Caroline Oliveira Andrino

Sistemática de *Paepalanthus* Mart. (Eriocaulaceae)

Systematics of *Paepalanthus* Mart. (Eriocaulaceae)

São Paulo
2018

Caroline Oliveira Andrino

Sistemática de *Paepalanthus* Mart. (Eriocaulaceae)

Systematics of *Paepalanthus* Mart. (Eriocaulaceae)

Tese apresentada ao Instituto de Biociências da Universidade de São Paulo, para a obtenção de Título de Doutora em Ciências, na Área de Botânica.

Orientador: Prof. Dr. Paulo Takeo Sano

São Paulo
2018

FICHA CATALOGRÁFICA

Andrino, Caroline Oliveira

Sistemática de *Paepalanthus* Mart. (Eriocaulaceae). Orientador: Prof. Dr. Paulo Takeo Sano.

227 p.

Tese (doutorado) - Instituto de Biociências da Universidade de São Paulo, Departamento de Botânica.

1. Filogenia 2. Taxonomia 3. Eriocaulaceae

Comissão Julgadora:

Prof(a). Dr(a).	Prof(a). Dr(a).
Prof(a). Dr(a).	Prof(a). Dr(a).

Prof. Dr. Paulo Takeo Sano

Orientador

À minha querida mãe,
Edméa Oliveira, dedico.

Agradecimentos

A melhor parte desses anos dedicados a este trabalho, além de todo o enriquecimento profissional e pessoal envolvido, são as pessoas que cruzaram meu caminho ou que sempre estiveram por perto. Foram longos quatro anos e neles couberam uma vida inteira. Ao mesmo tempo foi tudo muito rápido, e parece que ontem foi o dia da minha matrícula. Nesse dia, falei para os meus amigos que eu tinha acabado de decidir como seriam meus próximos quatro anos. Que inocência, não fazia idéia.

Primeramente, agradeço as instituições que sediaram essa pesquisa e financiadores: o Instituto de Biociências da **Universidade de São Paulo**, especialmente o **Laboratório de Sistemática Vegetal**; à Embrapa Recursos Genéticos e Biotecnologia e ao **The Field Museum** de Chicago; à Cordenação de Aperfeiçoamento de Pessoal de Nível Superior (**CAPES**), agradeço duplamente pela bolsa de pesquisa no país e pela bolsa do programa de doutorado sanduíche no exterior (PDSE); à **Fundação Banco Santander** pelo financiamento para as visitas aos herbários europeus, à **International Association for Plant Taxonomy** (**IAPT**), à **Systematics Association** and **Linnean Society of London** e ao **Smithsonian Institution** pelo financiamento às viagens de campo, e visitas a herbários nos Estados Unidos. Agradeço também à **Idea Wild** por fornecer equipamento para esse trabalho.

Agradeço aos meus orientadores, Paulo Takeo Sano e Marcelo Fragomeni Simon e Nancy Hensold, pela paciência e ensinamentos muito além das ciências. Muito obrigada pela confiança depositada em mim e por me incentivarem cada um a sua maneira. Ao Paulo, em especial, agradeço pelos oito anos de convivência e aprendizado diário, não importa onde eu estivesse.

Agradeço à Fabiane Costa e ao Maurício Watanabe pela amizade e incentivo sempre.

Agradeço aos meus colegas e amigos Sobre-as-Ondas, Annelise Frazão, Augusto Giaretta, Beatriz Gomes, Caetano Troncoso, Carolina Siniscalchi, Cíntia Luz, Eric Kataoka, Gisele Alves, Guilherme Antar, Juliana Rando, Juliana El Otra, Juliana Lovo, Leonardo Borges, Luiz Henrique Fonseca, Marcelo Devecchi, Marcelo Kubo, Matheus Cota, Pamela Santana, Paulo Baleeiro, e Rebeca Viana. Um agradecimento especial à Anne, à Carol Sinis, ao Gonella, ao Kubo e ao Augusto que foram maravilhosos sempre, mas em especial por segurarem a minha barra na reta final dessa fase.

Aos meus amigos dos tempos de escola, Rafael Lemes, Herika Nunes e Larissa, pelo incentivo e companheirismo. As minhas amigas Daniela Antunes e Bruna Diniz, pelo apoio.

Ao Rafael, pelo grande apoio e ajuda nos últimos meses.

A todos os amigos que fiz durante esses anos, obrigada por trazerem alegria aos meus dias.

Aos queridos Carol, Kubo, Gonella e Baleeiro, pela amizade construída nessa fase e tantas boas lembranças.

À minha família, pela compreensão, presença e apoio. À minha mãe e meus irmãos por todo amor. À Milu e Pipa por todo o carinho.

Muito obrigada!

Content

Abstract

Phylogenetic systematics has revolutionized biological classifications, increasing our understanding of the evolution of the characteristics of living beings and generating more efficient reference systems. At the same time, the computerization and the online availability of biological collections has facilitated consultations of type materials and determination updates. However, the genus *Paepalanthus*, which represents an important radiation of monocotyledons in the Neotropics and in *campos rupestres* vegetation, is far from being well-understood taxonomically and evolutionarily. The large numbers of species placed in non-monophyletic groups, and our poor understanding of species boundaries hamper understanding of their diversity. The focus of the present study was to improve our knowledge of this group by carrying out the most comprehensive phylogenetic study possible. The first chapter presents an overview of our current taxonomic knowledge of the family and the genus, as well as a newly revised list of valid names in *Paepalanthus*, which were only previously estimated. The list contains the infrageneric categories to which the species are assigned, their distributions, and comments when necessary. In the second chapter, a taxonomic study of *Paepalanthus* ser. *Paepalanthus* (*P.* [unranked] *Variabiles*) is presented, with the recognition of 127 species and delimitation of two complexes based on the examination of 16,000 exsiccate from Brazilian and other herbaria. A list of valid names, synonyms, nomenclatural notes, distribution maps, photographs of species in the field, and a discussion about the patterns found in *Paepalanthus* ser. *Variabiles* were produced. The third and last chapter presents the reconstruction of the phylogenetic hypothesis for *Paepalanthus*. It is based on data of three molecular markers (one plastid and two nuclear) obtained from 174 species of *Paepalanthus*, 20 species of other genera that emerged within *Paepalanthus* in previous phylogenies, and 12 species from external groups. The topology resulting from all of the analyses demonstrated good resolution, with well-supported clades, allowing the proposal of a new classification with consistent morphological correspondence.

Key-words: taxonomy, phylogeny, Eriocaulaceae

Resumo

A sistemática filogenética vem revolucionando as classificações biológicas, aumentando o entendimento da evolução das características dos seres vivos e resultando em um sistema de referência mais eficiente. Ao mesmo tempo, a informatização e disponibilização online das coleções biológicas tem acelerado o estabelecimento de acervos com alta confiabilidade taxonômica. No entanto, o gênero *Paepalanthus*, que respresenta uma importante irradiação de monocotiledôneas nos Neotrópicos e dos campos rupestres, está muito aquém do que poderia no que diz respeito ao seu entendimento, tanto taxonômico quanto evolutivo. O grande número de espécies em grupos não monofiléticos, a falta de circunscrição taxonômica e a grande dificuldade de aplicabilidade dos nomes das espécies emperram o entendimento de sua diversidade. O foco principal do trabalho foi melhorar o conhecimento desse grupo e a partir dos materiais coletados, realizar um estudo filogenético mais abrangente quanto possível. No primeiro capítulo, é apresentado um panorama geral sobre o gênero, bem como uma lista atualizada dos nomes aceitos em *Paepalanthus* que, até agora, eram somente estimativas. A lista contém categorias infragenéricas as quais as espécies foram atribuídas, incluindo sua distribuição e comentários quando necessário. No segundo capítulo, um estudo taxonômico de *Paepalanthus* ser. *Paepalanthus* (=*P.* [não-ranqueado] *Variabiles*) é apresentado, com o reconhecimento de 127 espécies e delimitação de dois complexos, a partir de 16.000 exsicatas examinadas em herbários brasileiros bem como internacionais. Foi produzida uma lista nomes aceitos, sinônimos, notas nomenclaturais, mapas de distribuição, fotografia das espécies em campo e uma discussão sobre os padrões encontrados em *Paepalanthus* ser. *Variabiles*. No terceiro e último capítulo, é apresentada a reconstrução da hipótese filogenética de *Paepalanthus*. Essa reconstrução é baseada em dados de três marcadores moleculares (um plastidial e dois nucleares), obtidos de 174 espécies de *Paepalanthus*, 20 espécies de outros gêneros que emergem juntamente com *Paepalanthus* nas filogenias anteriores e mais 12 espécies representando o grupo-externo. A topologia resultante de todas as análises apresentou boa resolução, com clados bem sustentados, permitindo que uma nova classificação fosse proposta com correspondência morfológica consistente.

Palavras-chave: taxonomia, filogenia, Eriocaulaceae

General Introduction

Eriocaulaceae comprises 10 genera and approximately 1400 species; *Paepalanthus* Mart. comprises about 400 species, distributed mainly throughout the Neotropics. The genus is the second largest in the family and, among angiosperms, the third largest genus of the Brazilian flora (BFG, 2015). This fact, however, far from reflecting what actually occurs in nature, more accurately reflects the lack of circumscription and taxonomic delimitation in the genus as a whole. Due to its morphological diversity (or uniformity), many Eriocaulaceae species described since the 19th century have been placed in the genus *Paepalanthus* for lack of better positioning. The same happened with one of 20 infrageneric categories defined by Ruhland (1903) in the latest revision of the genus, *Paepalanthus* ser. *Paepalanthus* (*P.* [unranked] *Variabiles* Ruhland), which comprises almost half of the Brazilian species of the genus and a third of all *Paepalanthus*. The group has not been comprehensively studied since Ruhland's (1903) monograph given the large number of species, many of them of difficult delimitation and with similar gross morphologies. The lack of knowledge of these species and the groups within this taxon represent the greatest challenge today in understanding *Paepalanthus* and consequently, the main impediment to the progress in taxonomic studies of the genus.

Additionally, the great majority of those groups established by Ruhland (1903) are not monophyletic (Andrade *et al.*, 2010, Giullietti *et al.*, 2012, Trovó *et al.*, 2013), and hundreds of species have been described for the genus since then, so even the current number of species in *Paepalanthus* is only an estimate.

An overview of our current knowledge of the genus, plus a list of all valid names as well as a taxonomic survey of *Paepalanthus* ser. *Paepalanthus* (*P.* [unranked] *Variabiles* Ruhland), are provided here, in addition to a comprehensive phylogeny based on the sampling acquired in the study of the species of the largest group within the genus.

References

Andrade, M. J. G. de, A.M. Giulietti, A. Rapini, L.P. de Queiroz, A. de S. Conceição, P.R.M. de Almeida, C. Van den Berg. (2010) A comprehensive phylogenetic analysis of Eriocaulaceae: Evidence from nuclear (*ITS*) and plastid (*psbA-trnH* and *trnL-F*) DNA sequences. *Taxon* 59: 379–388.

BFG (2015) Growing knowledge: an overview of Seed Plant diversity in Brazil. *Rodriguésia* 66(4): 1085–1113.

