mm long., pubescent at the basal portion in both surfaces, ciliated at the half basal portion, free filaments, 1.5–2.5 mm long., glabrous; rudimentary petals, present; style 6.2–7 mm long., bent in the middle at ca. 90°, pubescent around the stigma; ovary 1.1 × 1.2 mm, orbicular, glabrous, with conspicuous disc in the ovary base. Capsule 5–6 × 3.3–3.8 mm, glabrous. Seeds, 4–4.3 × 1.5–1.6 mm, oblong, caruncle 1.3 mm long, corneous, appendaged.

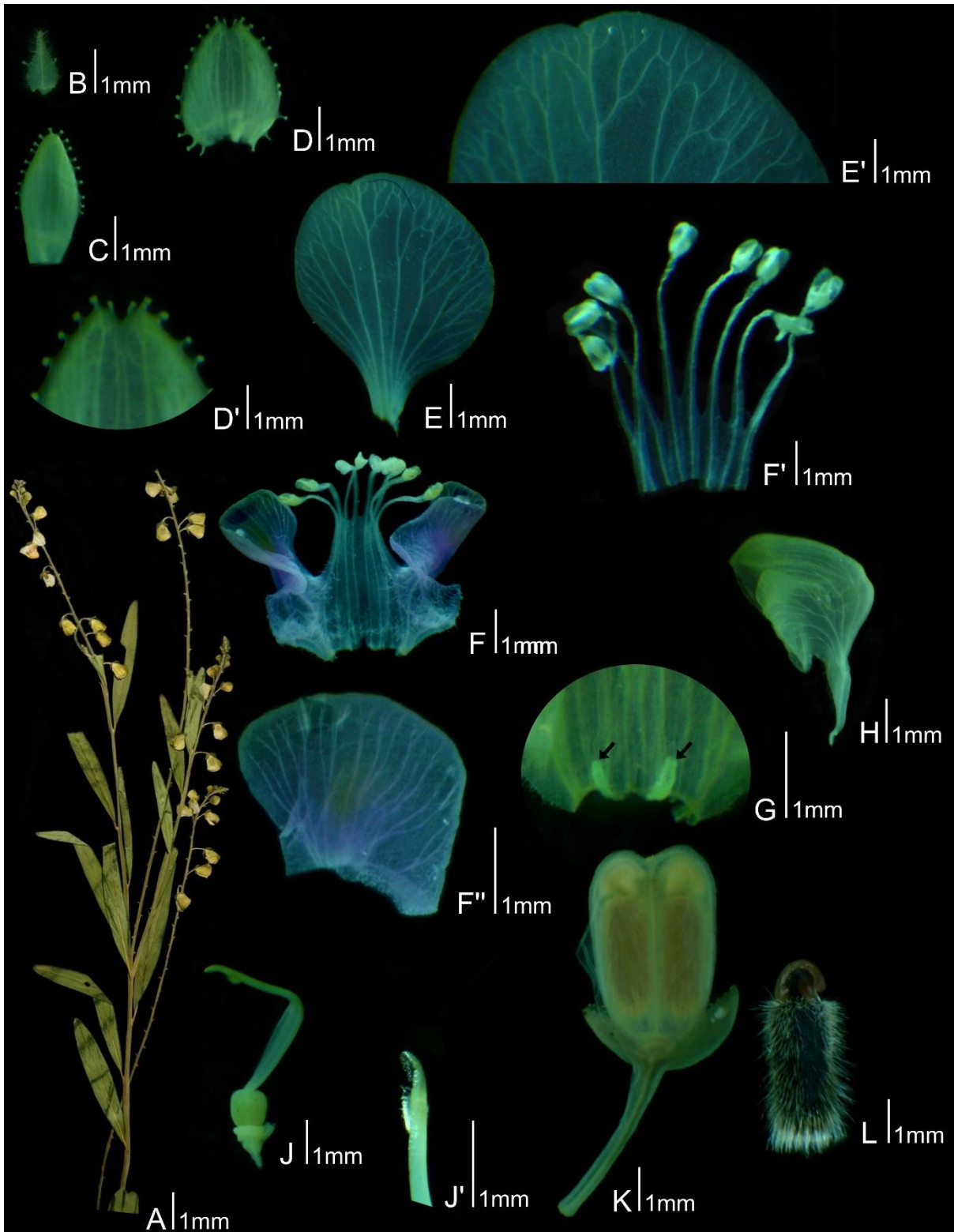


Figure 40. *Asemeia rhodoptera* (A. W. Benn.) J. F. B. Pastore & J. R. Abbott. (A. M. Mota *et al.* 227, CTBS, B–D, G–H. M. Mota & J. F. B. Pastore 174, CTBS. E–F'' from M. Mota & J. F. B. Pastore 235, CTBS). K–L from D. Philcox & A. Ferreira 3645, CTBS). —A. Habit. —B. Bract. —C. Adaxial sepal. —D. Abaxial sepals. —D'. Margin detail of abaxial sepals. —E. Inner sepal. —E'. Margin detail of inner sepal. —F. Lateral petals with androecium. —F'. Free filaments. —F''. Apex detail of lateral petals. —G. Rudimentary petals (black arrow). —H. Keel. —J. Gynoecium. —J'. Stigma detail. —K. Capsule. —L. Seed.

Distribution. *Asemeia rhodoptera* is widely distributed across several regions in Brazil. It can be found in various states, including Bahia, Distrito Federal, Goiás, Minas Gerais, Mato Grosso, Mato Grosso do Sul, Paraná, and Tocantins. Figure 37.

Nomenclatural Notes. Although Bennett (1874) cited the specimen “Ypanema, Pohl 565”, it was likely a mistake to “Martius 565”. Several specimens with nearby numbers of Martius were collected in Ypanema (Yperó municipality, São Paulo State) between Dec. 1817 to Jan. 1818. Furthermore, Ypanema was not part of the Pohl itinerary. There is a specimen *Pohl 1017* (‘Serra Monte Claro’, i.e. Santo Antônio do Descoberto, currently Santo Antônio do Descoberto, Goiás), noted by Bennett and noted as “*Polygala rhodoptera* Mart. mss”.

Additional Notes. Chodat (1893), Marques (1979), and Bernardi (2000) classified *Asemeia rhodoptera* as a synonym of *A. hebeclada*. However, Wurdack (1974), Aguiar et al. (2008), and Pastore & Cavalcanti (2009) considered them to be separate species. According to Pastore & Abbott (2012) the state of Goiás in Brazil contains the primary center of *P. rhodoptera* variation, with various morphotypes that are recognizable and possibly represent distinct species.

Additional Specimens Examined. BOLIVIA. **Beni:** José Ballivián, Pampas near Lake Rogagua, 31 Oct. 1921, *H. H. Rusby 1373* (MO, NY, US). BRAZIL. **Bahia:** Espigão Mestre, ca. 100 km WSW of Barreiras, 6 Mar. 1972, *W. R. Anderson 36715* (NY, UB); Ca. 5 km. S. of Rio Roda Velha, ca. 150 km. S.W. of Barreiras-BA (Drainage of the Rio Corrente, Western Bahia) Brazil, 15 Apr. 1966, *H. S. Irwin 14906* (NY, US). **Distrito Federal:** Brasília, Cachoeira Piripiripau, ca. 15 km S. of Planaltina, 20 Feb. 1970, *H. S. Irwin et al. 26442* (NY). **Goiás:** Teresina, 14°13'38"S, 47°53'36"W, estrada de terra para Cachoeira do Segredo, 17 Feb. 2021, *M. Mota & J. F. B. Pastore 226* (CEN, CTBS); Cavalcante, 1 km após a Balsa da Coterra (Minaçu/Cavalcante), entra a direita até o Rio Macacão, ca. 500 m após o rio, 24 Jan. 2001, *B. M. T. Walter 4781* (CEN, CTBS); Colinas do Sul, 6 Jan. 2006, *J. F. B. Pastore & E. Sukanuma 1408* (CEN, CTBS); Luziania, fazenda Engexplo, margem direita do rio Corumbá a montante, 10 Dec. 2002, *J. M. de Rezende 752* (CEN, CTBS, UEC); Niquelândia, Caminho para Uruaçu-GO, 18 Feb. 2021, *M. Mota et al. 235* (CTBS); Niquelândia, estrada para Macedo, cerrado, 18 Feb. 2021, *M. Mota et al. 230* (CTBS); Teresina de Goiás, na rodovia para Monte Alegre, 13 Mar. 2007, *J. F. B. Pastore 1836* (HUEFS). **Minas Gerais:** Delfinópolis, Serra Preta, Fazenda José Onório, 19 Oct. 2008, *R. Romero et al. 7935* (CTBS, HUFU); Delfinópolis, Canastra, Serra da Babilônia, entre

Delfinópolis e São Roque de Minas, 10 Feb. 2012, *J. F. B. Pastore 3986* (HUEFS); Gurinhatã, Margem da rodovia entre Gurinhatã e trevo que vai para Doverlândia, 12 Feb. 2013., *J. E. Q. Faria et al. 3270* (HUFU, UB); Ituiutaba, Serra do Corpo Seco, 16 Feb. 2013, *A. R. Rezende et al. 1146* (CTBS, HUFU); Montes Claros, ca. 31 km west of Montes Claros, road to Água Boa, 24 Feb. 1969, *H. S. Irwin 23799* (CEN, NY, UB, US); Rio Pardo de Minas, Vereda Funda. Barranco próximo a estrada, depois do campo de Arnica., 15 Dec. 2008, *A. C. Sevilha 5142* (CEN). **Mato Grosso:** Cuiabá, Rio Ariça, 12 Feb. 1974., *G. Hatschbach 34108* (NY, WAG); Nova Xavantina, W do Km 229 na estrada Xavantina-Cachimbo, 20 Dec. 1967, *D. Philcox & A. Ferreira 3645* (NY, P, UB). **Mato Grosso do Sul,** São Gabriel do Oeste, MS-429, ca. 11 Km da entrada da Fazenda São Pedro, 11 Apr. 2009, *L. C. P. Lima 583* (HUEFS). **Paraná:** Guaíra, Sete Quedas, 9 July 1950, *L. Camargo s.n.* (MBM, UPCB, US). **São Paulo:** Araraquara, 12 Apr. 1899, *A. Loefgren CGG4369* (SI, SP). São Paulo, Pedregulho, estrada de terra em entreito, brejo, 14 Jan. 1997, *K. Matsumoto et al. 44* (UEC). **Tocantins:** Natividade, Base da Serra da Antena, margem da estrada de terra, 11°41'37"S, 47°42'3"W, 839 m alt., 16 Jan. 2008, *J. F. B. Pastore et al. 2473* (CEN, HUEFS).

28. *Asemeia subaphylla* J. F. B. Pastore & M. Mota. *Syst. Bot.* 46: 85. 2021. TYPE: Brazil. Goiás: Alto Paraíso de Goiás, beira da GO-118, 14°01'23"S, 47°27'40"W, 22 Feb. 2019, *M. Mota & J. F. B. Pastore 173* (holotype, CTBS-4202). Figures 39E–F, 41.

Herb, 30–45 cm tall, branches pubescent. Leaves chartaceous, deciduous, sessile; blade 2.5–8 × 0.5–1 mm, linear, apex acute, base acute, margin entire pubescent in both surfaces. Racemes 1.5–2 cm long., rachis 7–11 cm long., pubescent, bracts 1–1.6 × 0.5–0.6 mm, ovate, apex acute, pubescent in both surfaces, margin with sparsely glands, ciliated, persistent; pedicel 2.2–2.3 mm long. puberulous, straight. Flower, except the pedicel 5 mm long., membranaceous; outer sepals, adaxial sepal 2.7–3 × 1.1–1.3 mm, apex rounded, glabrous on both surfaces, margin with glands except the basal portion, not ciliated, abaxial sepals 2–2.5 × 1.6–1.7 mm, apex rounded, glabrous on both surfaces, margin; inner sepals 5–5.7 × 4–4.4 mm, glabrous on both surfaces, margin not ciliated; Keel, cuculus 3.4–4 × 3.3–4 mm, trilobate, glabrous, except for the basal margin of the cuculus sparsely pubescent; claw 1.8 mm long., ciliated; lateral petals 3–3.7 mm, outer surface glabrous, inner surface sparsely puberulous in the lower half, ciliated at the base; staminal sheath 3 mm long., outer surface

glabrous, inner surface pubescent at the lower third, free filaments 2.5–3 mm long., glabrous; rudimentary petals present; style 6–6.2 mm long., bent in the middle at ca. 90°, stigma hooked-like, pubescent around the stigma; ovary 0.8–1 × 1 mm, orbicular, glabrous, with conspicuous disc in the ovary base. Capsule 4.2–5.5 × 3.4–3.5 mm, glabrous. Seeds 4 × 1.2–1.5 mm, oblong, caruncle 1 × 1.2 mm long., glabrous, corneous, appendaged, with dorsal and two lateral appendages, pubescent.

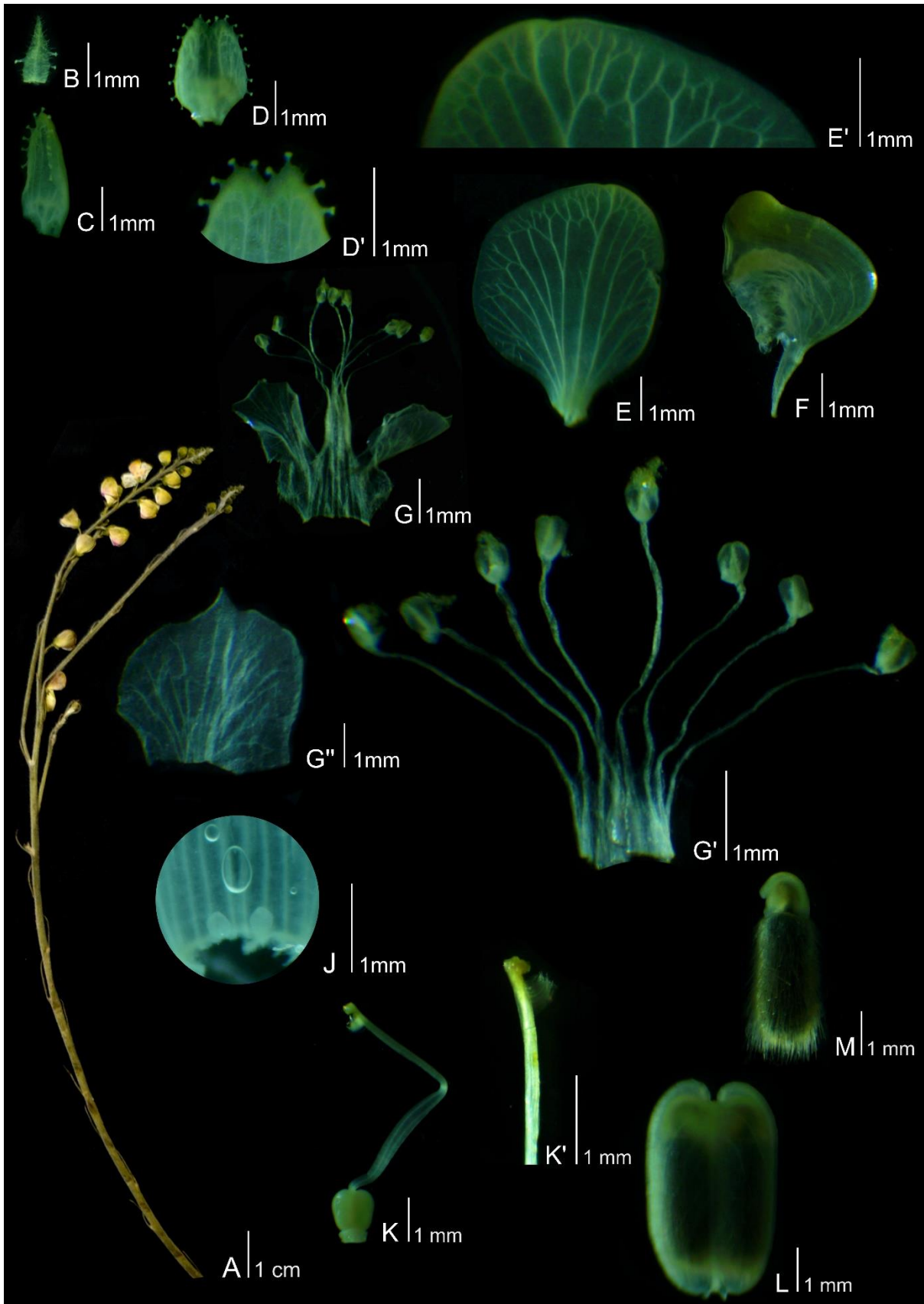


Figure 41. *Asemeia subaphylla* J. F. B. Pastore & M. Mota. (A. *M. Mota et al.* 225, CTBS). B–J. *M. Mota & J. F. B. Pastore* 173, CTBS). —A. Habit. —B. Bract. —C. Adaxial sepal. —D. Abaxial sepals. —D'. Margin detail of abaxial sepals. —E. Inner sepal. —E'. Margin detail of inner sepal. —

F. Keel. G. Lateral petals with androecium. —G'. Free filaments. —G''. Apex detail of lateral petals. —J. Rudimentary petals. —K. Gynoecium. —K'. Stigma detail. —L. Capsule. —M. Seed.