Giulietti, A.M., Andrade, M.J.G, Scatena, V.L., Trovó, M., Coan, A.I., Sano, P.T., Santos, F.A.R, Borges, R.L.B. & van den Berg, C. (2012) Molecular phylogeny, morphology and their implications for the taxonomy of Eriocaulaceae. *Rodriguésia* 63: 1–19.

Trovó, M., Andrade, M.J.G., Sano, P.T., Ribeiro, P.L. & van den Berg, C. (2013) Molecular phylogenetics and biogeography of Neotropical Paepalanthoideae with emphasis on Brazilian *Paepalanthus* (Eriocaulaceae). *Botanical Journal of the Linnean Society* 171: 225–243.

Ruhland, W. 1903. Eriocaulaceae. *In:* Engler, A., Das Pflanzenreich. Regni vegetabilis conspectus. IV.30. W. Engelmann, Leipzig.

Chapter 1

Paepalanthus Mart.: an overview of its taxonomic history and evolutionary traits

Abstract

Paepalanthus is, unquestionably, the most deficient genus in terms of circumscription in the Eriocaulaceae family, regarding its species circumscriptions, infrageneric classification and even generic limits. A first step towards understanding the genus is to know its composition. A general overview of the status of knowledge concerning *Paepalanthus* is here provided. In order to diagnose the current state of art of the taxonomy of the genus and compile available data about it, a list of accepted species, as well as their placement in the infrageneric classification and their geographical distribution is provided herein. *Paepalanthus*, as here circumscribed, comprises 405 species, of which 256 occur in Brazil, and 44 species are known only by the type specimen. Only three of the current 20 infrageneric categories of *Paepalanthus* have been recently reviewed, and the largest number of species is placed in a single unreviewed series, *Paepalanthus* ser. *Paepalanthus*, with 129 species.

Resumo

Paepalanthus é, inquestionavelmente, o gênero mais deficiente em relação à circunscrição na família Eriocaulaceae, seja referente à circunscrição de espécies, das categorias infragenéricas e, até mesmo, em relação aos limites do gênero. Um primeiro passo em direção ao entendimento do gênero é conhecer a sua composição. Um panorama geral do status de conhecimento sobre *Paepalanthus* é aqui fornecido. Com o objetivo de diagnosticar o atual estado da arte da taxonomia do gênero e compilar dados disponíveis acerca dele, uma lista de espécies aceitas, bem como suas respectivas posições na classificação infragenérica e distribuições geográficas são aqui fornecidas. *Paepalanthus* compreende 405 espécies, das quais 256 ocorrem no Brasil e 44 são conhecidas apenas do material tipo. Apenas três das 20 atuais categorias infragenéricas de *Paepalanthus* foram revisadas recentemente e o maior número de espécies está em uma única série ainda não revisada, *Paepalanthus* ser. *Paepalanthus*, com 129 espécies.

Introduction

Eriocaulaceae is currently classified as a monocotyledonous family belonging to the order Poales (APG IV, 2016) and as a sister group of Xyridaceae, together forming the early-diverging Xyrids clade (Bouchenak-Khelladi, 2014). Morphologically, the two families resemble each other and share the same habit; i.e., generally short stemmed, dense clusters of flowers on a scape, a perianth with a calyx, a corolla, and an ovary with thin-walled megasporangia (Judd *et al.*, 2009). Stützel (1990) and Oriani & Scatena (2012) described many characteristics that corroborate the close relationship of Eriocaulaceae and Xyridaceae, including the observation that the flowers of plants in both families have petals with elongated epidermal cells with straight walls, epipetalous stamens, staminodes, and anthers with longitudinal dehiscence. Eriocaulaceae and Xyridaceae emerged by the end of the Cretaceous and the early Cenozoic respectively. Both ancestors originated in sunny environments, and a reconstruction of the moisture preferences of Eriocaulaceae points to a lineage adapted to wet environments about 55 Ma (Bouchenak-Khelladi, 2014).

The monophyly of Eriocaulaceae has never been contested. The family is characterized mainly by a rosette habit, present in most of its species, and by its usually diclinous flowers arranged in capituliform inflorescences. Most species included in Eriocaulaceae are perennial herbs, measuring from a few centimeters up to about two meters tall. They have leaves in basal rosettes most of the time, from which scapes emerge surrounded by a cylindrical spathe. The inflorescences are capituliform, and the flowers are generally actinomorphic, diclinous, dimerous or trimerous, and pedicellate or sessile. The flowers are usually less than 0.5 centimeters in length and each one presents an axillary floral bract. The androecium of species in one subfamily is diplostemonous, while the species of the other are isostemonous. In the isostemonous species, staminodes are observed, corresponding to the reduction of the internal stamen whorl. The pollen grains are spiraperturate. The gynoecium is bi- or tricarpellate, superior, with axial placentation, and one orthotropous ovule per locule. The style branches can be simple or bifid, with filiform or papillose nectariferous appendages (Rosa & Scatena 2007). The fruit is usually a loculicidal capsule with a membranous pericarp and the seeds usually measure between 0.3 and 1.5 millimeters in length, with very varied sculptures (Giulietti 1997). Seed morphology, which may contain valuable taxonomic information, has still not been comprehensively studied in the family.

Currently, Eriocaulaceae comprises about 1400 species in 10 genera. The family is divided into two subfamilies. The plants of one subfamily, Eriocauloideae Ruhland, which includes the genera

Eriocaulon L. and *Mesanthemum* Koern., are characterized by having diplostemonous flowers, petals with glands, a gynoecium without nectariferous appendages and style branches inserted at the apex of the carpel (Rosa & Scatena, 2007). Plants of the other subfamily, Paepalanthoideae Ruhland, which comprises eight genera and about 800 species, are defined by their isostemonous flowers, petals without glands, a gynoecium with appendages inserted at the apex, and style branches inserted above the locule walls (Körnicke 1863; Ruhland 1903). The subfamily Eriocauloideae is widely distributed throughout the tropics, while the greatest diversity of Paepalanthoideae is in the Americas.

Eriocaulaceae as a whole has a pantropical distribution, but the greatest generic and specific diversity is found in the Neotropics. The Eriocaulaceae genera with the largest number of species are *Eriocaulon* L., with about 550 species, *Paepalanthus* Mart., with about 400 species, and *Syngonanthus* Ruhland, with about 150 species. The taxonomic characterization of genera and infrageneric taxa in Eriocaulaceae has historically been based on floral characteristics, starting at the time when the first groups were described (Koernicke, 1863; Ruhland, 1903) and continuing to the present day.

Taxonomic background

Eriocaulon was the first genus described, among those currently accepted for Eriocaulaceae, with the genus description published in 1754 (Linnaeus, Carl von, 1754). The genus was characterized basically by the calyx with lanceolate sepals, trimerous corolla with lanceolate and obtuse petals, villous apex, hairy pedicel, three stamens with thin filaments, oblong anthers and three styles. In the following years, two additional genera were described: *Nasmythia* Hudson (1778) and *Tonina* Aublet (1775).

Before being recognized as a distinct family, the genera currently described as belonging to Eriocaulaceae had been placed in other botanical families. As an example, according to the natural system of botanical classification proposed by Jussieu (1789), the genus *Tonina* Aubl. was classified as a taxon of uncertain family placement. *Eriocaulon* L., in turn, had been placed in the order Junci (corresponding to several modern families, including Juncaceae, Restiaceae and Commelinaceae). In the work of Kunth (1815), the genus *Eriocaulon* L. was placed in the family Restiaceae, in the section Eriocauleae. Kunth (1815) characterized *Eriocaulon* as having between 3-6 stamens, different from other early authors (Linnaeus, 1756, 1762-63, 1792; Jussieu, 1789).

Bongard (1831) presented the first monograph of the Brazilian *Eriocaulon* species, based on the collections of G. H. von Langsdorff and L. Riedel that had been deposited in the herbarium of St. Petersburg. Eighty species were reported, of which 73 were described as new.

Desvaux (1828) described three genera for Eriocaulaceae: *Randalia, Symphachne,* and *Sphaerochloa.* A year later, Vellozo (1829) described *Dupatya* as the first exclusively Brazilian genus of Eriocaulaceae, from three species from Rio de Janeiro (*D. aequalis*, *D. ligulata* and *D. hirsuta*). Vellozo's (1829, 1831) work faced several printing problems (Carauta 1969, Bediaga & Lima 2015), and the descriptions, which were completed in 1790, were only published in 1829 (Vellozo 1829), and the illustrations two years later (Vellozo, 1831), causing the loss of priority for some names. In the following year, Roxburgh (1832) described *Leucocephala* as another genus for the family.

Martius (1835) carried out the first comprehensive study of the Eriocaulaceae family. In his treatment, the genera *Dupatya, Randalia*, *Sphaerochloa, Symphachne,* and *Leucocephala* were synonymized with *Eriocaulon*. This study led to Eriocaulaceae comprising three genera, *Eriocaulon*, *Tonina* Aubl., and *Philodice* Mart, the latter described in that study, which was characterized by pistillate flowers fused in median portion. Martius (1835) also proposed splitting *Eriocaulon* into 3 groups: *Eriocaulon*, *Nasmythia,* and *Paepalanthus*, which he treated ambivalently as either genera or subgenera. *Paepalanthus* Mart. was characterized by bifid stigmas and glandular appendages on the gynoecium.

Kunth (1841) and most subsequent authors treated *Paepalanthus* as a genus, maintaining the same characterization proposed by Martius (1835). Kunth also described *Lachnocaulon* Kunth., a North American genus, which was distinguished by its monothecous anthers and by the complete reduction of the corolla of staminate and pistillate flowers. With this treatment, Eriocaulaceae had a total of five genera and 149 species.

The authorship of the genus *Paepalanthus* remained controversial for over a century. Rickett & Stafleu (1959) proposed *Paepalanthus* Mart. as a *'nomen conservandum'* (conserved against *Dupatya*) with *P. lamarckii* indicated as the conserved type (1930). However, Rickett & Stafleu (1959) argued that the choice of the type species of the genus was inadequate, since *P. lamarckii* was not included in the protologue of Martius in 1835. Thus, to maintain the type species, Rickett & Stafleu (1959) proposed the conservation of *Paepalanthus* Kunth against both *Paepalanthus* Mart. and *Dupatya.* Recently, Giulietti *et al.* (1998), proposed the return of the recognition of *Paepalanthus* Mart. and

elected *Paepalanthus erigeron* Mart. ex Körn. to be the conserved type. Giulietti et al. (1998) pointed out that Martius (1835) was the first to recognize the taxon and that *P. lamarckii* was an unfortunate and premature choice of a conserved type that could create instability in the classification of a large genus of economic importance, due to its characteristics closer to *Blastocaulon* Ruhland, among other reasons.

Körnicke (1863), in the treatment of Eriocaulaceae for *Flora Brasiliensis*, performed the second major revision of the family. The main distinctive morphological features of Eriocaulaceae described in this work were: annual or perennial herbs, female and male flowers gathered in dense capitula, corolla 2,3-merous; flowers with 4-6 stamens (diplostemonous) or with 2-3 stamens (isostemonous); and one ovule per locule. In that treatment, Körnicke (1863) recognized five genera for Brazil: *Eriocaulon* L., *Paepalanthus* Mart., *Philodice* Mart., *Tonina* Aubl. and the genus *Mesanthemum* [Körnicke (1857) describes the genus as distributed in Africa, but in Körnicke (1863), the author states that "according to Bongard" the genus is found in Rio de Janeiro; Actually, the genus occurs only in Africa]. Körnicke also proposed the division of *Paepalanthus* Mart. into 16 infrageneric categories: three sections and 14 subgenera. Section I was composed of two species, section II was composed of five subgenera, characterized by glabrescent capitula, and section III grouped nine subgenera that shared villous capitula. For *Eriocaulon* L., four subgenera were recognized: *E.* subg. *Astole* Körn., *E.* subg. *Trichopeplus* Körn., *E.* subg. *Spathopeplus* Körn., and *E.* subg. *Eriocaulon.* Additionally, Körnicke (1863) described many new species and proposed to split the family into two tribes: Eriocauleae Tribe, comprising the genera *Eriocaulon* L. and *Mesanthemum* Körrn, defined by species that have four to six stamens and glandular petals; and Paepalantheae Tribe, comprising the genera *Paepalanthus*, *Philodice* and *Tonina,* defined by species that have two to three stamens and absence of petal glands.

Ruhland (1903) performed the last taxonomic revision of the entire Eriocaulaceae family. Using the same criteria as Körnicke (1863), Ruhland (1903) proposed the division of Eriocaulaceae into two subfamilies: Paepalanthoideae and Eriocauloideae, corresponding to the tribes Paepalantheae and Eriocauleae of Körnicke (1863), respectively. Three new genera were described in Paepalanthoideae based on species segregated from *Paepalanthus* and some new species: *Blastocaulon* Ruhland, including three species defined by a distinct growth habit and by the presence of monothecous anthers; *Syngonanthus* Ruhland, characterized by species with pistillate flowers with petals united in the median portion and bithecous anthers, and *Leiothrix* Ruhland, characterized by

species with nectariferous and stigmatic appendages appearing on the gynoecium column at different heights.

Ruhland (1903) rearranged the genus *Paepalanthus* into 22 infrageneric taxa, some of them previously proposed by Körnicke (1863). The new classification was composed of six subgenera, five sections, six subsections, and five series (Tab. 1).

Silveira (1908, 1928), following the classification proposed by Ruhland (1903), described 177 new species and 28 new varieties for *Paepalanthus*. Although many species were illustrated, there was no identification key, limiting the usefulness of that resource. Moldenke (1937; 1939; 1940; 1947; 1948; 1949; 1950; 1951; 1952; 1953; 1957; 1959; 1962; 1963; 1971; 1974; 1976; 1977; 1978; 1979; 1980; 1981; 1982; 1983) published 185 other names but did not indicate infrageneric categories neither provided an identification key, and frequently did not explicitly compared the newly described species to others, making several of his species of difficult interpretation. Those are some of the reasons why *Paepalanthus* is the most complex genus of the family from a taxonomic point of view.

Other genera of Eriocaulaceae have been described in the last decades: *Rondonanthus* Herzog (1931), *Carptotepala* Moldenke (1951), *Wurdackia* Moldenke (1957), and *Moldenkeanthus* Morat (1976). Three of them were later synonymized: the genera *Carptotepala* and *Comanthera* L.B. Smith were synonymized into *Syngonanthus* (Giullieti & Hensold, 1991); *Wurdackia* today is synonymous with *Rondonanthus* (Hensold & Giulietti 1991); and *Moldenkeanthus* has been transferred to *Paepalanthus* (Stützel 1987). Within *Paepalanthus*, a subgenus restricted to the Pantepuis of the Guyana Shields, *P.* subg. *Monosperma* Hensold (1991), was described, and another subsection, *P.* subsect *Cryptanthella* (Suessenguth, 1942) described for the Andean Paramo. In 2004, *Paepalanthus* sect. *Actinocephalus* was revised and raised to the rank of genus (Sano, 2004) based on the presence of paraclades (an axillary reproductive stem supporting the scapes), and scapes arranged in umbels. Later, *Paepalanthus* sect. *Aphorocaulon* was also transferred to the genus *Actinocephalus* (Costa & Sano, 2013), the latter of which now comprises 47 species.

Tab. 1. Current infrageneric classification of *Paepalanthus* Mart. The numbers in parentheses represents the number of species in each group

Subgenera	Section	Subsection	Series
P. subg. *Thelxinoe* (2)			
P. subg. *Monosperma* (24)			
P. subg. *Platycaulon* (48)	*P.* sect. *Divisi* (24)		
	P. sect. *Conferti* (24)		
P. subg. *Xeractis* (28)	*P.* sect. *Chrysostegis* (5)		
	P. sect. *Gymnostegis* (1)		
	P. sect. *Pleurophyllon* (2)		
	P. sect. *Xeractis* (20)		
P. subg. *Paepalanthus* (260) (=*P.* subg. *Paepalocephalus Ruhland*)	*P.* sect. *Conodiscus* (4)		
	P. sect. *Dyostiche* (1)		
	P. sect. *Diphyomene* (21)		
	P. sect. *Paepalanthus* (234) (=*P.* sect. *Eriocaulopsis Ruhland*)	*P.* subsect. *Polycladus* (2)	
		P. subsect. *Polyactis* (26)	
		P. subsect. *Actinocephaloides* (6)	
		P. subsect. *Dichocladus* (8)	
		P. subsect. *Cryptanthella* (5)	
		P. subsect. *Paepalanthus* (180) (=*P.* subsect. *Eupaepalanthus Ruhland*)	*P.* ser. *Dimeri* (7)
			P. ser. *Vivipari* (4)
			P. ser. *Leptocephali* (31)
			P. ser. *Rosulati* (7)
			P. ser. *Paepalanthus* (127) (=*P.[unranked]Variabiles Ruhland*)
Unplaced Species: 38			
Doubtful Taxa: 3			

Studies within *Paepalanthus* have followed a similar pattern. Originally, the elevation of *P.* sect. *Actinocephalus* to the rank of genus would have been considered premature given the given indications that *Actinocephalus* is nested within *Paepalanthus*. On the other hand, this represented a step in the attempt to revise smaller groups and better define the structure of genus *Paepalanthus* and the groups inside it. Specifically, two of the four subgenera recognized by Ruhland (1903) have been reviewed, *P.* subg. *Xeractis* (Hensold, 1988) and *P.* subg. *Platycaulon* (Tissot-Squalli, 1997). Recently, *P.* sect. *Diphyomene* (Trovó & Sano, 2010) and *P.* subsect. *Cryptanthella* (Hensold, 2016) were also

revised, but that still represents a small group of phylogenetically untested species and groups, only about 25% of the currently accepted species of *Paepalanthus.*

Those reviewed subgenera, although they have not been comprehensively sampled in phylogenies, are morphologically distinct from the others and have well-defined geographic distributions. *Paepalanthus* subg. *Xeractis* Körn. comprises 28 species endemic to the central portion of the Espinhaço Range, in Minas Gerais State, Brazil, except for a disjunct species found during the present study (Andrino *et. al.*, in prep). The subgenus is easily recognized in the field by having involucral bracts usually surpassing the height of the flowers, and is easily diagnosed by the inner hairiness of the corolla of the staminate flower, present only in that group. *Paepalanthus* subg. *Platycaulon*, which is characterized by the partial or complete union of the scapes, comprises 48 species distributed from the Andes to southern Brazil. *Paepalanthus* subg. *Monosper*ma, which was proposed by Hensold (1991), comprises 24 species and is characterized by the bifid stigmas, style caducous in the fruit, fruiting sepals not reflexed, the consistent production of single-seeded indehiscent fruits in contrast to the capsular fruits characteristic of other members of the family, and its distribution restricted to the Guiana Shield.

Another group reviewed was *P.* subsect *Diphyomene*, characterized by the reproductive axis supporting the inflorescence and by its dimerous flowers. The taxon comprises 21 species distributed mainly in the Central Plateau of Brazil (Trovó & Sano, 2010). *Paepalanthus* subsect. *Cryptanthella*, recently reviewed and tentatively re-circumscribed by Hensold (2016), is a group of cushion plants native to the Andean paramo, and includes five species, but probably has close ties to other neotropical species. This subsection has never been sampled in phylogenies prior to the current work.

Evolutionary traits

When cladistic studies began to be performed and the monophyly of those groups were tested, the uncertainty of the common evolutionary history of *Paepalanthus* became evident. In fact, all infrageneric taxa of *Paepalanthus* so far tested, with the exclusion of *P.* subg. *Monosperma*, appear to be either paraphyletic or polyphyletic.

Giulietti *et al* (1995) produced the first phylogeny of the family, based on 29 morphological characters of 11 supraspecific taxa, representing 8 genera of the family. In that study, the subfamilies Eriocauloideae and Paepalanthoideae emerged monophyletic, and *Paepalanthus* polyphyletic. Some

years later, Giulietti *et al.* (2000) expanded the previous phylogeny by using 49 morpho-anatomical and phytochemical characters for 25 supra-specific terminal taxa, with *Paepalanthus* once again emerging as polyphyletic.

With the advent of phylogenies using molecular data, Unwin (2004) performed the first molecular phylogeny of the family, treating the terminals at the specific level using the *trnL-trnF* spacer and *ndhF* plastidial sequences in a sample of 63 taxa. The main conclusions of this work were the monophyly of the two subfamilies, as well as the genera *Actinocephalus* (Bong.) Sano, *Lachnocaulon* Kunth, and *Leiothrix*. In that analysis, the genus *Syngonanthus* emerged as paraphyletic and *Paepalanthus* again emerged as polyphyletic.

Some years later, a second phylogenetic analysis of Eriocaulaceae was carried out by Andrade *et al.* (2010) based on molecular characters of a nuclear sequence, the Internal Transcribed Spacer (ITS) and two loci of the chloroplast, the *trnL-trnF* spacer and the *psba-trnH* intergenic spacer. That study found a deep division of *Paepalanthus* into two major clades not readily distinguished by their morphologies, one of which included the genera *Actinocephalus*, *Lachnocaulon,* and *Tonina*. Within the other clade, *P.* subg. *Thelxinöe* emerged as monophyletic, as did *P.* subg. *Platycaulon* and *P.* subg. *Xeractis*; the sampling of the latter two subgroups was too scarce, however, to give support and resolve this grouping. As a result of that study, some taxonomic changes were made: the genus *Blastocaulon* was synonymized with *Paepalanthus* (Andrade *et al.* 2011), the genus *Comanthera* was reestablished to include *Syngonanthus* sect. *Eulepis* and *Syngonanthus* sect. *Thysanocephalus* (Parra *et al.*, 2010), and the genus *Philodice* was merged with *Syngonanthus* (Giulietti *et al.*, 2012). Because of the small sampling of some subgroups, however, any taxonomic changes within *Paepalanthus* could be premature.

Giulietti *et al.* (2012b), carried out another phylogenetic analysis based on the ITS and *trnL-trnF* molecular characters, with a lower sampling of 71 species, but also incorporating external morphology and anatomy, palynology and several recently published studies. That study supported the previous topology published by Andrade *et al.* (2010) and the subsequent taxonomic changes, and showed that many characters traditionally used for differentiating and circumscribing the genera within the family are, in fact, homoplasious. In that work, four monophyletic genera, *Syngonanthus*, *Comanthera*, *Leiothrix,* and *Rondonanthus* were recognized as sister groups of all other Paepalanthoideae genera.