Distribution. *Asemeia subaphylla* is endemic to the northwest of Goiás state, Brazil, occurring in Cerrado areas. Figure 37.

Additional Notes. *Asemeia subaphylla* is a recently described species (Mota & Pastore 2021). The specific epithet refers to the species' small and deciduous leaves, which gives the plant a leafless appearance during flowering.

Additional Specimens Examined. BRAZIL. **Goiás:** Alto Paraíso de Goiás, beira da Go-118, 14°1'23"S, 47°27'40"W, 22 Feb. 2019, *M. Mota & J. F. B. Pastore 173* (CTBS); Alto Paraíso de Goiás, Instituto Biorregional do Cerrado. Reserva Particular do Patrimônio Natural Murundu, 23 Jun. 2020, *C.F.S. Silva 565B* (UB); Alto Paraíso de Goiás, beira de estrada, próximo ao hotel Woodstock, 21 Feb. 2019, *M. Mota & J. F. B. Pastore 172* (CTBS); Cavalcante, estrada para Cavalcante, 5 Mar. 2003, *J. F. B. Pastore & E. Suganuma 433* (CEN, CTBS); Cavalcante, estrada para Cavalcante, 6 Mar. 2003, *J. F. B. Pastore & E. Suganuma 437* (CEN, CTBS); Teresina de Goiás, estrada para Teresina de Goiás-GO, - 13.98577° S, -47.50778° W, 25 Feb. 2017, *J. F. B. Pastore & M. Mota 5310* (CTBS); Cavalcante, Estrada Teresina de Goiás-GO-Cavalcante-GO, estrada para Poço Encantado, beira de estrada de terra, 13°47'35"S, 47°27'36"W, 17 Feb. 2021, *M. Mota et al. 225* (CTBS)

Asemeia subgenus **Asemeia** section **Purpurea** M. Mota & J. F. B. Pastore. sect. nov.

(Species 29–32).

The species of the section *Purpurea* present membranaceous leaves, a purple coloration on the abaxial base of the leaves, outer sepals with no glands, and absence of rudimentary petals.

The *Purpurea* clade recognized in (Mota et al. in prep.) is here recognized as a new section.

IDENTIFICATION KEY TO *ASEMEIA* SUBGEN. *ASEMEIA* SECTION *PURPUREA*

- 1a Seed with caruncle rugose.....31. *Asemeia glabra*
(A. W. Benn.) J. F. B. Pastore & J. R. Abbott
- 1b. Seed with caruncle corneous.....2

- 2a. Outer sepals margin entire, ciliated; pedicel curved, sparsely puberulous.....
30. *Asemeia cipoensis* Mota & J. F. B. Pastore
- 2b. Outer sepals margin erose, not ciliated; pedicel straight,
 glabrous.....3
- 3a. Cuculus glabrous32. *Asemeia ilheotica* (Wawra) J. F. B. Pastore & J. R.
 Abbott
- 3b. Cuculus pubescent at the lower third inner surface
33. *Asemeia nana* M. Mota &
 J. F. B. Pastore

29. *Asemeia cipoensis* M. Mota & J. F. B. Pastore, sp. nov. TYPE: Brazil. Minas Gerais: Jaboticatubas, Parque Nacional da Serra do Cipó, Trilha para o canion das Bandeirinhas, ca. 7 km da sede, 31 Oct. 2008, *L. M. Borges et al.* 317 (holotype, CTBS-3620!; isolectotypes, SPF [bc] 215008). Figure 42.

Diagnosis. *Asemeia cipoensis* is closely related with *Asemeia glabra*, presenting elliptic and membranaceous leaves, but differs in the size of the flowers (5 mm long. in *A. cipoensis* vs 4 mm long. *A. glabra*), bracts (ovate and margin ciliated in *A. cipoensis* vs deltoid and margin not ciliated *A. glabra*), outer sepals margin (entire, ciliated in *A. cipoensis* vs irregular, glabrous in *A. glabra*).

Herb, 15–30 cm tall, branches. Leaves membranaceous; petiole ca. 2 mm long., glabrous; blade 1.8–4.6 × 0.5–1.1 cm, elliptic, apex rounded to acute, base acute to obtuse, margin entire, densely ciliated, pubescent in both surfaces. Racemes, rachis 3.5–6.5 cm long., sublax, pubescent, bracts 1.4 × 0.6 mm, ovate, apex acute, outer surface pubescent, inner surface glabrous, margin without glands, ciliated caducous; pedicel 2.3–2.5 mm long. sparsely puberulous, curved. Flower, except the pedicel 5.5 mm long., membranaceous; outer sepals ovate, without yellow glands forming spots on the surfaces, adaxial sepal 3.2 × 1.6–1.7 mm, apex rounded, glabrous on both surfaces, margin without glands, not ciliated, abaxial sepals 2.9 × 1.7 mm, apex acute, glabrous on both surfaces, margin without glands, ciliated; inner sepals 7 × 5.6 mm, glabrous on both surfaces, margin not ciliated; Keel, cuculus 3 × 4 mm, trilobate, glabrous, except for the basal margin of the cuculus ciliated; claw 3 mm long., ciliated; lateral petals 5.2 × 1.9 mm, outer surface glabrous, ciliated at the lower half, inner

surface pubescent at the lower half; filament sheath 3.8 mm long., outer surface pubescent at the lower third, inner surface pubescent at the lower half, free filaments 2.2 mm long., glabrous; rudimentary petals absent; style 5.5 mm long., bent in the middle at ca. 90° with a semi-circle of trichomes in the pre-stigmatic region, stigma hooked-like; ovary, oblong, without conspicuous disc at the base of the ovary. Capsule 5.1 × 3.3 mm, oblong, glabrous. Seeds 2.5 × 1.7 mm, oblong, pubescent, caruncle 1.3 × 1.4 mm long., pubescent, corneous, appendaged, with dorsal and two lateral appendages.

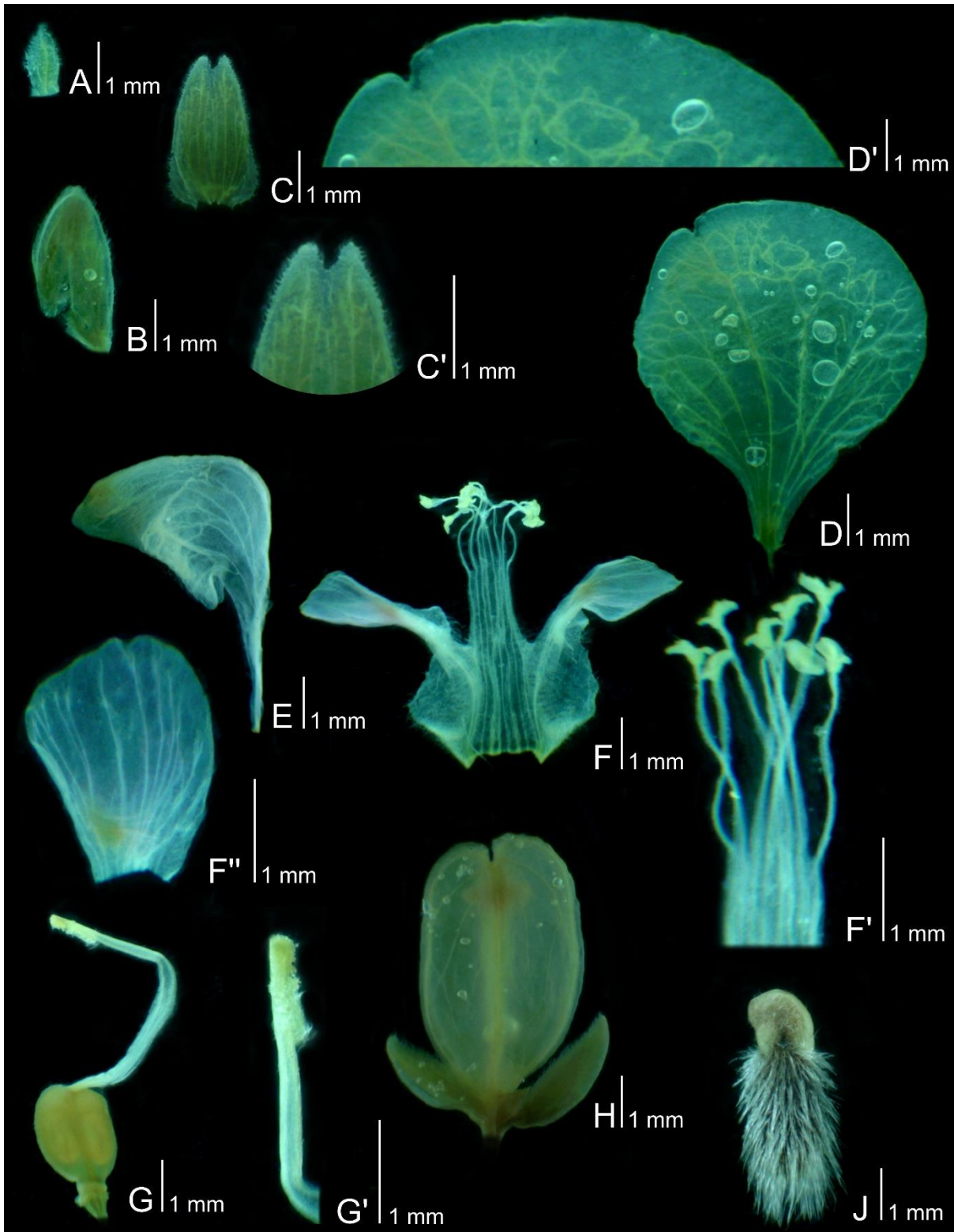


Figure 42. *Asemeia cipoensis* M. Mota & J. F. B. Pastore. (*L. M. Borges et al. 317, CTBS*). —A. Bract. —B. Adaxial sepal. —C. Abaxial sepals. —D. Inner sepal. —D'. Margin detail of inner sepal. —E. Keel. —F. Lateral petals with androecium. —F'. Free filaments. —F''. Apex detail of the lateral petals. —G. Gynoecium. —G'. Stigma detail. —H. Capsule. —J. Seed.

Distribution. Asemeia cipoensis is restricted to Serra do Cipó, Minas Gerais, Brazil.

Figure 43.

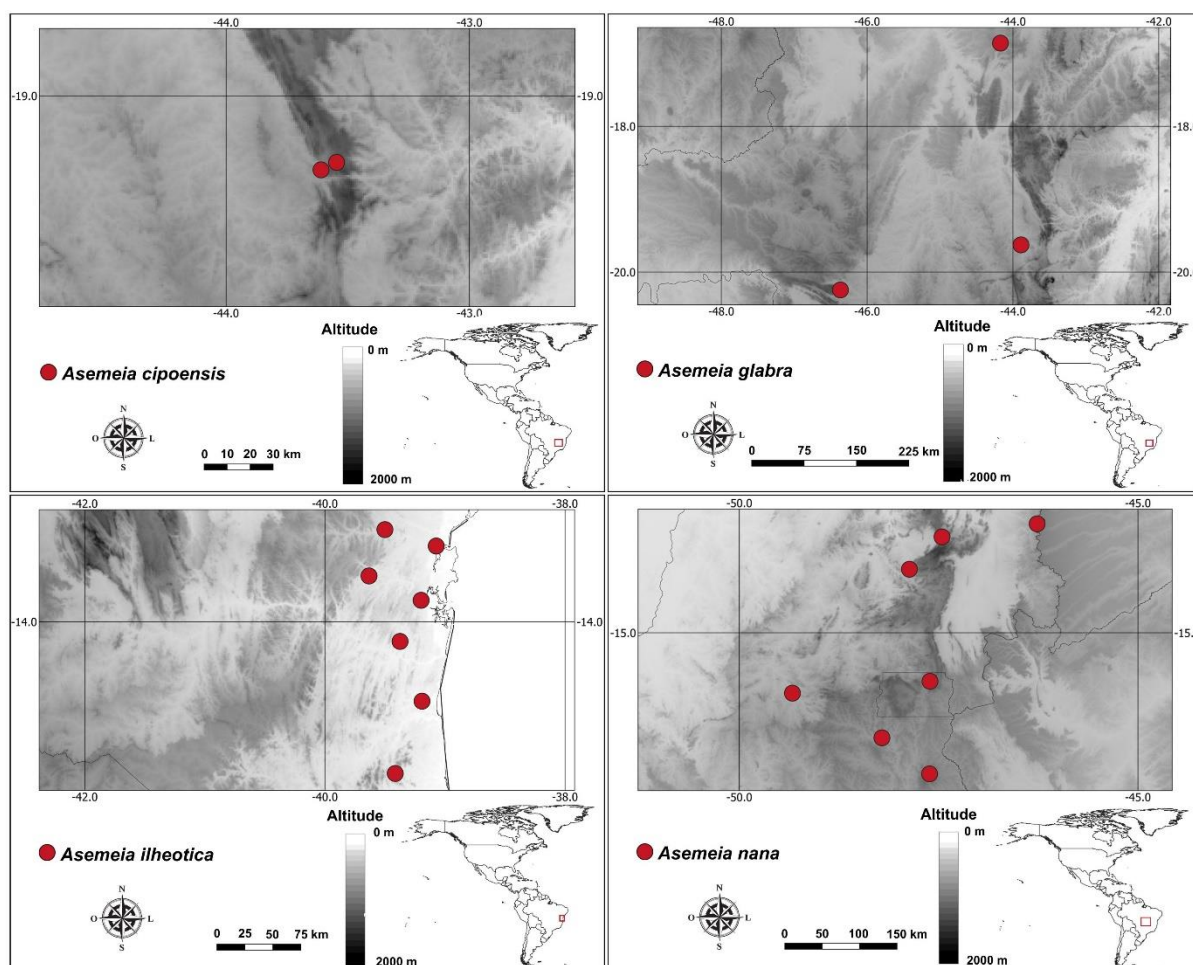


Figure 43. Distribution map of *Asemeia cipoensis* M. Mota & J.F.B. Pastore, *A. glabra* (A. W. Benn.) J. F. B. Pastore & J. R. Abbott, *A. ilheutica* (Wawra) J. F. B. Pastore & J. R. Abbott and *A. nana* M.Mota & J.F.B.Pastore.