The last comprehensive phylogenetic analysis of the family, published by Trovó *et al.* (2013), sampled 97 species, including 73 species of *Paepalanthus,* again using the ITS and *trnl-trnf* regions. This was the only study that sampled species of *Paepalanthus* subg. *Monosperma*, which emerged monophyletic. Additionally, morphological characters were mapped in the consensus tree in order to analyze the history of the characters. The study corroborated previous nomenclature changes and discussed the putative morphological synapomorphies of some clades, emphasizing that many of them were still defined only by molecular synapomorphies. Trovó *et al.* (2013) also discussed the biogeography of the group, showing that Eriocaulaceae also demonstrates some common distribution patterns of families occurring in *campos rupestres* and suggesting that the current distribution is probably related to vicariance and few long-distance dispersal events. Overall, the last three studies established a consistent backbone for the phylogenetic relationships within the family (Fig. 1), except for a few minor modifications. Additionally, those studies highlighted the need to thoroughly investigate phylogenetic relationships within *Paepalanthus*, a genus that has not yet been the focus of any study.

The phylogenetic analyses of Eriocaulaceae performed by Andrade *et al.* (2010), Giulietti *et al.* (2012), and Trovó *et al.* (2013) suggested that *P.* subg. *Platycaulon* and *P.* subg. *Xeractis* are monophyletic groups. However, those studies only sampled a few species of these subgenera, and for *P.* subg. *Platycaulon*, no Andean species was sampled. Thus, the monophyly of these subgenera could not be truly evaluated.

The first phylogenetic hypotheses within those subgenera were proposed by Echternacht *et al.* (2011), based on morphological characters and focusing on *P.* subg *Xeractis*, a group that is morphologically very distinct. The monophyly of the subgenus had already been tested, as mentioned above, but with only a few species, which did not allow any definitive conclusions to be drawn about the relationship between *P.* subg *Xeractis* and the other subgenera of *Paepalanthus* due to the lack of resolution. Echternacht *et al.* (2011) suggested that there is no exclusive morphological synapomorphy for *P.* subgenus *Xeractis* when considering all Eriocaulaceae, and that the taxonomic sections and series previously proposed for the subgenus are monophyletic.

Recently, *P.* subg. *Platycaulon* was the focus of another phylogenetic study (Diaz Peña, 2016), with extensive sampling of the subgenus, including many species from Brazil and the Andes. In that study, *P.* subg. *Platycaulon* emerged as paraphyletic. The study also concluded that the grouping of the Páramo species of *P.* subg. *Platycaulon* was not monophyletic, and that most of them derived from

Brazilian ancestors around 2 *mya* or less. Additionally, inside *P.* subg. *Platycaulon*, the series *Divisi* and *Conferti* were not recovered as monophyletic clades.

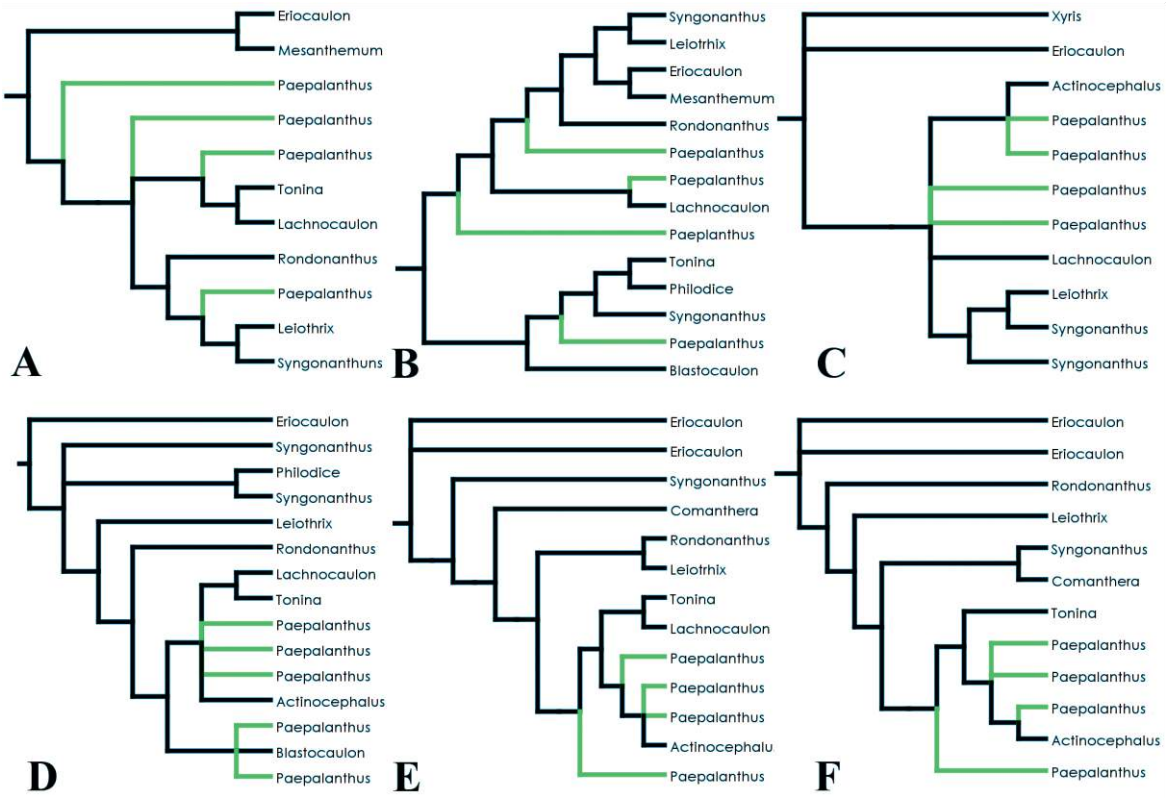


Fig. 1. Schematic phylogenetic relationships published over the years in Eriocaulaceae, with the position of *Paepalanthus* highlighted. These relationships were drawn from analyses of Giulietti *et al.*, 1995 (A); Giulietti *et al.*, 2000 (B); Unwin, 2004 (C), Andrade *et al.*, 2010 (D); Giulietti *et al.* 2012 (E) and Trovó *et al.* 2013 (F).

Among the currently recognized ten genera of the family, *Paepalanthus* shows the greatest diversity in the Neotropics. In Brazil, it is the third largest genus of flowering plants and the first in number of endemic species. The genus is distributed mainly in South America, with three species in Mexico, 19 species in Central America, two in Africa, and one in Madagascar (Giulietti & Hensold, 1990). In Brazil, it has a wide geographic distribution, with a diversity center located in the *campos rupestres* of the Espinhaço Range, where it is estimated that about 280 species occur (Giulietti *et al.*, 2010). A significant number of species also occur in the *cerrado* (savannas) of central-western Brazil, in the Andes, and in the Guiana Shield (Fig. 2).

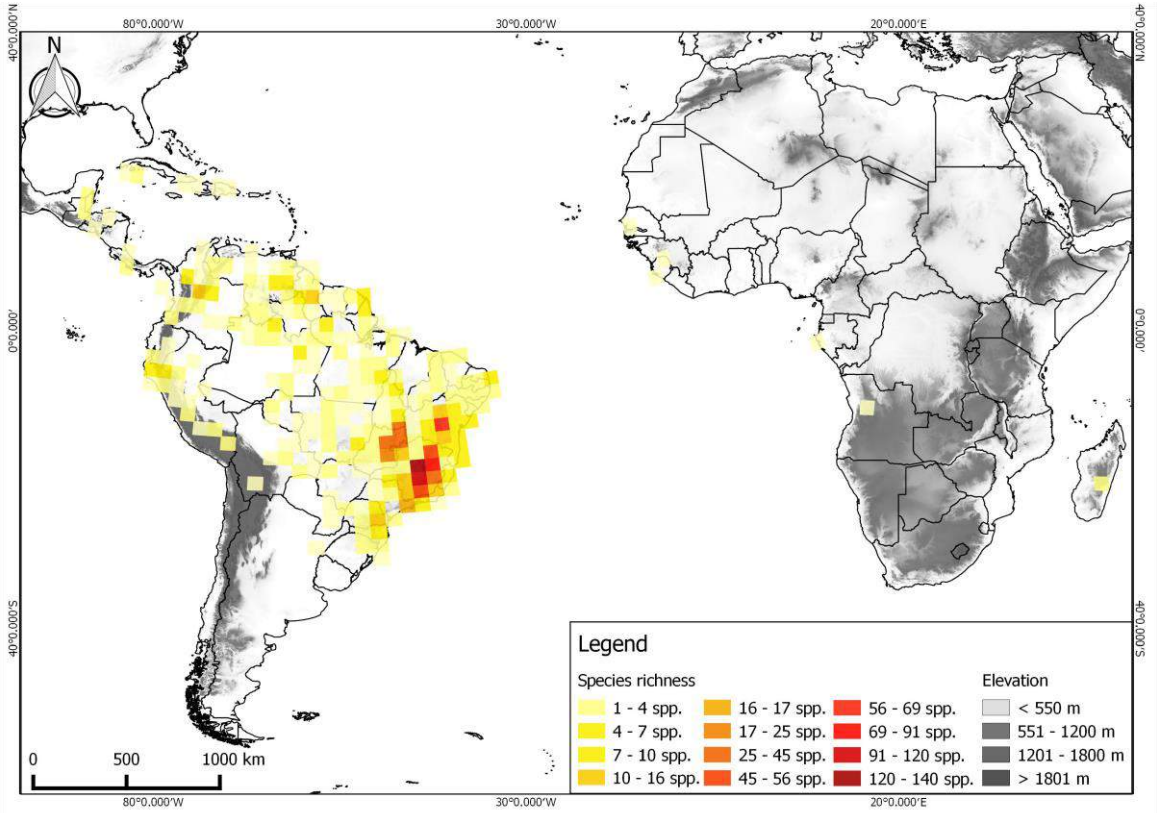


Fig. 2. Map with overlapping quadrants of the distribution of *Paepalanthus* species. The darker quadrants represent areas with higher species density.

The number of species in *Paepalanthus*, since its revision by Ruhland (1903), has undergone many changes and has never been re-counted, always being estimated based on summing data in previously published papers. Thus, estimates have ranged from 350 to 500 species worldwide (Trovó *et. al.* 2011, Giulietti *et al.* 2012, Costa *et al.* 2015, Tissot-Squali & Sauthier, 2016).