Additional Notes. The specimens of *A. cipoensis* were found in herbaria misidentified as *A. glabra*, due to the resemblance of the elliptic leaves, outer sepals without glands and the purple coloration on the abaxial surface of the leaves. The molecular phylogeny in Mota et al. (in prep.) supported *A. cipoensis* and *A. glabra* as a group. However they differ morphologically in the margin of the outer sepals (entire, ciliated in *A. cipoensis* vs erose, glabrous in *A. glabrous*), rachis length (3.5–6.5 cm in *A. cipoensis* vs 2.5 cm in *A. glabrous*), and pedicel length (2.3–2.5 cm in *A. cipoensis* vs 1–1.2 cm in *A. glabrous*) (Figure 44). Therefore, this species is recognized here as new.

S

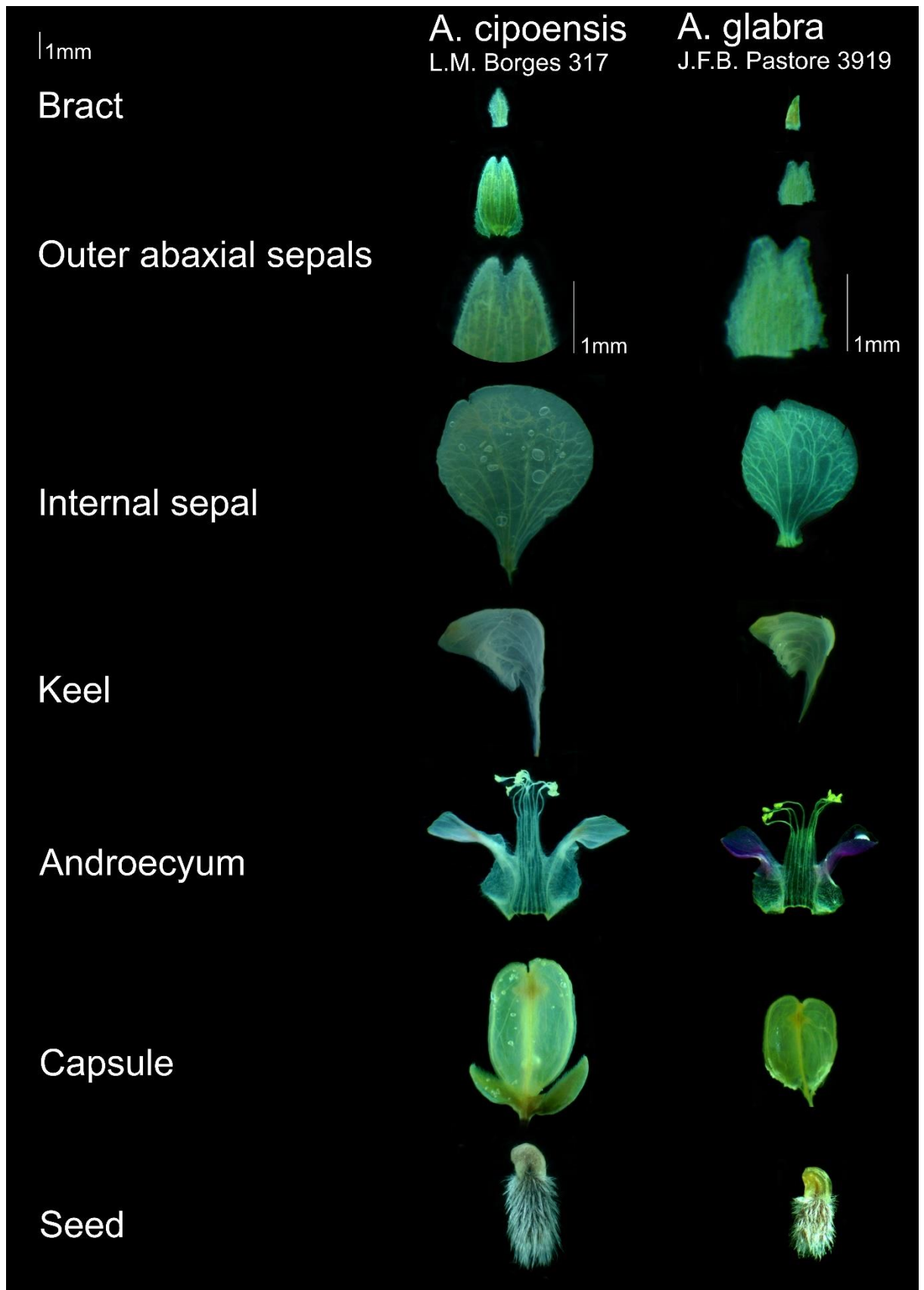


Figure 44. Morphological comparative plate of *Asemeia cipoensis* M. Mota & J. F. B. Pastore & M. Mota and *A. glabra* (A. W. Benn.) J. F. B. Pastore & J. R. Abbott. *Asemeia is* (L. M. Borges et al. 317, CTBS, *Asemeia glabra* J. F. B. Pastore & H. Moreira 3919, CTBS).

Additional Specimens Examined. BRAZIL. **Minas Gerais:** Serra do Cipó, 3 Mar. 1958, *E. P. Heringer & A. Castellanos* 5977 (UB). Serra do Cipó, Km 133/134, 18 Nov. 1969, *A. P. Duarte* 12031 (CTBS, HEPH); Jaboticatubas, Serra do Cipó, trilha para o Canion das Bandeirinhas, ca. 7 km da sede., 31 Oct. 2008, *L. M. Borges et al.* 317 (CTBS, SPF).

30. *Asemeia glabra* (A. W. Benn.) J. F. B. Pastore & J. R. Abbott, *Kew Bull.* 67: 806. 2012.

Polygala glabra A. W. Benn., *Fl. Bras.* 13: 15, 1874. TYPE: Brazil. Minas Gerais, Lagoa Santa, s.d., *J. E. B. Warming* 449 (lectotype, designated by Pastore & Abbott (2012: 806) C [bc] 10017347!; isolectotypes K [bc] 000590993!, P [bc] 00708654! (the specimen on the left). Figures 39D, 45.

Herb, 10–15 cm tall, branches pubescent. Leaves membranaceous; petiole 1–1.7 mm long., pubescent; blade 17.1–35 × 4.9–8 mm, elliptic, apex rounded to acute, base acute, margin entire, ciliated sparsely pubescent in the main veins in both surfaces. Racemes 0.5–0.6 cm long., rachis 2.5–3 cm long., subax, densely puberulous, bracts 1.2 × 0.6 mm deltoid, apex acute, outer surface sparsely pubescent, inner surface glabrous, margin ciliated, deciduous; pedicel 1–1.2 mm long. glabrous, curved. Flower, except the pedicel 4 mm long., membranaceous; outer sepals, adaxial sepal 2.2 × 1 mm, apex acute, glabrous on both surfaces, margin erose, without glands, not ciliated, abaxial sepals 2 × 1.4 mm, apex rounded, glabrous on both surfaces, margin erose, without glands, not ciliated; inner sepals 5 × 4 mm, glabrous on both surfaces, margin not ciliated; Keel, cuculus 1.3 × 1.5 mm, trilobate, glabrous, except for the basal margin of the cuculus pubescent; claw 1.7 mm long., not ciliated; lateral petals 2.3 × 0.9 mm, outer surface glabrous, inner surface pubescent in the basal half; staminal sheath 2.8 mm long., outer surface sparsely puberulous, inner surface pubescent at the lower half, free filaments 1.5 mm long., glabrous; rudimentary petals absent; style 4.8–5 mm long., bent in the middle at ca. 90°, pubescent around the stigma, stigma hooked-like; ovary 1.9 × 1.5 mm, glabrous, without conspicuous disc at the base of the ovary. Capsule 3.4 × 2.5 mm, elliptic glabrous. Seeds 3 × 1.2 mm, oblong, caruncle 1 × 1.2 mm long., sparsely pubescent, rugose.

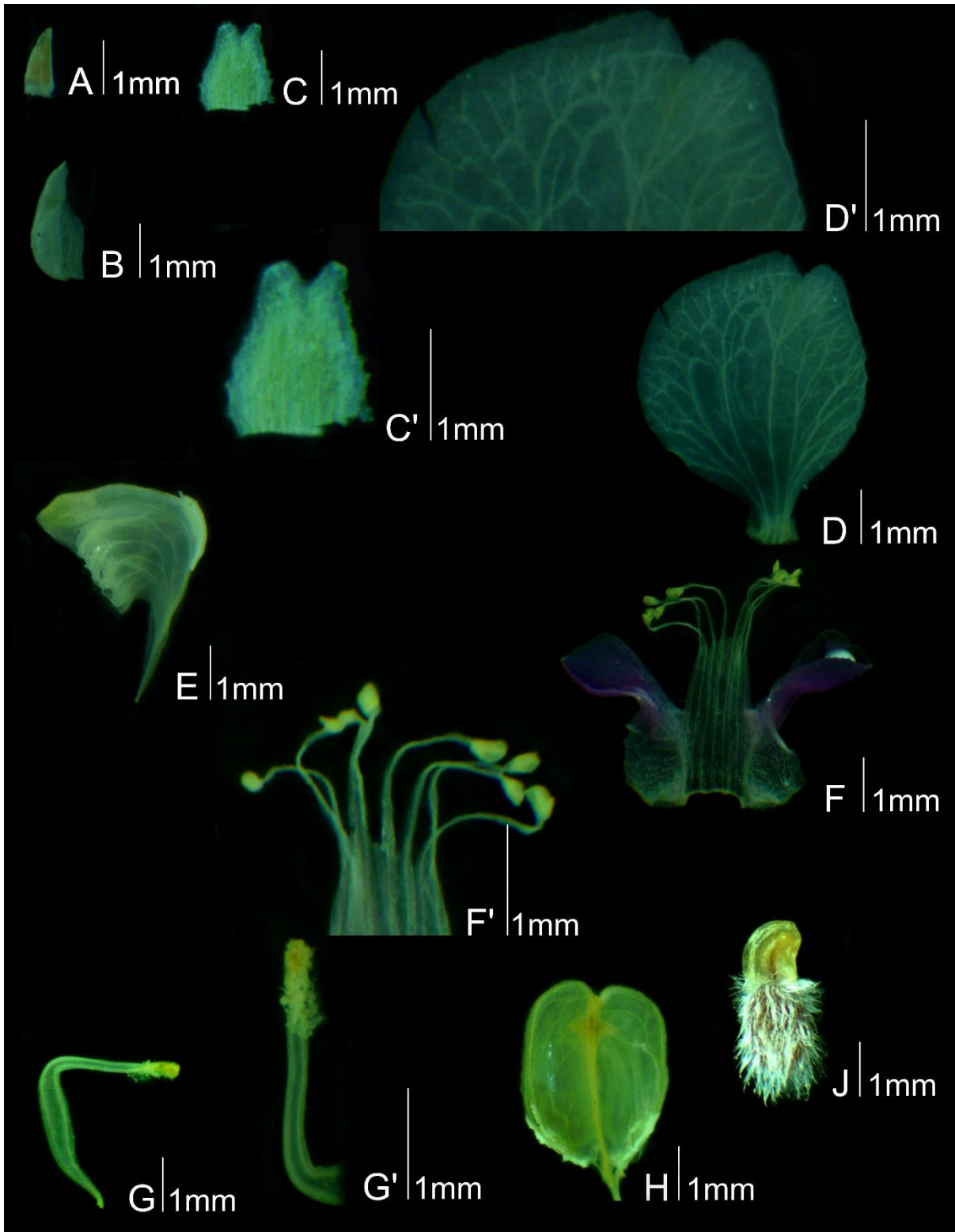


Figure 45. *Asemeia glabra* (A. W. Benn.) J. F. B. Pastore & J. R. Abbott. (*J. F. B. Pastore & H. Moreira 3919*, CTBS). —A. Bract. —B. Adaxial sepal. —C. Abaxial sepals. —C'. Margin detail of abaxial sepals. —D. Inner sepal. —D'. Margin detail of inner sepal. —E. Keel. —F. Lateral petals with androecium. —F'. Free filaments. —G. Gynoecium. —G'. Stigma detail. —H. Capsule. —J. Seed.

Distribution. Although, described in the 19th century, *Asemeia glabra* has a very restrict distribution, and rarely collected. This species is only known to the municipalities of São Roque de Minas and Lagoa Santa, both in the Minas Gerais state. This species occurs in open savannas, and considering the fleshy root system, this species is likely to flower in response to fire. Figure 43.

Additional Notes. Pastore & Abbott (2012) reported the occurrence of *A. glabra* in the states of Minas Gerais and Goiás. However, Mota *et al.* (2021) identified the specimens identified by Pastore & Abbott from Goiás (as well as the specimens identified as *P. ilheotica* by Wurdack from Goiás) as *A. nana*. These misidentifications are likely due to similarities in size (10–30 cm tall) and the presence of a purple color on the abaxial surface of the leaves. However, besides the distinct geographic distributions, there are distinguishing features between the two species as indumentum on branches and petioles (densely pubescent in *A. nana* and puberulous in *A. glabra*), leaf shape (ovate in *A. nana* and elliptic in *A. glabra*) and caruncle type (corneous in *A. nana* and rugose in *A. glabra*).

Additional Specimens Examined. BRAZIL. **Minas gerais:** São Roque de Minas, Estrada de terra entre São Roque de Minas e Bambuí, 11 Feb. 2012, *J. F. B. Pastore & J. H. Moreira 4019* (CTBS, HUEFS); Serra do Espinhaço, Serra dos Três Irmãos, ca. 31 km west of Montes Claros, road to Água Boa, 24 Feb. 1969, *H. S. Irwin 23798* (NY).

31. *Asemeia ilheotica* (Wawra) J. F. B. Pastore & J. R. Abbott. *Kew Bull.* 67: 807. 2012.

Polygala ilheotica Wawra, *Bot. Ergebn.* 41, t. 54. 1866. TYPE: Brazil. Bahia, Ilhéus, “Vork: Ilheos im sumpfigen Urwald; Wwr. u. Maly Coll. n. 268”, s.d. [Jan. 1860], *H. Wawra von Fernsee & F. de P. Malý 268* (holotype, W-0029022!). Figure 46.

Herb, 20–50 cm tall, branches pubescent. Leaves membranaceous; petiole 3–4 mm long., pubescent; blade 25–62.5 × 17–34.8 mm, ovate, apex acuminate, base obtuse to rounded, margin entire, ciliated, adaxial surface glabrous to estrigose, abaxial surface sparsely puberulous, densely in the main vein. Racemes, rachis 3.8–9.5 cm long., lax, sparsely puberulous to pubescent, bracts 1.1–2 × 0.4 mm ovate, apex acuminate, outer surface pubescent, inner surface glabrous, margin without glands, ciliated, caducous; pedicel 2.4–3.9 mm long. glabrous, straight. Flower, except the pedicel 5–7.7 mm long., membranaceous; outer sepals, adaxial sepal 3.8 × 2.6 mm, apex rounded, glabrous on both surfaces, without glands, ciliated at the base, abaxial sepals 3 × 2 mm, apex rounded, outer surface sparsely

pubescent, inner surface glabrous, margin without glands, ciliated at the base; inner sepals 9×6.8 mm, glabrous on both surfaces, margin without glands, not ciliated; Keel, cuculus 4.7×4.7 mm, trilobate, glabrous; claw 3.5 mm long., sparsely ciliated; lateral petals 5.8×2.3 mm, pubescent in the third half in both surfaces, ciliated at the base; staminal sheath 4.3 mm long., outer surface sparsely pubescent at the lower third, inner surface pubescent and ciliated at the lower third, free filaments 2.9 mm long., glabrous; rudimentary petals absent; style 5.6 mm long., bent in the middle at ca. 90° , pubescent around the stigma, stigma hooked-like; ovary 2.1×2 mm, globose, glabrous, without conspicuous disc at the base of the ovary. Capsule 5.9×4.8 mm. Seeds 2.7×1.4 mm, oblong, caruncle 1×1.3 mm long., sparsely pubescent, corneous, with dorsal and two lateral appendages.

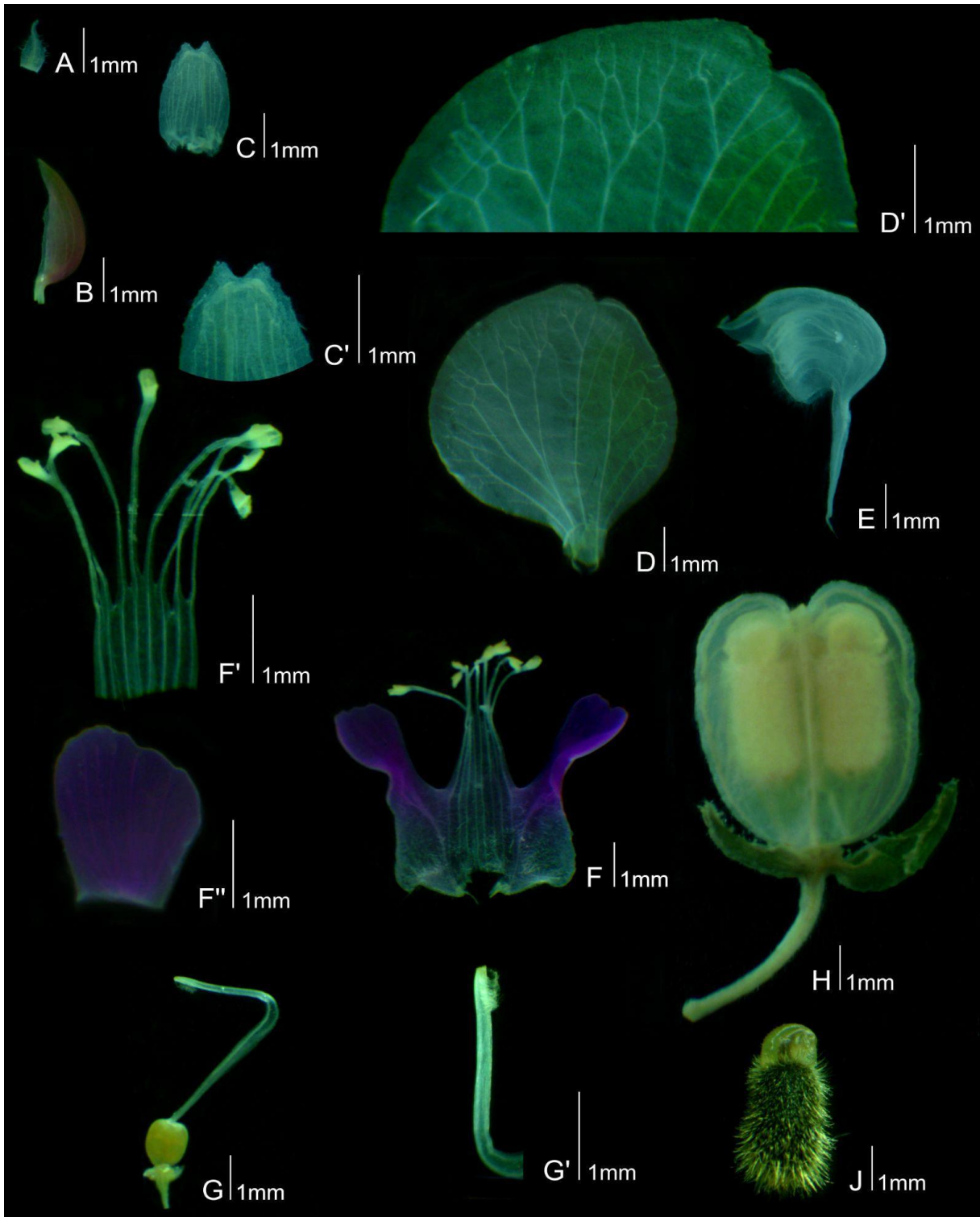


Figure 46. *Asemeia ilheotica* (Wawra) J. F. B. Pastore & J. R. Abbott. (J. F. B. Pastore & M. Mota 5476, CTBS). —A. Bract. —B. Adaxial sepal. —C. Abaxial sepals. —C'. Margin detail of abaxial sepals. —D. Inner sepal. —D'. Margin detail of inner sepal. —E. Keel. —F. Lateral petals with androecium. —F'. Free filaments. —F''. Apex detail of the lateral petals. —G. Gynoecium. —G'. Stigma detail. —H. Capsule. —J. Seed.

Distribution. *Asemeia ilheotica* is a frequent species in Mata Atlantica vegetation from southern Bahia state. The species is frequently collected in forest edges, sometimes found in anthropic environments, along the sides of dirt roads. Figure 43.

Additional Notes. Although Pastore & Abbott (2012) and Aguiar (2008) cited the distribution of *A. ilheotica* as occurring in Bahia and Espírito Santo state, Brazil, the specimens analyzed from Espírito Santo are *A. parietaria* (a member of subg. *Asemeia* sect. *Asemeia*). Aguiar (2008) also recognized specimens from Minas Gerais, and Goiás states as *A. ilheotica*, which were corrected to be *A. glabra* and *A. nana*.

Additional Specimens Examined. BRAZIL. **Bahia:** Arataca, Fazenda Jassy, Km 3 da Rodovia Arataca/Núcleo Colonial/Una, 200 m alt., 15 Apr. 1998., *L. A. Mattos Silva et al.* 3708 (ALCB, NY, HUEFS, UESC); Ibirapitanga, Fazenda Paineiras, 17 Feb. 1998., *A. S. Conceição* 196 (HUEFS); Igrapiúna, Reserva Michelin, entrada da mata de Vila 5, trilha do Guigó, 13°49'17"S, 39°11'54"W, 05 Apr. 2013, *L. Y. S. Aona* 2553 (CEN); Ilhéus, Castelo Novo, Fazenda Almada. Perto do cemitério, lado esquerdo, 20 Feb. 2018, *J. F. B. Pastore & M. Mota* 5476 (CTBS); Laje, Fazenda Sete Voltas, 13°09'01"S, 39°20'14"W, 28/08/2017., *T. T. Silva et al.* 131 (CTBS, HURB); Mutuípe, 13°14'S, 39°30'W, 18 Nov. 2006, *M. P. Leite & C. S. Souza* 52 (HUEFS); Valença, ca. 7 km na estrada para Orobo, 03 Nov. 1990, *A. M. de Carvalho* 3228 (CEPEC, CTBS, HURB, MBML, SPF, UESC); Wenceslau Guimarães, assentamento Oziel Alves, 13°37'08"S, 39°37'57"W, 8 June 2018, *N. X. M. Souza* 320 (CTBS, HURB).

32. *Asemeia nana* M. Mota & J. F. B. Pastore, *Kew Bull.* 78: 167. 2023. TYPE: Brazil.

Goiás: Pirenópolis, Serra dos Pireneus, 15°49'06"S, 48°53'57"W, 1141 m alt., 21 Feb. 2021, *M. Mota & J. F. B. Pastore* 238 (Holotype: CTBS-6002). Figures 47, 48A.

Herb, 20–30 cm tall, branches densely pubescent. *Leaves* membranaceous; petiole 1.6–2.5 mm long., densely pubescent; blade 21.3–31.3 × 11.7–16.3 mm, ovate, apex ovate to acuminate, base obtuse to rounded, margin entire, ciliated, adaxial surface glabrous to estrigose, abaxial surface glabrous, puberulous in the main veins on both surfaces. Racemes peduncle 1–4 cm long., rachis 3–7.7 cm long., sublux, puberulous to pubescent, bracts 0.9–1.3 × 0.3–0.5 mm deltoid, apex acute, outer surface pubescent, inner surface glabrous, margin without glands, ciliated, caducous; pedicel 2–4 mm long. glabrous, straight. Flower, except the pedicel 3.8–4 mm long., membranaceous; outer sepals, adaxial sepal 2 × 2 mm, apex

rounded, glabrous on both surfaces, margin erose, without glands, not ciliated, abaxial sepals 2×2 mm, apex rounded, glabrous on both surfaces, margin erose, without glands, not ciliated; inner sepals $5.3\text{--}5.9 \times 4.9\text{--}6.2$ mm, glabrous on both surfaces, margin erose, not ciliated; Keel, cuculus $2.5\text{--}3.2 \times 2.5\text{--}3.6$ mm, trilobate, outer surface glabrous, inner surface pubescent at the lower third, ciliated; claw $1.8\text{--}2.5$ mm long., sparsely ciliated; lateral petals $3.7\text{--}4$ mm, outer surface glabrous, inner surface pubescent at the lower half; staminal sheath 2.8 mm long., outer surface glabrous to sparsely pubescent at the lower third, inner surface pubescent at the lower half, free filaments 2 mm long., glabrous; rudimentary petals absent mm; style $4.2\text{--}5.2$ mm long., bent in the middle at ca. 90° angle, pubescent around the stigma, stigma hooked-like; ovary $0.8\text{--}1 \times 0.8\text{--}1$ mm, globose, glabrous, with conspicuous disc in the ovary base. Capsule 4.4×3.7 mm, elliptic, glabrous. Seeds 3.3×1.5 mm, oval, caruncle 1×1.3 mm long., sparsely puberulous, corneous, appendaged, with dorsal and two lateral appendages.

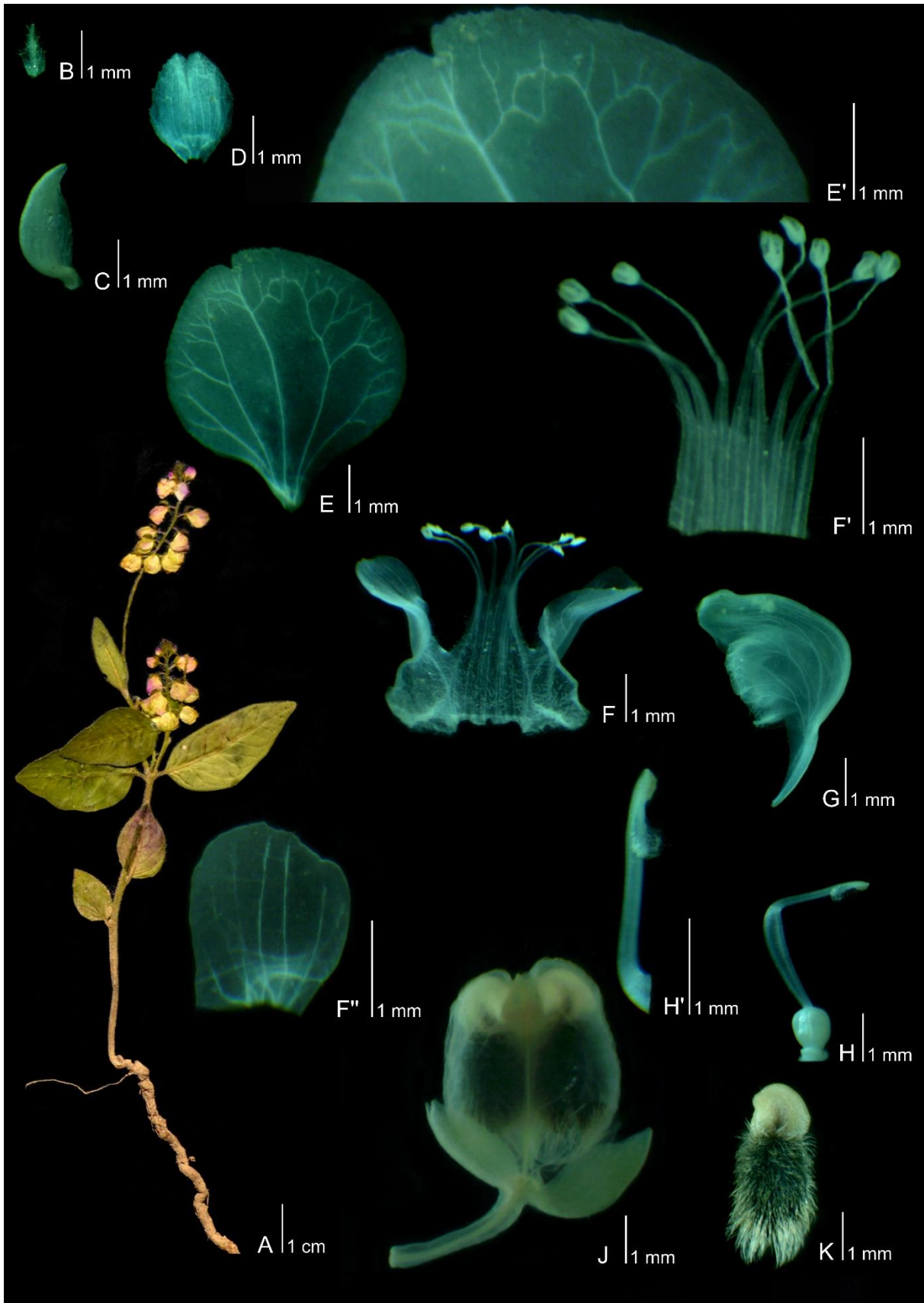


Figure 47. *Asemeia nana* M. Mota & J. F. B. Pastore. (*M. Mota & J. F. B. Pastore* 238, CTBS). — A. Habit. — B. Bract. — C. Adaxial sepal. — D. Abaxial sepals. — E. Inner sepal. — E'. Margin detail

of inner sepal. —F. Lateral petals with androecium. —F'. Free filaments. —F''. Apex detail of the lateral petals. —G. Keel. —H. Gynoecium. —H'. Stigma detail. —J. Capsule. —K. Seed.