Maretial and Methods

We performed a comprehensive survey of the extant herbarium specimens and the current literature to obtain a definitive list of the current number of accepted species in *Paepalanthus*, with valid names, their placement in the infrageneric categories, and where they occur. We first personally examined over 16,000 specimens in the following herbaria (acronyms according to Thiers, continuously updated): ALCB, B, BM, BHCB, BR, CEN, CEPEC, CESJ, DIAM, ESA, ESAL, F, HB, HBG, HBR, HEPH, HRB, HUEFS, HUFU, IAC, K, L, LE, M, MBM, NY, OUPR, P, R, RB, SP, SPF, U, UB, UEC, US, W, WU, and then checked our data against the online databases of the International Plant Names Index – IPNI (http://www.ipni.org), Tropicos.org (2017), *The Plant*

List (2013), and *Paepalanthus* in the Flora do Brasil 2020 (under construction, 2017). We also checked the lists of the Flora of the Venezuelan Guayana (Hensold *et al.* 1999), Flora of Cuba (Géigel, 2004), Moldenke (1980), and Stützel (1989). From there, we checked the revision studies of *Actinocephalus* (Sano, 2005; Costa; 2005; Costa & Sano, 2013), *P.* subg. *Platycaulon* (Tissot-Squali, 1997) and *P.* subg. *Xeractis* (Hensold, 1988). Finally, we checked all recent papers published in the genus and the new species described (Trovó & Sano, 2009; Trovó *et al.*, 2011, 2012, 2013, 2015; Trovó & Sano, 2014; Echternacht *et al.* 2015; Costa *et al.*, 2016; Tissot-Squalli *et al.*, 2016; Andrino *et al.*, 2016; Hensold, 2016, 2017). There are many varieties in some species, but it was not possible at the moment to check the identities of all of them and the validity of their names. In Moldenke's works alone (1937; 1939; 1940; 1947; 1948; 1949; 1950; 1951; 1952; 1953; 1957; 1959; 1962; 1963; 1971; 1974; 1976; 1977; 1978; 1979; 1980; 1981; 1982; 1983) there are 88 published names for varieties, of uncertain validity or taxonomic placement. Also included in this list are infrageneric species classifications and geographic distributions, as well as comments, when relevant. We present the results of our comprehensive survey in Appendix 1.

Our survey indicated that 408 species are currently recognized in the genus. Among those, 258 are placed in *P.* subg. *Paepalanthus* (*P.* subg. *Paepalocephalus* Ruhland), which is divided into five sections (Tab. 1). The largest of those sections, *Paepalanthus* sect. *Paepalanthus* (P. sect. *Eriocaulopsis* Ruhland), comprises 234 species, distributed in six subsections. Again, the largest of those subsections (with 180 species), *Paepalanthus* subsect. *Paepalanthus* (*P.* subsect *Eupaepalanthus* Ruhland), is divided into five series – and that is where is the greatest challenge to the study of the genus lies. *Paepalanthus* ser. *Paepalanthus* (*P.* [unranked] *Variabiles* Ruhland), for example, currently has 143 names, representing 127 species and 16 varieties. This high number of species in a single group (*P.* ser. *Paepalanthus*), which are often difficult to identify, makes the work of taxonomic revision significantly challenging.

Nomenclator botanicus

Nomenclator botanicus of currently accepted names in *Paepalanthus* Mart. (404 species), including the infrageneric classification and the distribution by country (and more precise locality, when possible) of each species. Species not assigned to any category were placed in the infrageneric categories according to Ruhland's (1903) conccepts when it was possible. Comments are provided, when relevant.

Paepalanthus **Mart.** ***nom. cons.***

1. Paepalanthus acantholimon **Ruhland, Pflanzenr. IV.30: 163. 1903.**
Series: *P.* [subsect. *Paepalanthus*] ser. *Rosulati* (Ruhland) Giul.
Distibution: Brazil (Minas Gerais – Caparaó)

2. Paepalanthus acanthophyllus **Ruhland, Pflanzenr. IV.30: 186. 1903.**
Section: *P.* [subg. *Paepalanthus*] sect. *Diphyomene* Ruhland
Distribution: Brazil (Distrito Federal; Goiás; Minas Gerais)

3. Paepalanthus accrescens **Silveira, Floral. Mont.: 96. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais – Serra do Cipó)

4. Paepalanthus aculeatus **Silveira, Fl. Ser. Min.: 65. 1908.**
Section: *P.* sect. *Paepalanthus* (*Paepalanthus* sect. *Eriocaulopsis* Ruhland)
Subsection: *Unplaced*
Series: *Unplaced*
Distribution: Brazil (Minas Gerais – Serra do Cipó)
Comments: This species was excluded from *Paepalanthus* subg. *Xeractis* in which it was originally placed (Silveira, 1908), because its features did not agree with the concept of *P.* subg. *Xeractis* in the review carried out by Hensold (1988), who placed it in *Paepalanthus* sect. *Paepalanthus*.

5. Paepalanthus acuminatus **Ruhland, Pflanzenr. IV.30: 217. 1903.**
Section: *P.* sect. *Paepalanthus* (*Paepalanthus* sect. *Eriocaulopsis* Ruhland)
Subsection: *Unplaced*
Series: *Unplaced*
Distribution: Brazil (Minas Gerais: Caeté, Lima Duarte, Santa Bárbara)
Comments: Placed by Ruhland (1903) in *P.* subg. Xeractis, from which it was removed by Hensold (1988).

6. Paepalanthus acutipilus **Silveira, Floral. Mont.: 173. 1928.**
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis* Ruhland
Distribution: Brazil (Minas Gerais – Caeté, Santa Bárbara)

7. Paepalanthus aequalis **(Vellozo) J.F. Macbr.,** Publ. Field Mus. Nat. Hist. Bot., Ser 11(2): 43, 1931. ≡ *Dupatya aequalis* Vell, Fl. Flumin, 36, 1829.
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais; São Paulo)

8. Paepalanthus aereus **Silveira, Floral. Mont.: 161. 1928.**
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*
Distibution: Brazil (Minas Gerais – Diamantina Plateau)

9. Paepalanthus albiceps **Silveira, Floral. Mont.: 172. 1928.**
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*
Distribution: Brazil (Minas Gerais – Espinhaço Range)

10. Paepalanthus albidus **Gardner, Hooker's Icon. Pl.: 6. 1843**
Series: Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali* (Ruhland) Giul.
Distribution: Brazil (Minas Gerais – Espinhaço Range)

11. Paepalanthus albotomentosus **Herzog, Repert. Spec. Nov. Regni Veg. 20: 83. 1924.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Bahia – Espinhaço Range)

12. Paepalanthus albovaginatus **Silveira, Floral. Mont.: 233. 1928.**
Section: *P.* [subg. *Platycaulon*] sect. *Divisi* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Brazil (Santa Catarina; São Paulo; Paraná)
Comments: This species has three varieties.

13. Paepalanthus albovillosus **Silveira, Floral. Mont.: 33. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais – Diamantina Plateau)

14. Paepalanthus aleurophyllus **Trovó, Blumea 58: 77, 2013.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais: Santo Antônio do Itambé)

15. Paepalanthus almasensis **Moldenke, Phytologia 45: 470. 1980.**
Unplaced
Dimerous flowers.
Distribution: Brazil (Bahia – Pico das Almas)
Series: According to the Ruhland's (1903) concepts, should be placed in *Paepalanthus* [subsect. *Paepalanthus*] ser. *Dimeri* (Ruhland) Giul.

16. Paepalanthus alpestris **(Körn) Tissot-Squalli, Feddes Repert. 108(5–6): 361. 1997.** ≡ *Paepalanthus planifolius* (Bong.) Körn var. *alpestris* Körn., Fl. Bras. 3: 376. 1863.
Section: *P.* [subg. *Platycaulon*] sect. *Conferti* (Ruhland) Tissot-Squalli ex Hensold

Distribution: Colombia

17. Paepalanthus alpinus **Körn., Fl. Bras. 3: 376. 1863.**
Section: *P.* [subg. *Platycaulon*] sect. *Conferti* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Colombia

18. Paepalanthus alsinoides **Wright, Anales Acad. Ci. Med. Habana: 49. 1871.**
Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali* (Ruhland) Giul.
Distribution: Cuba

19. Paepalanthus altamirensis **Tissot-Squalli & Sauthier, Phytotaxa 299: 252. 2017**
Section: *P.* [subg. *Platycaulon*] sect. *Divisi* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Brazil (Minas Gerais)

20. Paepalanthus amoenus **(Bong.) Körn., Fl. Bras. 3: 316. 1863.** ≡ *Eriocaulon amoenum* Bong. Mem. Acad. Imp. Sci. St.-Pétersbourg, Ser. 6, Sci. Math. 1. 637. 1831
Section: *P.* [subg. *Paepalanthus*] sect. *Diphyomene*
Distribution: Brazil (Minas Gerais; Goiás)

21. Paepalanthus anamariae **Hensold, Syst. Bot. Monogr. 23: 121. 1988.**
Section: *P.* [subg. *Xeractis*] sect. *Chrysostegis* Hensold
Distribution: Brazil (Minas Gerais - Espinhaço Range)

22. Paepalanthus andicola **Körn., Fl. Bras. 3: 408. 1863.**
Section: *P.* [subg. *Platycaulon*] sect. *Conferti (Ruhland) Tissot-Squalli ex Hensold*
Distribution: Colombia; Venezuela

23. Paepalanthus apacarensis **Moldenke, Mem. New York Bot. Gard.** 9: 408. 1957.
Subgenus: *P.* subg. *Monosperma* Hensold
Distibution: Venezuela

24. Paepalanthus arcuatus **Trovó, Novon 22:325. 2013**
Section: *P.* [subg. *Paepalanthus*] sect. *Diphyomene*
Distribution: Brazil (Minas Gerais – Serra do Cipó)

25. Paepalanthus aretioides **Ruhland, Pflanzenr. IV.30: 164. 1903.**
Series: *P.* [subsect. *Paepalanthus*] ser. *Rosulati*
Distibution: Brazil (Minas Gerais – Diamantina Plateau)

***26. Paepalanthus argenteus (Bong.) Körn.*, Fl. Bras. 3: 343. 1863.** ≡ Eriocaulon argenteum Bong., Mem. Acad. Imp. Sci. St.-Pétersbourg, Ser. 6, Sci. Math. 1. 631. 1831

Section: *P.* [subg. *Xeractis*] sect. *Chrysostegis* Hensold

Distribution: Brazil (Minas Gerais - Espinhaço Range)

Comment: This species has two varieties

***27. Paepalanthus argillicola* Silveira, Floral. Mont.: 108. 1928.**

Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali*

Distribution: Brazil (Minas Gerais; Rio de Janeiro)

***28. Paepalanthus argyrolinon* Körn., Fl. Bras. 3: 374. 1863.**

Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*

Distribution: Brazil (Minas Gerais)

Comments: This species is known only from type specimen.

***29. Paepalanthus argyropus* Silveira, Fl. Ser. Min.: 36. 1908.**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais – Diamantina Plateau)

***30. Paepalanthus argyrotrychus* F.N. Costa, Andrino & Echtern., Phytotaxa 247: 118. 2016**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais – Serra do Ambrósio)

***31. Paepalanthus aristatus* Moldenke, Phytologia 7: 122. 1960.**

Subsection: *P.* [sect. *Paepalanthus*] subsect. *Dichocladus* Ruhland

Distribution: Venezuela

***32. Paepalanthus ascendens* Silveira, Floral. Mont.: 237. 1928.**

Section: *P.* [subg. *Platycaulon*] sect. *Conferti* (Ruhland) Tissot-Squalli ex Hensold

Distribution: Brazil (Minas Gerais)

Comments: This species is known only from type specimen.