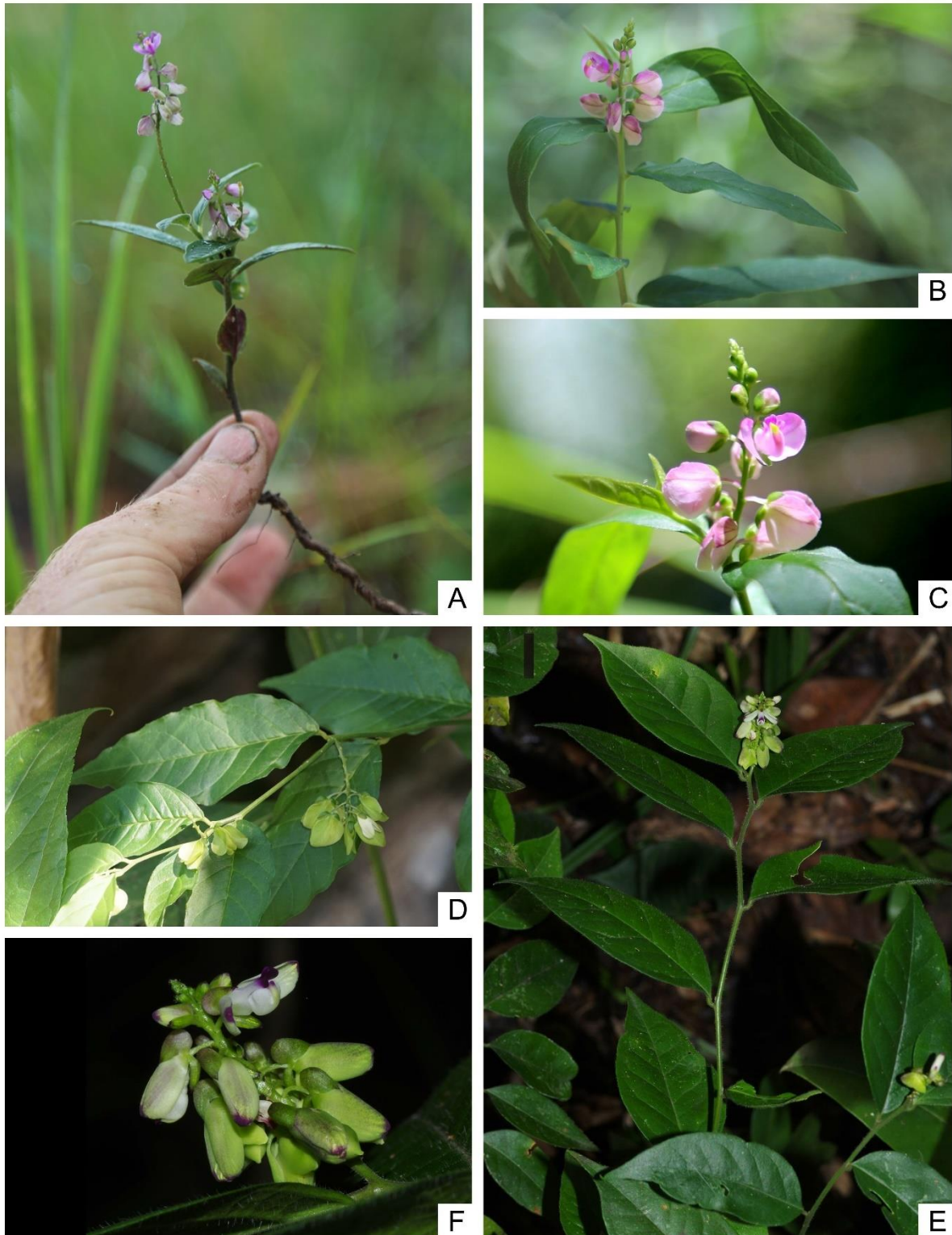


Figure 48. —A. *Asemeia nana* M. Mota & J. F. B. Pastore. —B, C. *Asemeia fimbriata* (A. W. Benn.) M. Mota & J. F. B. Pastore. —D. *Asemeia hondurana* (Chodat) J. F. B. Pastore & J. R. Abbott. —E, F. *Asemeia echinosperma* (Görts) J. F. B. Pastore & J. R. Abbott. Photos: A, B, C by J. F. B. Pastore; D by J. R. Galdamez; E, F. by H. Galliffet.

Distribution. *Asemeia nana* occurs in Cerrado areas, at west of Goiás state, between 800–900 m. Figure 43.

Additional Notes. *Asemeia nana* is a recently described species (Mota et al. 2021) and was misidentified in herbaria specimens as *A. glabra*, probably due to the small size of the individuals and the purplish coloration on the abaxial surface of the leaves. This last morphological characteristic is also observed in *A. ilheotica*.

Additional Specimens Examined. BRAZIL. **Distrito Federal:** Brasília, Bacia do Rio São Bartolomeu, 28 Jan. 1981, *E. P. Heringer et al.* 6077 (IBGE, US); Brasília, Chapada da Contagem, próximo à FERCAL, 20 Jan. 2005, *J. F. B. Pastore* 1224 (CEN). **Goiás:** Alto paraíso de Goiás, 6–7 km E of Alto Paraíso on road to Nova Roma, elev. Ca. 1400 m alt., 7 Mar. 1973, *W. R. Anderson et al.* 6574 (K); Alto paraíso de Goiás, Rodovia GO-239 em direção à Colinas do Sul, 14°12'12"S, 47°52'1"W, 12 Apr. 2017, *J. F. Carrión & G. A. Reis-Silva* 1814 (HUEFS); Cavalcante, Fazenda Renascer, 6 May 2002, *J. F. B. Pastore et al.* 16 (CEN); Cristalina, Rodovia Cristalina-Brasília, 15 Dec. 2004, *J. F. B. Pastore et al.* 1162 (CEN); Cristalina, 30 km ao Norte de Cristalina, BR 040, 20 Nov. 1976, *A. C. Allem* 499 (CEN); Jaraguá, Rodovia Belém - Brasília, Rio das Almas, 21 Nov. 1975, *G. Hatschbach & R. Kummrow* 37757 (MBM); Luziania, Fazenda Engexplo, margem direita do rio Corumbá, 16°19'01"S, 48°12'42"W, 877 m alt., 10 Dec. 2002, *J. M. Rezende et al.* 725 (CEN); Pirenópolis, Serra dos Pirineus, 15°49'06"S, 48°53'57.4"W, 1141 m alt., 21 Feb. 2021, *M. Mota & J. F. B. Pastore* 238 (CTBS); São Domingos, Saída da Fazenda dos Alagoanos, em direção à Estiva, 13°38'53"S, 46°35'46"W, 12 Mar. 2004, *A. A. Santos et al.* 2335 (CEN).

Asemeia subgenus **Asemeia** section **Striata** M. Mota & J. F. B. Pastore. sect. nov. (Species 33–34)

TYPE: *Asemeia acuminata* (Willd.) J. F. B. Pastore & J. R. Abbott.

IDENTIFICATION KEY TO *ASEMEIA* SUBGEN. *ASEMEIA* SECTION *STRIATA*

- 1a. Pedicel 1.5–1.9 mm, glabrous, flower 5–6.2 mm, ovary without disc at the base of ovary.....33. *A. acuminata*

1b. Pedicel 3–3.5 mm, sparsely puberulous, flower 7 mm, ovary with disc at the base of ovary.....34. *A. fimbriata*

33. *Asemeia acuminata* (Willd.) J. F. B. Pastore & J. R. Abbott, Kew Bull. 67: 805. 2012.

Polygala acuminata Willd, Sp. Pl., ed. 4, 3: 887. 1802. *Badiera acuminata* (Willd.) DC., Prodr. 1: 335. 1824. TYPE: Without locality, “*Habitat in Nova Hispania*”, s.d., *L. Néé s.n.* [perhaps mislabeled and actually collected in Cuchero, Huanuco, Peru by H. Ruiz & J. Pavon, see Martinez et al. 2022] (lectotype [perhaps holotype], designated by Martinez *et al.* (2022: 111), B-W-12990, possible isolectotypes, BM!, FI!, MA-812765, P [bc] P02527041).

Polygala smithii S. F. Blake, Bull. Torrey Bot. Club 51: 84. 1924. TYPE: Colombia. Santa Marta, Oct. 1898, *H. H. Smith 1309* (holotype, US [bc] 00109039!, isotypes, BR [bc] BR0000008967343, DAO [bc] 000424409, E [bc] 00327079, K [bc] K000590939!, MO [bc] 524118!, NY [bc] 00435746!, P [bc] P02576936!, P [bc] P02576937!, PH [bc] 00015427, S [bc] S-0819481, V [bc] 0067472F. Figure 49.

Herb, 0.30–1.2 m tall, branches puberulous-adpressed. Leaves membranaceous; petiole 5 mm long., puberulous; blade 52.8–80 × 20–25.3 mm, ovate, apex acute, mucronate, base obtuse, margin entire ciliated glabrous to sparsely estrigose in both surfaces ciliated. Racemes, rachis 1.9–3.3 cm long., sublux, pubescent, bracts 1.6 × 0.6 mm deltoid, apex acute, pubescent in both surfaces, margin without glands, ciliated, caducous; pedicel 1.5–1.9 mm long. glabrous, curved. Flower, except the pedicel 5–6.2 mm long., membranaceous; outer sepals ovate, without yellow glands forming spots on the surfaces, apex, adaxial sepal 3.4 × 1.7 mm, apex rounded, glabrous on both surfaces, margin without glands, ciliated, abaxial sepals 2.9 × 2.3 mm, apex rounded, glabrous on both surfaces, margin without glands, ciliated; inner sepals 6.7 × 5.6 mm, glabrous on both surfaces, margin ciliated, except at the apex; Keel, cuculus 3 × 3.2 mm, trilobate, glabrous, except for the basal margin of the cuculus pubescent; claw 2.5 mm long., ciliated; lateral petals 4.7 × 2.5 mm, outer surface glabrous, inner surface pubescent, ciliated in the lower half portion; filament sheath 3.4 mm long., outer surface glabrous, inner surface sparsely pubescent at the base, free filaments 2.6 mm long., glabrous; rudimentary petals present; style 5.4 mm long., bent in the middle at ca. 90°, with a semi-circle of trichomes in the pre-stigmatic region; ovary 1.1 × 1 mm, globose, glabrous, without a disc in the ovary base. Capsule 6 × 5.7 mm, glabrous. Seeds 4.5 × 2.3

mm, oval, with longitudinal stripes, pubescent, caruncle 2.2×1.9 mm long., rugose, sparsely puberulous.

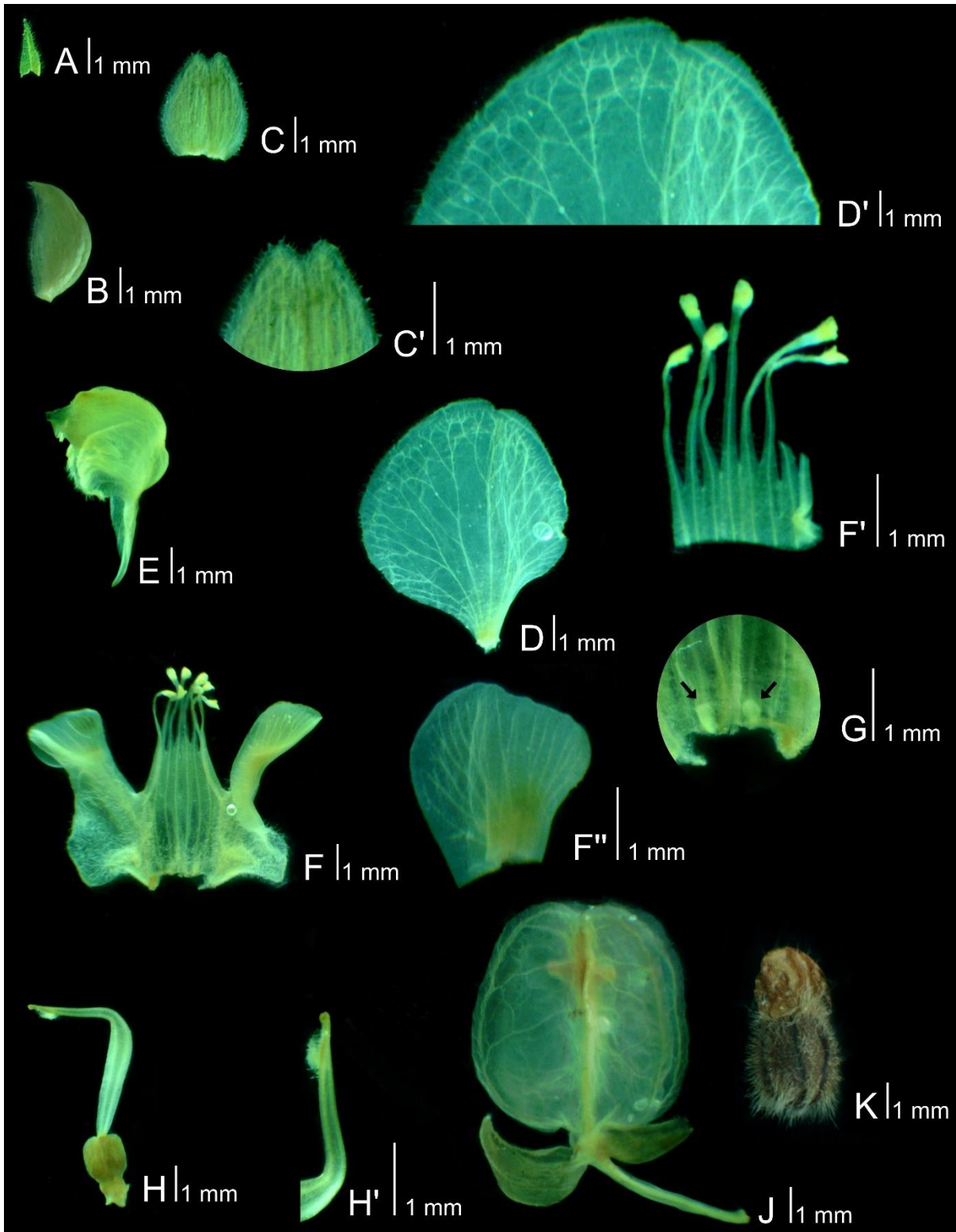


Figure 49. *Asemeia acuminata* (Willd.) J. F. B. Pastore & J. R. Abbott. (A–H' from *A. Gentry et al.* 40143, CTBS, J–K from *G. T. Prance* 8473, CTBS). —A. Bract. —B. Adaxial sepal. —C. Abaxial sepals. —C'. Margin detail of abaxial sepals. —D. Inner sepal. —D'. Margin detail of inner

sepal. —E. Keel. —F. Lateral petals with androecium. —F'. Free filaments. —F''. Apex detail of lateral petals. —G. Rudimentary petals (black arrow). —H. Gynoecium. —H'. Stigma detail. —J. Capsule. —K. Seed.

Distribution. *Asemeia acuminata* is native to the western states of Acre, Rondônia, and Amazonas states in Brazil, as well as Bolivia, Colombia, and Peru. Although Pastore & Abbott (2012) cited its presence in Venezuela, no confirmed records have been found there.

Figure 50.

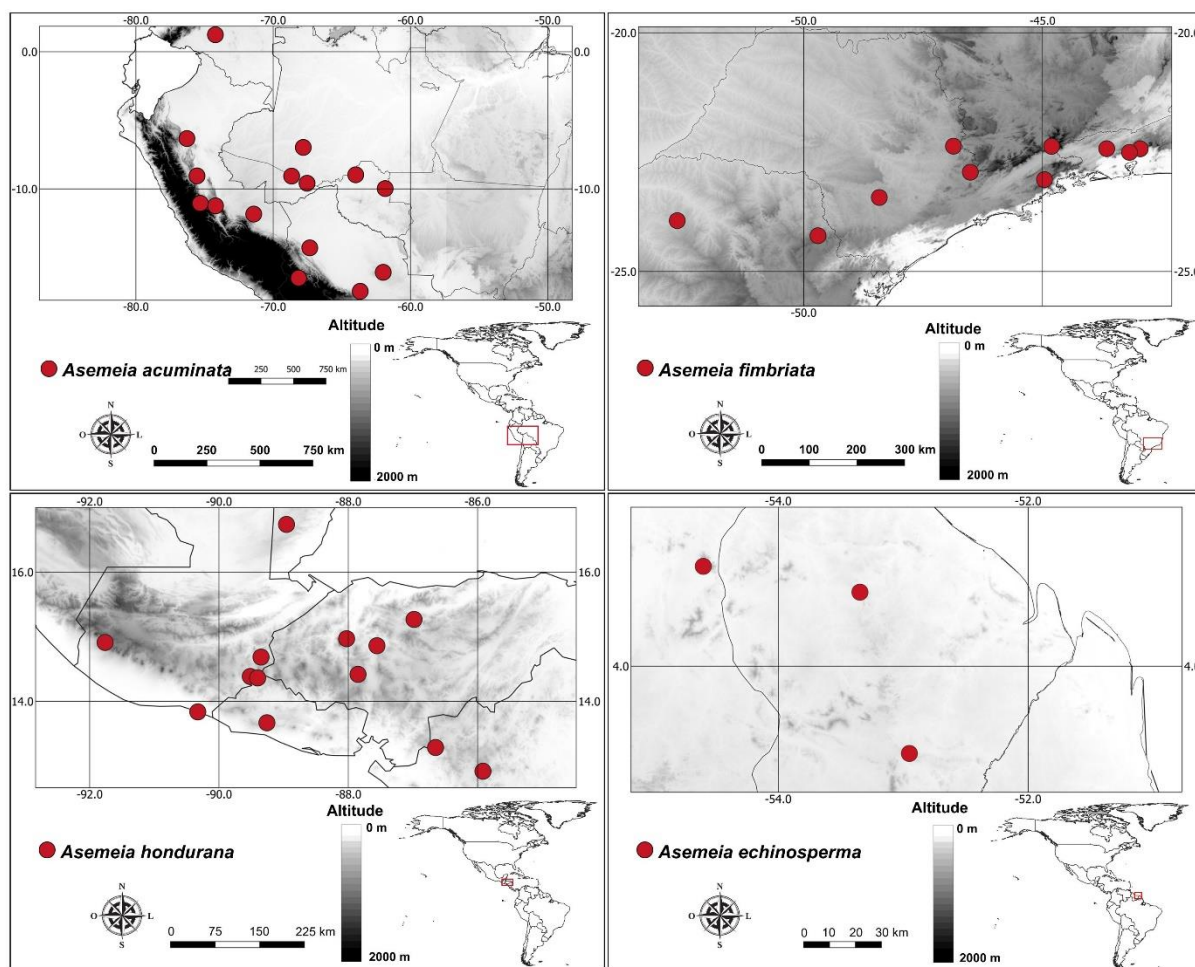


Figure 50. Distribution Map of *Asemeia acuminata* (Willd.) J.F.B.Pastore & J.R. Abbott, *A. fimbriata* (A. W. Benn.) M. Mota & J. F. B. Pastore, *A. hondurana* (Chodat) J.F.B. Pastore & J.R.Abbott and *A. echinosperma* (Görts) J. F. B. Pastore & J. R.Abbott.

Nomenclatural Notes. According to Pastore & Abbott (2012), the holotype has the label written “Humboldt & Bonpland,” but is unlikely that these botanists collected it (see Rankin-Rodríguez & Greuter, 2001). Bernardi (2000) observed that the original label “N. España,” which refers to Mexico, which is a country where *A. acuminata* has never been found. Finally, the lectotype in B-W (or perhaps the holotype) was considered to be more likely a

mislabelled specimen not collected by Née, but by during the Ruiz and Pavon expedition, more specifically in Huanuco, Peru (Pastore & Abbott 2012, Martinez et al. 2022).

Additional Notes. This species was previously considered in a broader taxonomic delimitation by Bernardi (2000), where *Polygala fimbriata* was regarded as a synonym. Here, we adopt a narrower taxonomic concept for this, and restrict its occurrence to the state of Acre and Rondônia in Brazil, as well as Bolivia, Peru and Colombia (see further details, referring to the additional comments provided under *Asemeia fimbriata*).

Additional Specimens Examined. BOLIVIA. **Reyes:** 25 Nov. 1921, *H. H. Rusby 1388* (G). **La Paz:** Kaka tributary, upper rio Beni, Dec. 1906, *J. W. Evans 52* (BM). **Santa Cruz:** Ichilo, Buena Vista, 400 m alt., 1 Mar. 1967, *R. F. Steinbach 767* (U); Ñuflo de Chavez, 8 km de Concepcion em la ruta a la Piedra de Calama, 16°04'43"S, 61°59'03"W, 464 m alt., 12 Feb. 2008, *P. S. I. Pozo & D. Villarroel 600* (K, USZ). **Cochabamba:** Chapare, 300 m alt., 21 Oct. 1966, *R. F. Steinbach 415* (U). BRAZIL. **Acre:** Porto Acre, Reserva Forestal Huamaitá, ca. 27 Km NNE of Rio Branco along the road to Porto Acre, 28 Km S of Porto Acre, 3 Km E along road to Universidade Federal do Acre Field Station, situated along S edge of Rio Acre, 150–200 m alt., 03 Dec. 2001, *T. B. Croat 85954* (MO, NY); Xapuri, Reserva Extrativista Chico Mendes, Seringal Sibéria, Colocação Semitumba, 03 Feb. 1994, *L. C. Ming 390* (NY, UFACPZ); Rio Branco, Estrada para Placido de Castro., 17 Oct. 1980, *C. A. Cid Ferreira & B. W. Nelson 2932* (MO, NY, US); Sena Madureira, Basin of Rio Purus, Rio Macaú. Colocação Apuí. River descending, 3 m below high water mark, 30 Mar. 1994, *D. C. Daly 8086* (INPA, NY, UFACPZ, US). **Rondonia:** basin of Rio Madeira, trail from Fortaleza, Rio Abuña 20 km, above mouth, to Sebastião Mines, 15 Nov. 1968, *G. T. Prance et al. 8473* (A, F, INPA, K, M, MG, NY, P, R, S, U, US); Porto Velho, Ao longo da BR 364, 61km W de Jaci Parana. Ramal 5, 08°58'17"S, 63°59'16"W, 90 m alt., 12 Apr. 2012, *M. F. Simon 1459* (CEN, IAN, INPA, RON, UFACPZ); trail from Fortaleza, Rio Abuña 20 km, above mouth, to São Sebastião mines, 15 Nov. 1968, *G. T. Prance et al. 8473* (F, INPA, K, M, MG, NY, P, R, S, U, US). COLOMBIA. **Magdalena:** Santa Marta, 2000 ft., Oct. 1898-1901, *E. H. Smith 1309* (BR, DAO, E, K, MO, NY, P, P bis, PH, S, US, V). PERU. **Junin:** Chanchamayo, La Merced, trocha a lo largo quebrada Kimiri, ca. 11°03'S, 75°19'W, 850 m alt., 19 Oct. 2002, *C. Persson & C. Grandez 711* (L). **Madre de Dios:** Manu, Parque Nacional del Manu, rio Manu, Cocha Cashu Station, 71°25'W, 11°50'S, 350 m alt., 16 Aug. 1984, *R. Foster 9855* (MO). **San Martín:** Pongo de Cainarachi, Rio Cainarachi, tributary of Rio Huallaga, 230 m alt., Sep.-Oct. 1932, *G. Klug 2676* (BM). **Ucayali:** provincia

Padre Abad, distrito Padre Abad, Boqueron Padre Abad, 09°03'S, 75°33'W, 300 m alt., 17 June 2004, *J. Schunke Vigo & J. G. Graham 15650* (G).

34. *Asemeia fimbriata* (A. W. Benn.) M. Mota & J. F. B. Pastore, comb. nov., Fl. Bras.

(Martius) 13(3): 13. 1874. *Polygala fimbriata* A. W. Benn., Fl. Bras. (Martius) 13(3): 13. 1874. TYPE: Brazil. Rio de Janeiro, Cantagalo, "Habitat prope Canta Gallo, prov. Rio de Janeiro: Peckolt; ad Lagon Santa prov. Minas Geraes; Warming", 1859, *T. Peckolt 29* (lectotype, designated by Pastore & Abbott (2012: 805), BR [bc] 0000005286881).

Polygala vauthieri Chodat, Mém. Soc. Phys. Genève 31, 2 (2): 65, t. 16. 1893. TYPE: Brazil. Rio de Janeiro, Serra dos Orgãos, "Hab: in Brasiliae prov. Min. Geraes (Claussen v.s. in Hb. Deless.) prov. de Rio de Janeiro, Serra dos Orgaos (Vauthier 471, v.s. in Hb. Deless.), Nov. Friburgia Claussen anno 1842, v.s. in Hb. Deless.", 1833, *A. C. Vauthier 471* (lectotype, designated by Pastore & Abbott (2012): G [bc] 00227244!; isolectotypes G [bc] 00227243!, P [bc] 02577001!, P [bc] 02577002!).

Polygala vauthieri Chodat var. *hirsutula* Chodat ex Osterm., Denkschr. Kaiserl. Akad. Wiss., Wien. Math. Naturwiss. Kl. 79: 297. 1908. TYPE: Brazil. São Paulo, Itapetininga, Aug. 1901, *F. Ostermeyer s.n.* B†? (type not located). NEOTYPE. Brazil, São Paulo, Itapetininga, 20 Jan. 1949, *J. J. de Lima s.n.* (neotype, designated here, RB-69981 [bc] 00320325). Figures 48B–C, 51.

Shrub, 40–1 m tall, branches pubescent. Leaves membranaceous; petiole 3–4 mm long., pubescent; blade 40–65 × 15–23 mm, ovate to lanceolate, apex obtuse to acute, base rounded to obtuse, margin entire, ciliated, strigose on both surfaces. Racemes, rachis 2.5–8 cm long., subaxillary, pubescent, bracts 2.2 × 1 mm deltoid, apex acute, pubescent on both surfaces, margin without glands, ciliated, deciduous; pedicel 3–3.5 mm long. sparsely puberulous, curved. Flower, except the pedicel 7 mm long., membranaceous; outer sepals ovate, without yellow glands forming spots on the surfaces, apex, adaxial sepal 4 × 2.5 mm, apex rounded, glabrous on both surfaces, margin without glands, ciliated, abaxial sepals 3.8 × 3 mm, apex rounded, glabrous on both surfaces, margin without glands, ciliated; inner sepals 7.6 × 6.8 mm, glabrous on both surfaces, margin erose, not ciliated; Keel cuculus 4 × 4.5 mm, trilobate, glabrous, except for the basal margin of the cuculus pubescent; claw 3 mm long., sparsely ciliated; lateral petals 6 × 2.9 mm, outer surface glabrous, inner surface

pubescent, ciliated in the middle and lower half portion; filament sheath 4 mm long., outer surface esparsely puberulous at the base, inner surface pubescent at the base, ciliated in the middle and basal portion, free filaments 2.3 mm long., glabrous; rudimentary petals present; style 6.9 mm long., bent in the middle at ca. 90°, with a semi-circle of trichomes in the pre-stigmatic region; ovary 1.2 × 1.3 mm, globose, glabrous, with conspicuous disc in the ovary base. Capsule 6.2 × 6.6 mm, glabrous. Seeds 5 × 2.5 mm, oval, with longitudinal stripes, caruncle 2.1 × 2.4 mm long., rugose, sparsely puberulous.

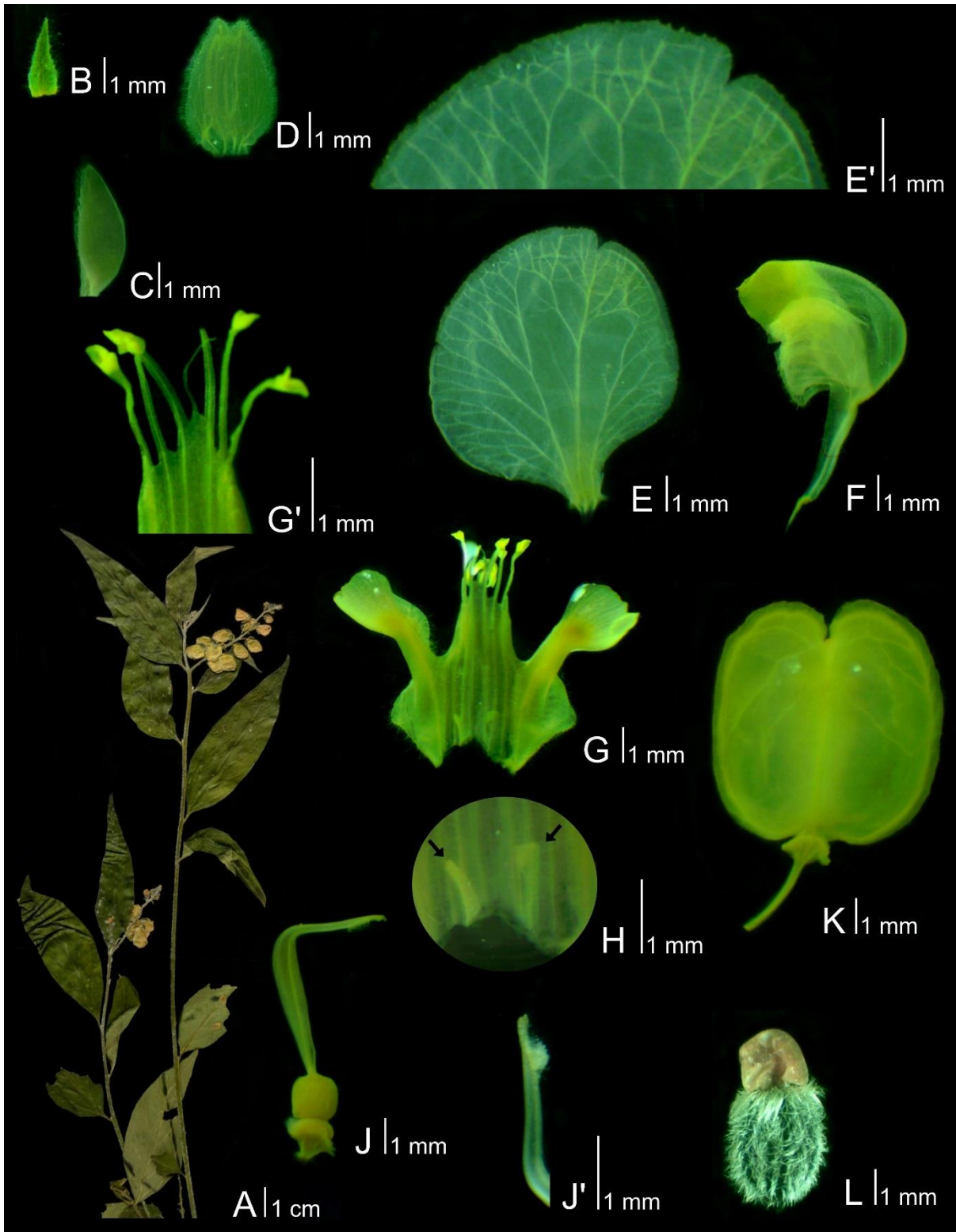


Figure 51. *Asemeia fimbriata* (A. W. Benn.) M. Mota & J. F. B. Pastore. (A. Mota *et al.* 199, CTBS B–L. G. M. Antar *et al.* 1171, CTBS). —A. Habit. —B. Bract. —C. Adaxial sepal. —D. Abaxial sepals. —E. Inner sepal. —E'. Margin detail of inner sepal. —F. Keel. —G. Lateral petals with androecium. —G'. Free filaments. —H. Rudimentary petals (black arrow). —J. Gynoecium. —J'. Stigma detail. —K. Capsule. —L. Imature seed.

Distribution. *Asemeia fimbriata* is endemic to Brazil, occurring in Minas Gerais, Rio de Janeiro, São Paulo and Paraná states. Figure 50.

Nomenclatural Notes. The original material of *Polygala vauthieri* Chodat var. *hirsutula* Chodat ex Osterm., was not located. It is possible that it was destroyed in B during the WWII or lost during the fire which destroyed part of the Chodat's original herbarium in the University of Geneva in 24–25 December of 1898. Here we designated a neotype from the topotype, Itapetininga (São Paulo State) and with the same characters described by Chodat (1893) for *Polygala vauthieri* Chodat var. *hirsutula* Chodat.