***33. Paepalanthus ater* Silveira, Floral. Mont.: 247. 1928.**

Series: *P.* [subg. *Xeractis* sect. *Xeractis*] ser. *Fuscati* Hensold

Distribution: Brazil (Minas Gerais – Serra do Cipó)

***34. Paepalanthus atrovaginatus* Ruhland, Pflanzenr. IV.30: 134. 1903.**

Series: *P.* [subsect. *Paepalanthus*] *ser. Leptocephali*

Distribution: Brazil (Minas Gerais – Ouro Preto)

35. Paepalanthus augustus **Silveira, Fl. Ser. Min.: 59. 1908.**
Series: *P.* [subg. *Xeractis* sect. *Xeractis*] ser. *Fuscati* Hensold
Distribution: Brazil (Minas Gerais – Serra do Cipó)
Comments: This species has two varieties.

36. Paepalanthus aureus **Silveira, Floral. Mont.: 66. 1928.**
Section: *P.* [subg. *Xeractis*] sect. *Gymnostegis* Hensold
Distribution: Brazil (Minas Gerais – Serra do Cipó)

37. Paepalanthus auyantepuiensis **Moldenke, Acta Biol. Venez. 2: 47. 1957.**
Subgenus: *P.* subg. *Monosperma* Hensold
Distibution: Venezuela

38. Paepalanthus balansae **Ruhland, Pflanzenr. IV.30: 151. 1903.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Mato Grosso do Sul; Paraná); Paraguay

39. Paepalanthus baraunensis **Silveira, Floral. Mont.: 112. 1928.**
Series: *P.* [subsect. *Paepalanthus*] *ser. Leptocephali*
Distribution: Brazil (Minas Gerais – Diamantina Plateau)

40. Paepalanthus barbulatus **Herzog, Repert. Spec. Nov. Regni Veg. 20: 83. 1924.**
Subsection: *P.* subsect. *Paepalanthus*
Series: *Unplaced*
Distribution: Brazil (Bahia – Espinhaço Range)

41. Paepalanthus batatalensis **Silveira, Floral. Mont.: 77. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

42. Paepalanthus belizensis **Moldenke, Phytologia 27: 67. 1973.**
Unplaced
Distribution: Belize

43. Paepalanthus bellus **Moldenke, Phytologia 8: 391. 1962.**
Unplaced
Distribution: Brazil (Paraná)

44. Paepalanthus benedicti **Silveira, Floral. Mont.: 238. 1928.**
Section: *P.* [subg. *Platycaulon*] sect. *Conferti* (Ruhland) Tissot-Squalli ex Hensold

Distribution: Brazil (Minas Gerais)

Comments: this species is known only from type specimen and requires orthographic correction to *Paepalanthus benedictoi* (ICN).

45. *Paepalanthus bifidus* (Schrad.) Kunth, Enum. Pl. 3: 512. 1841 ≡ *Eriocaulon bifidum* Schrad., Mantissa 2: 468. 1824.

Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali* (Ruhland) Giul.

Distribution: French Guiana, Guyana, Brazil, Venezuela, Suriname, Peru.

46. *Paepalanthus blepharophorus* (Bong.) Kunth., Enum. Pl. III: 499, 1841. ≡ *Eriocaulon blepharophoron* Bongard, Mém. Acad. Imp. Sci. St.-Pétersbourg: 626. 1831.

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais – Espinhaço Range)

47. *Paepalanthus bombacinus* Silveira, Floral. Mont.: 82. 1928.

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais – Espinhaço Range)

48. *Paepalanthus bongardii* Kunth., Enum. Pl. III: 519. 1841.

Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*

Distibution: Brazil (Minas Gerais; São Paulo)

49. *Paepalanthus bonsai* Trovó & Sano, Novon 19(3): 412. 2009.

Subsection: *P.* [sect. *Paepalanthus*] subsect. *Dichocladus* Ruhland

Distribution: Brazil (Minas Gerais – Diamantina Plateau)

50. *Paepalanthus bosseri* (Morat) Stützel, Pl. Syst. Evol. 156: 138. 1987. ≡ *Moldenkeanthus bosseri* Morat, Adansonia:, n.s. 15(4): 468. 1976.

Unplaced

Distribution: Madagascar

Comments: This species is known only from type specimen.

51. *Paepalanthus brachyphyllus* Ruhland, Pflanzenr. IV.30: 175. 1903.

Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*

Distibution: Brazil (Bahia, Minas Gerais, Rio de Janeiro)

52. *Paepalanthus brevicaulis* Silveira, Floral. Mont.: 28. 1928.

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais)

53. Paepalanthus brevis **Trovó, Syst. Bot. 36(3): 610. 2012.**
Section: *P.* [subg. *Paepalanthus*] sect. *Diphyomene*
Distribution: Brazil (Federal District)

54. Paepalanthus bromelioides **Silveira, Floral. Mont.: 55. 1928.**
Section: *P.* [subg. *Platycaulon*] sect. *Divisi* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Brazil (Minas Gerais – Serra do Cipó)

55. Paepalanthus brunnescens **Ruhland, Pflanzenr. IV.30: 136. 1903.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

56. Paepalanthus bryoides **(Bong.) Kunth., Enum. Pl. III: 520, 1841.** ≡ *Eriocaulon bryoides* Bong, Mém. Acad. Imp. Sci. St.-Pétersbourg: 624. 1831.
Series: *Paepalanthus* [subsect. *Paepalanthus*] ser. *Leptocephali*
Distribution: Brazil (Minas Gerais – Diamantina Plateau)

57. Paepalanthus cachambuensis **Silveira, Floral. Mont.: 50. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais; São Paulo)

58. Paepalanthus cacuminis **Ruhland, Pflanzenr. IV.30: 205. 1903.**
Section: *P.* [subg. *Platycaulon*] sect. *Divisi* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Brazil (Minas Gerais)
Comments: This species is known only from type specimen.

59. Paepalanthus caespititius **Mart. ex Körn., Fl. Bras. 3: 365. 1863.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

60. Paepalanthus caldensis **Malme, Bih. Kongl. Svenska Vetensk.-Akad. Handl. 27(11): 29. 1901.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais; Paraná; Rio Grande do Sul, Santa Catarina; São Paulo)

61. Paepalanthus callocephalus **Silveira, Floral. Mont.: 29. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais – Diamantina Plateau)
Comments: This species is known only from type specimen.

62. Paepalanthus calvoides **Ruhland, Pflanzenr. IV.30: 146. 1903.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais; Rio de Janeiro)

63. Paepalanthus calvulus **(Ruhland) Hensold, Syst. Bot. Monogr. 23: 119. 1988.** ≡ *Paepalanthus* elatus (Bong.) Körn var. calvulus Ruhland, Pflanzenr. IV.30: 215. 1903.
Section: *P.* [*subg.* Xeractis] sect. *Chrysostegis* Hensold
Distribution: Brazil (Minas Gerais - Espinhaço Range)

64. Paepalanthus calvus **Körn., Fl. Bras. 3: 391. 1863.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais; Rio de Janeiro; São Paulo)

65. Paepalanthus camptophyllus **Ruhland, Pflanzenr. IV.30: 174. 1903.**
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*
Distibution: Brazil (Minas Gerais)

66. Paepalanthus canastrensis **Silveira, Floral. Mont.: 228. 1928.**
Section: *P.* [subg. *Platycaulon*] sect. *Divisi* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Brazil (Minas Gerais – Serra da Canastra)

67. Paepalanthus candidus **Silveira, Ser. Fl. Min.: 38. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

68. Paepalanthus canescens **(Bong.) Körn., Fl. Bras. 3: 381. 1863.** ≡ *Eriocaulon canescens* Bong., Mem. Acad. Imp. Sci. St.-Pétersbourg, Ser. 6, Sci. Math. 1. 623. 1831
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Actinocephaloides* Ruhland
Distribution: Brazil (Minas Gerais – Diamantina Plateau)

69. Paepalanthus capanemae **Silveira, Arch. Jard. Bot. Rio de Janeiro: 8. 1918.**
Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali*
Distribution: Brazil (Minas Gerais; Goiás; Rio de Janeiro)

70. Paepalanthus caparoensis **Ruhland, Pflanzenr. IV.30: 145. 1903.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais; Rio de Janeiro)

*71. **Paepalanthus capillaris*** **(Bong.) Körn., Fl. Bras. 3: 367. 1863.** ≡ *Eriocaulon capillare* Bong., Mem. Acad. Imp. Sci. St.-Pétersbourg, Ser. 6, Sci. Math. 1. 625. 1831

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Goiás)

*72. **Paepalanthus capillatus*** **Silveira, Floral. Mont.: 79. 1928.**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais)

Comments: This species is known only from type specimen.

*73. **Paepalanthus capillifolius*** **Moldenke, Phytologia 32: 485. 1976.**

Unplaced

Distribution: Brazil (Minas Gerais – Diamantina Plateau)

*74. **Paepalanthus capitatus*** **Silveira, Floral. Mont.: 164. 1928.**

Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*

Series: *unplaced*

Distibution: Brazil

*75. **Paepalanthus capito*** **Körn., Fl. Bras. 3: 392. 1863.**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais – Diamantina Plateau)

Comments: This species is known only from type specimen.

*76. **Paepalanthus capixaba*** **Trovó, Fraga & Sano, Phytotaxa 258 (1): 083. 2016.**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Espírito Santo)

*77. **Paepalanthus cardonae*** **Moldenke,** Phytologia 3: 39. 1948.

Subgenus: *P.* subg. *Monosperma* Hensold

Distibution: Venezuela

Comments: This species is known only from type specimen.

*78. **Paepalanthus carvalhoi*** **Giul. & E.B.Miranda, Kew Bull. 64: 527. 2009.**

Section: *P.* sect. *Paepalanthus* (*Paepalanthus* sect. *Eriocaulopsis* Ruhland)

Subsection: *Unplaced*

Series: *Unplaced*

Distribution: Brazil (Bahia – Espinhaço Range)

*79. **Paepalanthus caryonauta*** **Hensold, PhytoKeys 64: 16. 2016.**

Subsection: *P.* [sect. *Paepalanthus*] subsect. *Cryptanthella* Suess.
Distribution: Colombia (Central Cordillera); Ecuador; Bolivia; Peru.

80. Paepalanthus catharinae **Ruhland, Pflanzenr. IV.30: 147. 1903.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Santa Catarina; Rio Grande do Sul; Paraná)

81. Paepalanthus celsus **Tissot-Squalli, Feddes Repert. 108: 364. 1997.**
Section: *P.* [subg. *Platycaulon*] sect. *Conferti* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Ecuador

82. Paepalanthus cephalotrichus **Silveira, Fl. Ser. Min.: 39. 1908.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais – Serra do Cipó)

83. Paepalanthus chaseae **Moldenke, Phytologia 8: 164. 1962.**
Unplaced
Distribution: Brazil (Minas Gerais – Diamantina Plateau)
Comments: This species is known only from type specimen.

84. Paepalanthus chiapensis **Moldenke, North Am. Fl. 19(1): 39. 1937.**
Unplaced
Distribution: Brazil (Minas Gerais – Diamantina Plateau)
Comments: Probably an Eriocaulon. This species may need further study.