Additional Notes. Bernardi (2000) synonymized *A. fimbriata* and *A. acuminata*, probably due to the seeds with longitudinal stripes, this position was followed by Pastore & Abbott (2012). Although these species are obviously closely related and share several morphological characters, they can be easily recognized by the leaves dimensions which are often narrower in *A. fimbriata* (15–23 mm vs 20–25.3 mm in *A. acuminata*), petioles length (3–4 mm in *A. fimbriata* vs 5 mm in *A. acuminata*), and the most notable, the cuculus shape (forming a half-circle in *A. fimbriata* vs somewhat rounded resembling keel in genus *Caamembeca* in *A. acuminata*) (Figure 52). Also, both species can be recognized by their distribution, *A. fimbriata* is endemic to the southern states of Brazil, and in Paraná State, whereas *A. acuminata* occurs in Bolivia, Peru, Colombia, and the northern states of Brazil, Acre, Rondônia, and Western Amazonia.

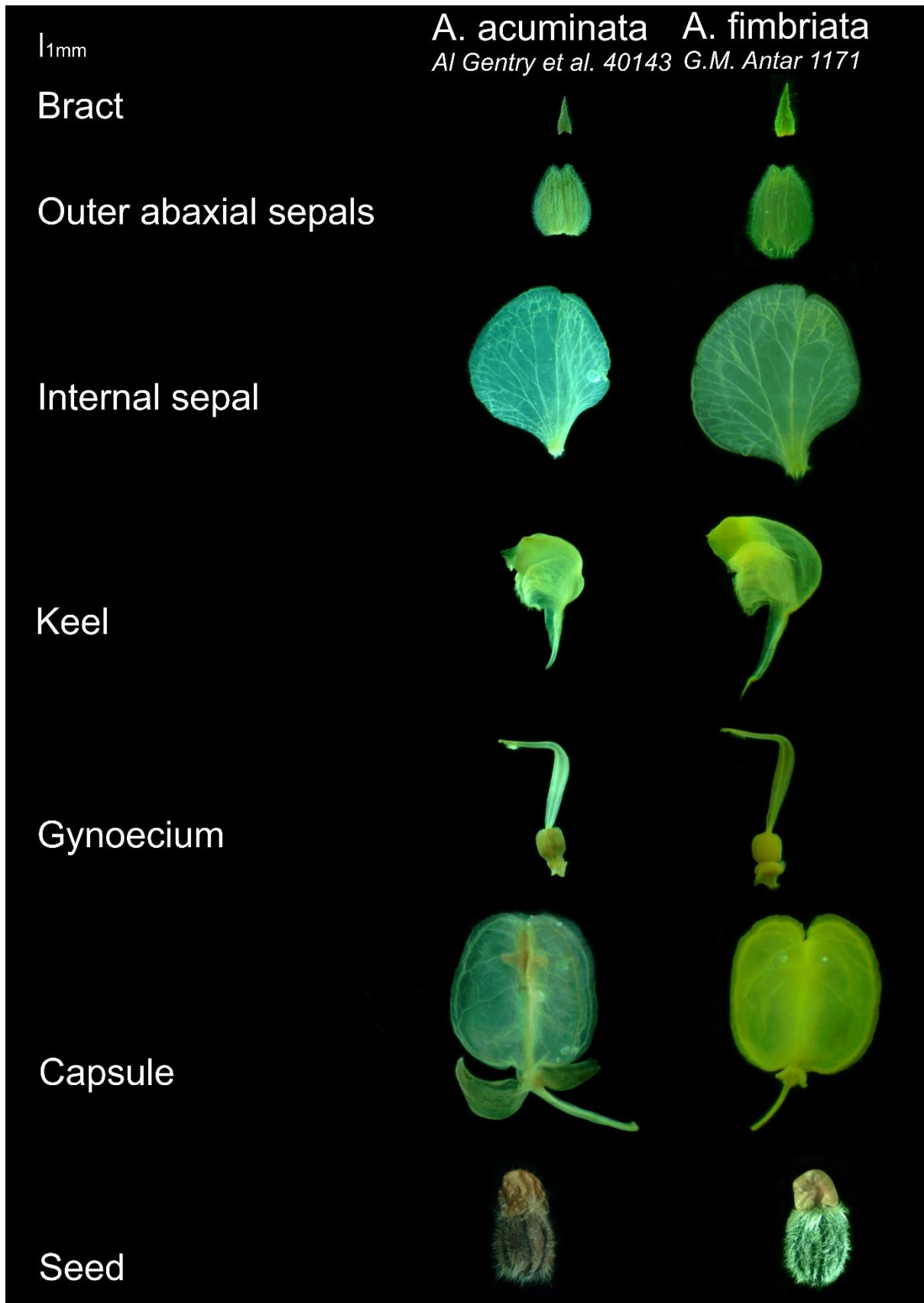


Figure 52. Morphological comparative plate of *Asemeia acuminata* (Willd.) J.F.B.Pastore & J.R.Abbott and *Asemeia fimbriata* (A. W. Benn.) M. Mota & J. F. B. Pastore. *Asemeia*

acuminata (Willd.) J.F.B.Pastore & J.R.Abbott (A–H' from *A. Gentry et al. 40143*, CTBS, J–K from *G. T. Prance 8473*, CTBS). *Asemeia fimbriata* (A. W. Benn.) M. Mota & J. F. B. Pastore (A. Mota et al. 199, CTBS B–L. *G. M. Antar et al. 1171*, CTBS).

Additional Specimens Examined. BRAZIL. **Minas Gerais:** ‘ad Padre Correa & Rigistro Velho’, s.d., *J. B. E. Pohl 29* (W). Descoberto, Reserva municipal da Represa do Grama, 21°25'48"S, 42°57'14"W, 26 Nov. 2004, *C. M. Sakuragui 1616* (CEPEC, MBM, RB). **Paraná:** Araruna, Fazenda Floresta Negra, 23°56'06"S, 52°38'46"W, 571 m alt., 29 Apr. 2015, *E. L. Siqueira 1506* (CTBS, HCF, MBM); Telêmaco Borba, 3 Oct. 1988, *M.C. Dias et al. 331* (CTBS, FUEL). **Rio de Janeiro:** Rio Paquequer, Jan. 1823, *H. K. Beyrich s.n.* (P). Barra do Piraí, Fragmento do Campus UGB, 22°22'44,40"S, 44°48'37,20"W, 20 Mar. 2015, *F. S. Souza et al. 1702* (BHCB, RB); Petrópolis, Correias, estrada União Industria, próximo do Santatório de Correias., 03 Nov. 2002, *J. M. A. Braga et al. 7120* (NY, RB); Valença, Parque Municipal da Serra da Concórdia, trilha da Caixa d'água, 22°20'52.2"S, 43°45'48.6"W, 760m, 13 Dec. 2016, *A. Cabral et al. 120* (CTBS, SPF); Vassouras, estrada Mata-cães, 4 Feb. 2021, *M. Mota et al. 181* (CTBS). **São Paulo:** Botucatu, Parque ecológico da Pavuna, 22°55'15"S, 46°30'40"W, 750 m alt., 14 Nov. 2009, *L. B. Santos 441* (HRCB, RB); Cunha, estrada real, 6 Feb. 2021, *M. Mota & J. F. B. Pastore 199* (CTBS); Cunha, 5 Feb. 2021, *M. Mota et al. 201* (CTBS); Itapira, Mata do Rio do Peixe, 22°22'33"S, 46°51'51"W, 1 Nov. 1994, *K. D. Barreto et al. 1762* (ESA, RB, UEC).

Asemeia subgenus **Longipedicelata** M. Mota & J. F. B. Pastore, subgen. nov. (Species 35)

35. Asemeia hondurana (Chodat) J. F. B. Pastore & J. R. Abbott, *Kew Bull.* 67: 803. 2012.

Polygala hondurana Chodat, *Bot. Jahrb. Syst.* 115: 75. 1914. TYPE: Honduras.

“Subequatoriale Andine Provinz: Nicaragua, Dep. Matagalpa, Cuesta Del Mte. Grande, Fichten-Eichenwald, 950 m (Rothschuh N. 616). – Honduras, Entre Meambar y Puente De Los Altos de Sta. Cruz, Um 1500 Bis 2000' (Niederlein)”, *Niederlein s.n.* (holotype B†, B as photo F negative 013027 in F). NEOTYPE: Guatemala, Santa Rosa: Buena Vista, Dec. 1892, *E. T. Heyde & E. Lux 4314* (neotype, designated here, G (no barcode).

Asemeia tonsa (S. F. Blake) J. F. B. Pastore & J. R. Abbott, *Kew Bull.* 67: 805. 2012.

Polygala tonsa S. F. Blake, *Contr. Gray Herb.* 47: 63. 1916. TYPE: Guatemala. Dept.

Santa Rosa, "Guatemala: La Vega, Dept. Santa Rosa, 1.525 m., Sep. 1893, *Heyde & Lux 3067* (type coll: GK)." Sep. 1893, *E. T. Heyde & E. Lux 3067* (holotype, GH [bc] 00025959; isotypes G [Deless.], K [bc] 000591016!, US [bc] 00109050!). Figures 48D, 53.

Shrub, 1–1.8 m tall, branches puberulous-adpressed. Leaves; petiole 3.1–3.3 mm long.; blade 68.5–78.5 × 21.5–24.4 mm, lanceolate, apex acuminate, base acute, margin ciliate glabrous both surfaces, not ciliated. Racemes, peduncle 0.8–1.1 cm long., rachis 1.8–2.7 cm long.; pedicel 5.9 mm long. puberulous, straight. Flower, except the pedicel 7–8 mm long., membranaceous; outer sepals, adaxial sepal 4.2 × 3 mm, apex rounded, glabrous on both surfaces without no glands, margin ciliated abaxial sepals 3.5 × 1.9 mm, apex acute, margin without glands, ciliated; inner sepals 8.5 × 7.2 mm, glabrous on both surfaces, margin without glands, not ciliated; Keel, cuculus 6 × 4.8 mm, unilobate, glabrous on both surfaces; claw 1.9 mm long., sparsely ciliated; lateral petals 6 × 3 mm, outer surface glabrous, inner surface pubescent and ciliated in the lower half; staminal sheath 3.1 × 3 mm long., free filaments 3.6 mm long., glabrous; rudimentary petals present; style 9 mm long., bent in the middle at ca. 90°, stigma circinate, pubescent around the stigma; ovary 2 × 1.9 mm globose, glabrous, without conspicuous disc in the ovary base. Capsule 6.4 × 5.4 mm, apex hardly lobed, obovate. Seeds 3 × 2.5 mm, oval, 2.2 × 2 mm sparsely pubescent, rugose.

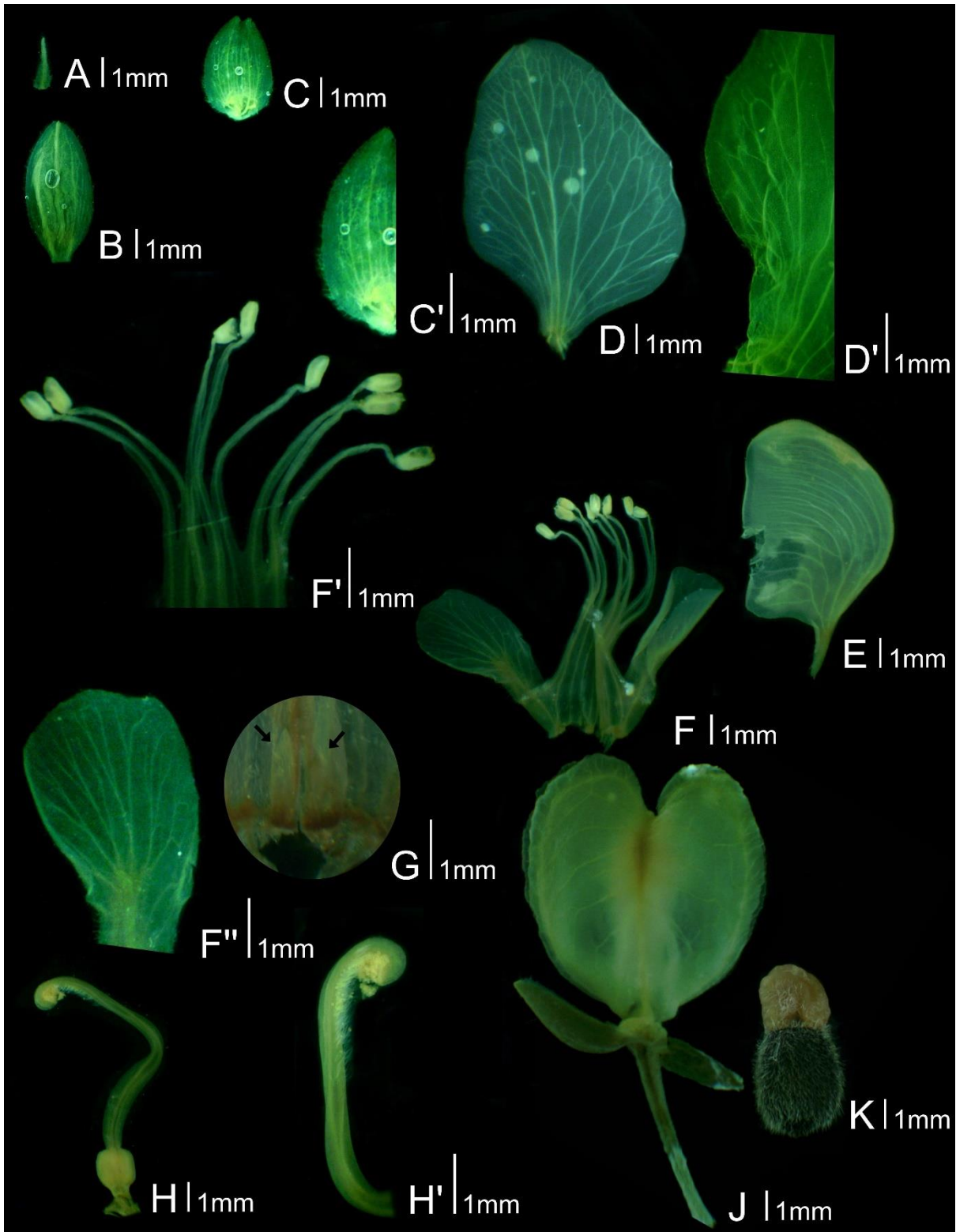


Figure 53. *Asemeia hondurana* (Chodat) J. F. B. Pastore & J. R. Abbott. (A–F'', H, H'. *Smith 6*, BM. G. E. T. Heyde & E. Lux 4314, G. K, J. D. Villacorta 223, BM). —A. Bract —B. Adaxial sepal. —C. Abaxial sepals. —C'. Margin detail of abaxial sepals. —D. Inner sepal. —D'. Margin detail of inner sepal. —E. Keel. —F. Lateral petals with androecium. —F'. Free filaments. —F''. Apex detail of the lateral petals. —G. Gynoecium. —G'. Stigma detail. —H. Capsule. —J. Seed.

Distribution. *Asemeia hondurana* is restrict to Central America, collected in Belize, Nicaragua, El Salvador, Guatemala, and Honduras. Occurs in the shadow of the well-drained tropical forest of Central America. Figure 50.

Nomenclatural Notes. The original material for *Polygala hondurana*, as cited on the original protologue by Chodat (1893), were lost during the WWII, and no duplicates were found. Thus, a neotype is selected here.

Additional Notes. The characteris that distinguished *A. hondurana* and *A. tonsa* from other species of the subgenus *Longipedicelata*, such as membranaceous leaves, unilobed keels (a character shared only with *A. apopetala*), circinate stigma, membranaceous flowers, outer sepals ciliated and without glands, were analyzed in several specimens. It was observed that there was difficult to morphologically distinguishing them, leading to the proposed synonymization of *A. tonsa* under *A. hondurana*. Additionally, there is an overlapping distribution between these species.