85. Paepalanthus chimantensis **Hensold, Ann. Missouri Bot. Gard. 78(2): 428. 1991.**
Subgenus: *P.* subg. *Monosperma* Hensold
Distibution: Venezuela

86. Paepalanthus chiquitensis **Herzog, Repert. Spec. Nov. Regni Veg. 20: 86. 1924.**
Section: *P.* [subg. *Paepalanthus*] sect. *Diphyomene*
Distribution: Brazil (Amazonas; Bahia; Federal District; Goiás; Maranhão; Mato Grosso; Minas Gerais; Pará; Piauí; Rondônia; São Paulo; Tocantins); Bolivia, Colombia; Venezuela.

87. Paepalanthus chloroblepharus **Ruhland, Pflanzenr. IV.30: 139. 1903.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais – Espinhaço Range)

88. Paepalanthus chlorocephalus **Silveira, Fl. Ser. Min.: 60. 1908.**

Series: *P.* [subg. *Xeractis* sect. *Xeractis*] ser. *Fuscati* Hensold
Distribution: Brazil (Minas Gerais - Espinhaço Range)

89. Paepalanthus chloronema **Silveira, Floral. Mont.: 121. 1928.**
Series: *P.* [subsect. *Paepalanthus*] ser. *Rosulati*
Distibution: Brazil (Minas Gerais – Caparaó)

90. Paepalanthus chlorophyllus **Silveira, Floral. Mont.: 80. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais – Serra do Cipó)

91. Paepalanthus chloropus **Silveira, Floral. Mont.: 24. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais – Serra da Moeda)

92. Paepalanthus chrysolepis **Silveira, Floral. Mont.: 256. 1928.**
Section: *P.* [subg. *Xeractis*] sect. *Chrysostegis* Hensold
Distribution: Brazil (Minas Gerais - Diamantina plateau)

93. Paepalanthus chrysophorus **Silveira, Floral. Mont.: 176. 1928.**
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*
Distribution: Brazil (Minas Gerais – Espinhaço Range)

94. Paepalanthus ciliolatus **Ruhland, Pflanzenr. IV.30: 147. 1903.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

95. Paepalanthus cinereus **Giul. & L.R.Parra, Kew Bull. 49(3): 444. 1994**
Unplaced
Distribution: Brazil (Bahia – Espinhaço Range)
Comments: It is a *nom. nov. e stat. nov* for *Paepalanthus vestitus* var. *caulescens*, and although they are morphologically quite distinct, the placement should be same as *Paepalanthus vestitus*, *Paepalanthus* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland).

96. Paepalanthus clausenii **Hensold, Syst. Bot. Monogr. 23: 106. 1988.**
Series: *P.* [subg. *Xeractis* sect. *Xeractis*] ser. *Fuscati* Hensold
Distribution: Brazil (Minas Gerais - Espinhaço Range)

97. Paepalanthus coloides **Ruhland, Pflanzenr. IV.30: 178. 1903.**

Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*
Distribution: Brazil (Minas Gerais – Diamantina Plateau)

98. Paepalanthus comans **Silveira, Floral. Mont.: 262. 1928.**
Series: *P.* [subg. *Xeractis* sect. *Xeractis*] ser. *Fuscati* Hensold
Distribution: Brazil (Minas Gerais - Diamantina Plateau)

99. Paepalanthus complanatus **Silveira, Floral. Mont.: 244. 1928.**
Series: *P.* [subg. *Xeractis* sect. *Xeractis*] ser. *Albidi* Hensold
Distribution: Brazil (Minas Gerais – Serra do Cipó)

100. Paepalanthus conduplicatus **Körn., Fl. Bras. 3: 414. 1863.**
Section: *P.* [subg. *Platycaulon*] sect. *Conferti* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Brazil (Minas Gerais)
Comment: This species has two varieties

101. Paepalanthus conjunctus **Trovó, Phytotaxa 178: 53. 2014.**
Section: *P.* [subg. *Paepalanthus*] sect. *Diphyomene*
Distribution: Brazil (Federal District)

102. Paepalanthus contasensis **Moldenke,** Phytologia 45: 472. 1980.
Unplaced
Distribution: Brazil (Bahia – Espinhaço Range)

103. Paepalanthus convexus **Gleason, Bull. Torrey Bot. Club 58: 328. 1931.**
Subgenus: *P.* subg. *Monosperma* Hensold
Distibution: Brazil (Amazonas), Guiana, Venezuela.

104. Paepalanthus cordatus **Ruhland, Pflanzenr. IV.30: 189. 1903.**
Section: *P.* [subg. *Paepalanthus*] sect. *Diphyomene*
Distribution: Brazil (Goiás)

105. Paepalanthus coronarius **Silveira, Floral. Mont.: 63. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)
Comments: This species is known only from type specimen.

106. Paepalanthus corymbosus **(Bong.) Kunth., Enum. Pl. III: 509. 1841.** ≡ *Eriocaulon corymbosum* Bongard, Mém. Acad. Imp. Sci. St.-Pétersbourg: 629. 1831.
Section: *P.* [subg. *Platycaulon*] sect. *Divisi* (Ruhland) Tissot-Squalli ex Hensold

Distribution: Brazil (Minas Gerais)

107. Paepalanthus costaricensis **Moldenke, N. Amer. Fl. 19: 38. 1937.**
Section: *P.* [subg. *Platycaulon*] sect. *Conferti (Ruhland) Tissot-Squalli ex Hensold*
Distribution: Costa Rica

108. Paepalanthus crassicaulis **Körn., Fl. Bras. 3: 408. 1863.**
Section: *P.* [subg. *Platycaulon*] sect. *Conferti* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Colombia; Ecuador; Peru; Venezuela.

109. Paepalanthus crateriformis **Silveira, Floral. Mont.: 60. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais – Serra do Cabral)

110. Paepalanthus crinitus **Tissot-Squalli, Feddes Repert. 108: 361. 1997.**
Section: *P.* [subg. *Platycaulon*] sect. *Divisi* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Brazil (Minas Gerais – Diamantina Plateau)

111. Paepalanthus cristatus **Moldenke, Brittonia 3: 157. 1939.**
Unplaced
Distribution: Venezuela

112. Paepalanthus cryocephalus **Silveira, Floral. Mont.: 116. 1928.**
Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali*
Distribution: Brazil (Minas Gerais – Diamantina Plateau)

113. Paepalanthus cumbricola **Moldenke, Mem. New York Bot. Gard. 9: 409. 1957.**
Subgenus: *P.* subg. *Monosperma* Hensold
Distibution: Venezuela

114. Paepalanthus cururensis **Moldenke, Phytologia 3: 40. 1948.**
Unplaced
Distribution: Brazil (Amazonas; Pará)

115. Paepalanthus cuspidatus **Silveira, Floral. Mont.: 49. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais; São Paulo)

116. Paepalanthus damazioi **Beauverd, Bull. Herb. Boissier, sér. 2, 8: 292. 1908.**
Series: *P.* [subsect. *Paepalanthus*] ser. *Vivipari* (Ruhland) Andrino **stat nov.**

Distibution: Brazil (Minas Gerais)

117. Paepalanthus dasynema **Ruhland, Pflanzenr. IV.30: 178. 1903.**
Series: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*
Distribution: Brazil (Minas Gerais – Espinhaço Range)

118. Paepalanthus decorus **Abbiatti, Notas Mus. La Plata, Bot. 13: 307. 1948.**
Section: *unplaced*
Distribution: Brazil (Rio Grande do Sul)
Comment: The species has the characteristics of the *P.* sect. *Diphyomene,* as the reproductive axis and dimerous flowers, but was not included in the treatment of *P.* sect *Diphyomene* Ruhland performed by Trovó (2010). However, *P. decorus* is somewhat similar to *Paepalanthus flaccidus*, which was excluded from *P.* sect. *Diphyomene* by Trovó (2010), and is known only from type specimen. Therefore, its place in the classification is uncertain.

119. Paepalanthus decussus **Körn., Fl. Bras. 3: 318. 1863.**
Section: *P.* [subg. *Paepalanthus*] sect. *Diphyomene*
Distribution: Minas Gerais
Comment: This species is known only from type specimen

120. Paepalanthus dendroides **(Kunth) Kunth, Enum. Pl. 3: 507. 1841.** ≡ *Eriocaulon dendroides* Kunth., Nov. Gen. Sp. Pl. (4) 1: 251. 1815.
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Cryptanthella* Suess.
Distribution: Costa Rica; Panama; Colombia (Central and Eastern Cordilleras); Peru; Brazil (Pico da Neblina): Amazonas.

121. Paepalanthus desperado **Ruhland, Pflanzenr. IV.30: 138. 1903.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

122. Paepalanthus diamantinensis **Moldenke, Phytologia 3: 314. 1950.**
Unplaced
Distribution: Brazil (Minas Gerais – Diamantina Plateau)
Comments: This species is known only from type specimen.

123. Paepalanthus dianthoides **Mart. ex Körn.**, Fl. Bras. 3: 339. 1863.
Series: *P.* [subg. *Xeractis* sect. *Xeractis*] ser. *Albidi* Hensold
Distribution: Brazil (Minas Gerais - Espinhaço Range)

124. Paepalanthus dichotomus **Klotzsch ex Körn., Fl. Bras. 3: 348. 1863.**
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Dichocladus* Ruhland
Distribution: Brazil (Amazonas); British Guiana; Guiana, Venezuela.

125. Paepalanthus dichromolepis **Silveira, Floral. Mont.: 42. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais – Espinhço Range)

126. Paepalanthus diffissus **Moldenke, Phytologia 8: 392. 1962.**
Section: *P.* [subg. *Platycaulon*] sect. *Divisi* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Venezuela

127. Paepalanthus digitiformis **Hensold, Syst. Bot. Monogr. 23: 64. 1988.**
Series: *P.* [subg. *Xeractis* sect. *Xeractis*] ser. *Albidi* Hensold
Distribution: Brazil (Minas Gerais - Espinhaço Range)

128. Paepalanthus diplobetor **Ruhland, Pflanzenr. IV.30: 134. 1903.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

129. Paepalanthus distichophyllus **Mart., Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 17(1): 23. 1835.**
Section: *P.* [subg. *Paepalanthus*] sect. *Dyostiche* Ruhland
Distribution: Brazil (Minas Gerais – Espinhaço Range)

130. Paepalanthus diversifolius **Silveira, Floral. Mont.: 47. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais; São Paulo)

131. Paepalanthus dupatya **Mart. ex Körn.**, Fl. Bras. 3: 410. 1863.
Section: *P.* [subg. *Platycaulon*] sect. *Conferti* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Brazil (Minas Gerais; Rio de Janeiro; São Paulo)

132. Paepalanthus echinoides **Trovó, Phytotaxa 231: 81. 2015.**
Section: *P.* [subg. *Paepalanthus*] sect. *Conodiscus* Ruhland
Distribution: Brazil (Goiás)

133. Paepalanthus elatissimus **Silveira, Fl. Ser. Min.: 37. 1908.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais – Espinhaço Range)

134. Paepalanthus elongatulus **Ruhland, Pflanzenr. IV.30: 140. 1903.**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Bahia; Goiás; Minas Gerais; Rio de Janeiro)

135. Paepalanthus elongatus **(Bong.) Körn., Fl. Bras. 3: 312. 1863.** ≡ *Eriocaulon elongatum* Bong., Mém. Acad. Imp. Sci. St.-Pétersbourg, Ser. 6, Sci. Math. 1. 630. 1831

Series: *P.* [subsect. *Paepalanthus*] ser. *Dimeri* (Ruhland) Giul.