Additional Specimens Examined. BELIZE. **Cayo:** Las Cuevas Research Station, main road, 16°44.22'N, 88°57.37'W, 600 m alt., 26 May 2000, *S. D. Smith 6* (BM). EL SALVADOR. **La Libertad:** Antiguo Cuscatlan, laderas de La Laguna, 13°40'N, 89°15'W, 830 m alt., laderas interiores de um cráter volcanico antiguo, 2 m SE de R.36, 19 Dec. 1988, *R. Villacorta 223* (K, LAGU). **Chalatenango:** Corbelam, Mancomunidad La Montañona, 14°23'N, 88°91'W, 1400 m alt., 18 Oct. 2002, *R. A. Carballo & C. de López 514* (B, BM, EAP, LAGU, MO). **Santa Ana:** Metapán, 89°24'11"W, 14°21'40"N, 865 m alt., 26 Apr. 2021, *D. Rodríguez 8328* (B, K, LAGU, MO). GUATEMALA. **Chiquimula:** Olapa, Las Palmas, 1200 m alt., 18 May 1999, *M. Véliz 99.7060* (BIGUA, BM, MEXU). **Santa Rosa:** Buena Vista, Dec. 1892, *E. T. Heyde & E. Lux 4314* (G); La Vega, 500 alt., Sep. 1893, *E. T. Heyde & E. Lux 3067* (K). HONDURAS. **Comayagua:** La libertad, 15 km de La Libertad, 14°51'35"N, 87°33'25"W, 1100 m alt., 25 June 1981, *R. A. Meigs 1511* (UMA). **Cortes:** Pena Blanca, Pena Blanca, 2300ft, 14 Feb. 1982, *D. H. Taq* (CTBS, MO). **Yoro:** near Puente Grande, on a tributary of the Rio Agua (Rio Puente Grande), 22 May 1987, *S. Blackmore & M. Chorley 4057* (BM). NICARAGUA. **Madriz:** between La sabana and Cusmapa, 1350 m alt., 14 Mar. 1967, *A. R. Molina 20601* (BM, EAP, F). **Matagalpa:** Matagalpa, 1000 m alt., 13 Jan. 1963, *L. O. Williams et al. 23737* (BM, EAP, F)

Asemeia subgenus **Wurdackia** M. Mota & J. F. B. Pastore, subgen. nov. (Species 36)

TYPE: *Asemeia echinosperma* (Görts) J. F. B. Pastore & J. R. Abbott.

36. *Asemeia echinosperma* (Görts) J. F. B. Pastore & J. R. Abbott. *Polygala echinosperma* Görts. TYPE: Suriname, Nassau Mts, mountain savanna forest near km 11.6, “Nassau Mts., mountain savanna forest near km 11.6”, 16 March 1949, *J. Lanjouw & J. C. Lindeman 2738* (lectotype, designated here, U [bc] 0008032; isolectotypes, K [bc] 000590952!, U [bc] 0008066). Figures 48E–F, 54.

Shrub to subshrub, 0.5–1.5 m tall, branches puberulous. Leaves membranaceous; petiole 1.6–3.3 mm long., pubescent; blade 4.8–10 × 2–3.1 cm, ovate-lanceolate to lanceolate, apex acuminate, base acute to rounded, margin entire, sparsely ciliated glabrous both surfaces. Racemes congested rachis 2.3–5.1 cm long., sparsely pubescent bracts 1.3 × 0.7 mm deltoid, apex acuminate outer surface sparsely pubescent, inner surface glabrous, margin ciliated, sparsely at the apex; pedicel 2.4 mm long. glabrous straight. Flower, except the pedicel 1–1.5 cm long., membranaceous; outer sepals with yellow glands forming spots on the surfaces (only on the abaxial sepals), adaxial sepal 4 × 1.8 mm, apex rounded, glabrous on both surfaces margin without glands, ciliated, abaxial sepals 3.5 × 1.9 mm, apex rounded, glabrous on both surfaces, margin without glands, ciliated; inner sepals 7.4 × 3 mm, with yellow glands forming spots on the surfaces, outer surface short pubescent, inner surface glabrous, margin ciliated; Keel, cuculus 4 × 2 mm, trilobate, glabrous, except for the basal margin of the cuculus sparsely ciliated; claw 1.2 mm long., not ciliated; lateral petals 5.6 × 1.3 mm, outer surface pubescent at the lower half, inner surface glabrous; filament sheath 3 mm long., glabrous on both surfaces, free filaments 1.6 mm long., glabrous; rudimentary petals absent; style 4.4 mm long., bent in the middle at ca. 90°, puberulous at the apex, stigma straight; ovary 1.6 × 1.8 mm, glabrous, with a conspicuous disc at the base of the ovary with a globose structure that may be a auriculate nectarius. Capsule 7.4 × 6 mm, elliptic, apex hardly lobed, with yellow glands forming spots. Seeds 3.5 × 2.8 mm, oval pubescent, caruncle 1.7 × 1.9 mm long., rugose, glabrous.

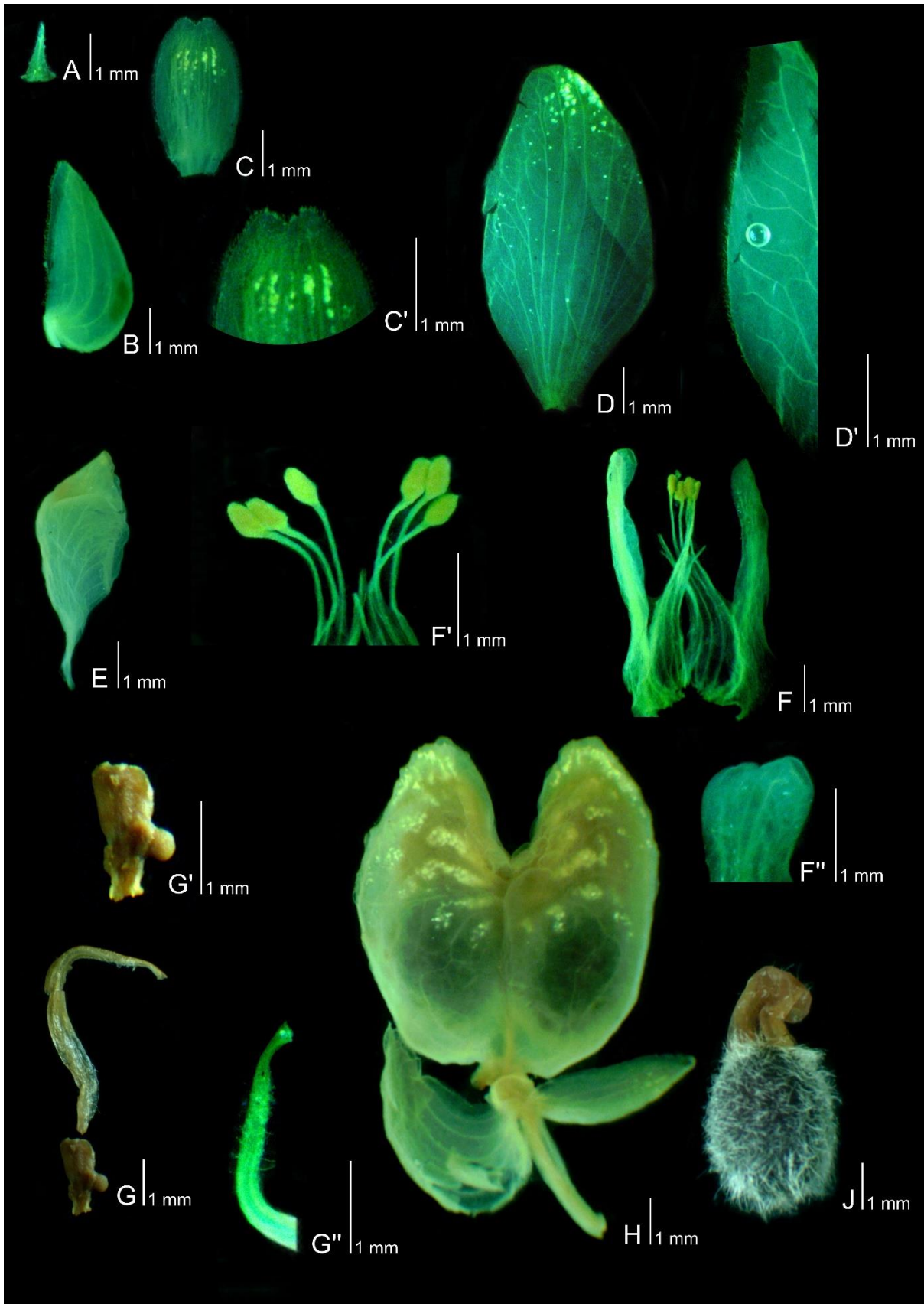


Figure 54. *Asemeia echinosperma* (Görts) J. F. B. Pastore & J. R. Abbott. (*J. Granville et al.* 5898, G). — A. Bract. B. Adaxial sepal. —C. Abaxial sepals. —C'. Margin detail of abaxial sepals. —D. Inner sepal. —D'. Margin detail of inner sepal. —E. Keel. —F. Lateral petals with androecium. —F'.

Free filaments. —F''. Apex detail of the lateral petals. —G. Gynoecium. —G'. Ovary —G''. Stigma detail. —H. Capsule. —J. Seed. A–J.

Distribution. *Asemeia echinosperma* was first described from Suriname; however, specimens have also been found in French Guiana. Figure 50.

Nomenclatural Notes. Pastore & Abbott (2012) placed *Asemeia echinosperma* in *A.* subgen. *Apopetala*, possibly due to its lack of morphological resemblance to species in *A.* subgen. *Asemeia*. However, the authors also recognized that the species was morphologically distinct from *A.* subgen. *Apopetala*, suggesting that it might be better accommodated in a separate subgenus.

Additional Notes. *Asemeia echinosperma* displays unique features in the genus *Asemeia*. This species (and the subgenus *Wurdackia*) can be recognized by the presence of yellow glands on various structures, as the abaxial sepals, inner sepals, and capsule. The capsule is slightly winged, with apex hardly lobed, and the disc at the base of the ovary exhibits a structure resembling a nectary.

Additional Specimens Examined. FRENCH GUIANA. **Camopi:** Monts Bakra, 1.5 km à l'Ouest du Pic Coudreau, 52°57'W, 03°18'N, 520 m alt., 16 June 2002, *J. J. de Granville et al.* 14799 (CAY, L, P, U, US). **Guyanne:** Montanges de la Trinité, sommet nord, forêt dense sur crête avec chaos granitique, 12 Jan. 1984, *J. J. de Granville et al.* 5898 (P). SURINAME. **Marowijne:** In montibus, qui dicuntur Nassau, km 11,6, 16 Mar. 1949, *J. Lanjouw & J. C. Lindeman* 2738 (K, U); Nassau Montains, Marowine River, 400–500 m alt., 10 Mar. 1955, *B. maguire* 40783A (K); Nassau mts., Plateau C, 6 Feb. 2003, *M. J. Jansen Jacobs* 6572 (U, US).

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2.6. CAPÍTULO VI. (227) Proposal to permit a binding decision on whether or not an indirect reference to a basionym or replaced synonym is sufficient for valid publication of a name

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(227) Proposal to permit a binding decision on whether or not an indirect reference to a basionym or replaced synonym is sufficient for valid publication of a name

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Recently a proposal to amend the *Shenzhen Code* (Turland & al. in *Regnum Veg.* 159. 2018), to include the possibility of requesting a binding decision to decide whether an illustration fulfills the requirements of Art. 38.8, was presented in Proposal 076 (Pastore & al. in *Taxon* 70: 456. 2021). Now we have a similar proposal to include the possibility of requesting a binding decision on whether or not an indirect or cryptic reference to a basionym or replaced synonym is sufficient for valid publication. The *Code* has a number of provisions where an indirect reference to a previous publication can affect the valid publication of a name, e.g. Art. 38.12, 38.13, 40.3, 41.3, and 43.2.

According to Art. 41.3: “Before 1 January 1953 an indirect reference (see Art. 38.14) to a basionym or replaced synonym is sufficient for valid publication of a new combination, name at new rank, or replacement name.” In some situations, the form in which such a reference appears creates doubt as to whether it fulfills the requirement of Art. 41.3. This situation has no simple solution, and its subjectivity could lead to a name being considered validly published or not depending on the interpretation of the original publication. The case of *Polygala pubescens* Muhl. was comprehensively described by Pastore & Mota (in *Phytotaxa* 383: 125–

127. 2018), where the authors argued that *P. pubescens* Muhl. was a replacement name for *P. senega* var. *rosea* Michx., because the name at new rank based on Michaux's name was preoccupied by *P. rosea* Desf. at the time. However, this interpretation has not been widely accepted. The alternative interpretation, that "*rosea*" was treated by Muhlenberg (Cat. Pl. Amer. Sept: 63. 1813) as a variety of *P. pubescens*, a binomial that did not exist at that time, renders *P. pubescens* var. *rosea* (Michx.) Muhl. as not validly published. As regards "*Polygala pubescens* Muhl.", IPNI (<https://www.ipni.org/> accessed 5 February 2023) provides the following remarks: "Muhlenberg published *Polygala pubescens rosea* Mx and thus indirectly referred to *P. senega* var. *rosea* Michx. Since *P. pubescens* remained invalid in 1813, var. *rosea* Muhl. was also invalidly published." This situation creates instability for some related names because *P. pubescens* Mart. (in Denkschr. Königl. Bot. Ges. Regensburg. 1(1): 185. 1815), a heterotypic synonym, is either an illegitimate later homonym or a correct name, and *P. pubescens* Nutt. (Gen. N. Amer. Pl. 2: 87. 1818) is either an isonym or a later homonym.

Furthermore, there is no provision in the *Code* to resolve the issue as to whether or not something is a new combination, name at new rank, or replacement name, and so a stalemate is reached. Therefore, we present a proposal to modify Art. 41 in order to permit, when it is unclear if a cryptic "indirect reference" satisfies Art. 41.3, the submission of a request for a binding decision to the General Committee.

(227) Add a new Article to Art. 41 as follows:

"41.n. When it is doubtful whether an author has satisfied the requirement of Art. 41.3 for an "indirect reference" to a basionym or replaced synonym, a request for a decision may be submitted to the General Committee, which will refer it for examination to the specialist committee for the appropriate taxonomic group (see Div. III Prov. 2.2, 7.9, and 7.10). A Committee recommendation as to whether the name concerned is validly published may then be put forward to an International Botanical Congress and, if ratified, will become a binding decision with retroactive effect. These binding decisions are listed in App. VI."

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4. CONSIDERAÇÕES FINAIS

Esta tese incluiu diversas abordagens para ampliar entendimento do gênero *Asemeia* (Polygalaceae). Dentre os pontos de destaque estão: a filogenia com amostragem da grande maioria das espécies, uma nova classificação infragenérica para gênero, um estudo morfológico minucioso que apresentando a variação morfológica no gênero em detalhes. Por fim, o esforço para tipificar todos os nomes com base no contexto histórico resultou em diversas novidades nomenclaturais. Entretanto, assim como provavelmente todos os estudos, esta tese gera novas perspectivas para investigações futuras em *Asemeia*, com destaque para a delimitação específica de algumas espécies, que ainda requer atenção, como *Asemeia decumbens*, *A. grandiflora* e *A. extraaxillaris*, as quais podem ter sido excessivamente abrangentes nesta tese, como também estudos moleculares direcionados a avaliar uma possível delimitação reticulata e presença de híbridos pontuais em *Asemeia*. Além disso, estudos anatômicos, polínicos e ecológicos podem se valer desta proposta de classificação taxonômica para guiar futuras investigações em *Asemeia* e seus complexos.

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