Distibution: Brazil (Bahia; Federal District; Goiás; Minas Gerais; São Paulo; Tocantins)

Comment: This species has eleven varieties

136. Paepalanthus ensifolius **(Kunth) Kunth., Enum. Pl. 3: 501. 1841.** ≡ *Eriocaulon ensifolium* Kunth, Nov. Gen. Sp. Pl. (4) 1: 251. 1815.

Section: *P.* [subg. *Platucaulon*] sect. *Conferti* (Ruhland) Tissot-Squalli ex Hensold

Distribution: Colombia; Costa Rica; Ecuador; Peru; Venezuela

137. Paepalanthus erectifolius **Silveira, Fl. Ser. Min.: 51. 1908.**

Section: *P.* [subg. *Paepalanthus*] sect. *Diphyomene*

Distribution: Brazil (Bahia; Minas Gerais; - Espinhaço Range)

138. Paepalanthus erigeron **Mart. ex Körn., Fl. Bras. 3: 390. 1863.**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Bahia – Espinhaço Range)

139. Paepalanthus eriocauloides **Ruhland, Pflanzenr. IV.30: 182. 1903.**

Section: *P.* [subg. *Paepalanthus*] sect. *Conodiscus* Ruhland

Distribution: Brazil (Bahia; Goiás; Minas Gerais; Pará)

Comment: This species is probably a synonym of *Paepalanthus sphaerocephalus*.

140. Paepalanthus eriophaeus **Ruhland, Pflanzenr. IV.30: 130. 1903.**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais – Espinhaço Range)

141. Paepalanthus exiguus **(Bong.) Körn., Fl. Bras. 3: 314. 1863.** ≡ *Eriocaulon exiguum* Bong., Mem. Acad. Imp. Sci. St.-Pétersbourg, Ser. 6, Sci. Math. 1. 627. 1831

Section: *P.* [subg. *Paepalanthus*] sect. *Conodiscus* Ruhland

Distribution: Brazil (Goiás; Federal District; Minas Gerais)

142. Paepalanthus extremensis **Silveira, Floral. Mont.: 163. 1928.**

Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*

Distibution: Brazil (Goiás; Minas Gerais)

143. Paepalanthus falcatus **(Bong.) Körn., Fl. Bras. 3: 387. 1863.** ≡ *Eriocaulon falcatum* Bong., Mém. Acad. Imp. Sci. St.-Pétersbourg, Ser. 6, Sci. Math. 1. 630. 1831.

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais – Espinhaço Range)

144. Paepalanthus fallax **Beauverd, Bull. Herb. Boissier, sér. 2, 8: 288. 1908.**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais)

Comments: This species is known only from type specimen.

145. Paepalanthus farinaceus **F.N. Costa, Adrino & Trovó in Costa *et al.*, Phytotaxa 247: 118. 2016**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais – Serra do Ambrósio)

146. Paepalanthus fasciculatus **(Rottb.) Körn., Enum. Pl. 3: 506. 1841.** ≡ *Eriocaulon fasciculatum* Rottb., Acta Lit. Univ. Hafn.: 271. 1778.

Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali*

Distribution: Brazil (Amazonas; Pará; Roraima); Guyana; Colombia; French Guiana;

147. Paepalanthus fasciculifer **Silveira, Floral. Mont.: 73. 1928.**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais – Serra do Cabral)

148. Paepalanthus fasciculoides **Hensold, Ann. Miss. Bot. Gard. 78(2): 431. 1991.**

Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali*

Distribution: Brazil (Pará); Venezuela

149. Paepalanthus fastigiatus **(Bong.) Körn., Fl. Bras. 3: 386. 1863.** ≡ *Eriocaulon fastigiatum* Bong., Mém. Acad. Imp. Sci. St.-Pétersbourg, Ser. 6, Sci. Math. 1. 624. 1831

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais)

Comments: This Species is known only from type specimen.

150. Paepalanthus ferreyrae **Moldenke, Phytologia 3: 273. 1950.**

Subsection: *P.* [sect. *Paepalanthus*] subsect. *Dichocladus* Ruhland

Distribution: Peru

151. Paepalanthus flaccidus **(Bong.) Kunth., Enum. Pl. III: 511. 1841.** ≡ *Eriocaulon flaccidum* Bongard, Mém. Acad. Imp. Sci. St.-Pétersbourg: 636. 1831.

Unplaced

Distribution: Brazil (Bahia; Federal District; Goiás; Minas Gerais; São Paulo)

Comments: This species was excluded from *Paepalanthus* [subg. *Paepalanthus*] sect. *Diphyomene* Ruhland to which it belonged originally (Ruhland, 1903) in the review carried out by Trovó (2010). After that, it was not included in any other infrageneric taxa.

152. Paepalanthus flaviceps **Körn., Fl. Bras. 3: 412. 1863.**

Section: *P.* [subg. *Platycaulon*] sect. *Conferti* (Ruhland) Tissot-Squalli ex Hensold

Distribution: Brazil (Minas Gerais)

153. Paepalanthus flavorutilus **Ruhland, Pflanzenr. IV.30: 144. 1903.**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais – Diamantina Plateau)

154. Paepalanthus flexuosus **Trovó, Syst. Bot. 36(3): 612. 2012.**

Section: *P.* [subg. *Paepalanthus*] sect. *Diphyomene*

Distribution: Brazil (Goiás)

155. Paepalanthus fraternus **N.E.BR., Trans. Linn. Soc. London, Bot. 6: 69. 1901.**

Subgenus: *P.* subg. *Monosperma*

Distibution: Brazil (Amazonas, Roraima), Guayana, Venezuela.

156. Paepalanthus freyreissii **(Thunb.) Körn., Fl. Bras. 3: 382. 1863.** ≡ *Eriocaulon freyreysii* Thunb., Pl. Bras. 1: 7. 1817.

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais – Serra de Ibitipoca; Serra de Itacolomi)

157. Paepalanthus fulgidus **Moldenke, Mem. New York Bot. Gard. 9: 279. 1957.**

Subgenus: *P.* subg. *Monosperma*

Distibution: Venezuela

158. Paepalanthus fuscoater **Körn., Fl. Bras. 3: 382. 1863.**

Subsection: *P.* [sect. *Paepalanthus*] subsect. *Actinocephaloides*

Distribution: Brazil (Minas Gerais)

Comments: This species is known only from type specimen.

159. Paepalanthus gardnerianus **(Gardner)** ***Walp., Ann. Bot. Syst. 1: 889. 1849.*** *Cladocaulon brasiliense* Gardner Hooker's Icon. 6: 528. 1843.

Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*

Distibution: Brazil (Minas Gerais – Diamantina Plateau)

160. Paepalanthus garimpensis **Silveira, Floral. Mont.: 251. 1928.**

Series: *P.* [subg. *Xeractis* sect. *Xeractis*] ser. *Fuscati* Hensold

Distribution: Brazil (Minas Gerais - Espinhaço Range [Serra do Garimpo])

161. Paepalanthus gentlei **Moldenke, N. Amer. Fl. 19(1): 40. 1937.**

Unplaced

Distribution: Belize; Honduras.

162. Paepalanthus glabrescens **(Moldenke) Hensold Ann. Miss. Bot. Gard. 78(2): 433. 1991.** ≡ *Paepalanthus dichotomus Klotzsch ex Körn var. glabrescens Moldenke*, Phytologia 9: 187. 1963.

Subsection: *P.* [sect. *Paepalanthus*] subsect. *Dichocladus* Ruhland

Distribution: Peru.

163. Paepalanthus glabrifolius **Ruhland, Pflanzenr. IV.30: 139. 1903.**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Rio de Janeiro)

164. Paepalanthus glaucescens **Körn., Fl. Bras. 3: 391. 1863.**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil

Comments: This species is known only from type specimen.

165. Paepalanthus glaucophyllus **Silveira, Floral. Mont.: 23. 1928.**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais)

Comments: This species is known only from type specimen.

166. Paepalanthus glaucopodus **Silveira, Floral. Mont.: 99. 1928.**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais – Espinhaço range)

Comments: This species is known only from type specimen.

167. Paepalanthus glaziovii **Ruhland, Pflanzenr. IV.30: 181. 1903.**

Subsection: *P.* [sect. *Paepalanthus*] subsect. *Dichocladus* Ruhland

Distribution: Brazil (Minas Gerais – Diamantina Plateau)

168. Paepalanthus gleasonii **Moldenke, Phytologia 2: 140. 1946.**
Subgenus: *P.* subg. *Monosperma*
Distibution: Brazil (Amazonas); Venezuela.

169. Paepalanthus globosus **Ruhland, Pflanzenr. IV.30: 143. 1903.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais; Espírito Santo)

170. Paepalanthus globulifer **Silveira, Floral. Mont.: 240. 1928.**
Section: *P.* [subg. *Platycaulon*] sect. *Conferti* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Brazil (Minas Gerais)

171. Paepalanthus grao-mogolensis **Silveira, Floral. Mont.: 133. 1928.**
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polycladus* Ruhland
Distibution: Brazil (Minas Gerais – Grão-Mogol)
172. Paepalanthus guaraiensis **Moldenke, Phytologia 36: 49. 1977.**
Unplaced
Distribution: Bolivia; Brazil (Amazonas; Goiás; Maranhão; Tocantins)

173. Paepalanthus gyrotrichus **Ruhland, Pflanzenr. IV.30: 132. 1903.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais – Espinhaço Range)

174. Paepalanthus harleyi **Moldenke, Phytologia 45(6): 472. 1980.**
Unplaced
Distribution: Brazil (Bahia – Espinhaço Range)

175. Paepalanthus harmsii **Ruhland, Pflanzenr. IV.30: 216. 1903.**
Section: *P.* sect. *Paepalanthus* (*Paepalanthus* sect. *Eriocaulopsis* Ruhland)
Subsection: *Unplaced*
Series: *Unplaced*
Distribution: Brazil (Minas Gerais – Serra de Ibitipoca)
Comments: Placed by Ruhland (1903) in *P.* subg. Xeractis, from which it was removed by Hensold (1988).

176. Paepalanthus henriquei **Silveira, Floral. Mont.: 37. 1928. & Ruhland, Pflanzenr. IV.30: 129. 1903.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

177. Paepalanthus hirtellus **Trovó, Echtern. & Sano, Phytotaxa 15:26. 2011.**
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Actinocephaloides*
Distribution: Brazil (Minas Gerais – Santo Antônio do Itambé)

178. Paepalanthus holstii **Steyerm., Ann. Miss. Bot. Gard. 75: 311. 1988.**
Subgenus: *P.* subg. *Monosperma*
Distibution: Venezuela
Comments: This species is known only from type specimen.

179. Paepalanthus homomallus **(Bong.) Körn., Fl. Bras. 3: 340. 1863.** ≡ *Eriocaulon homomallum* Bong. Mém. Acad. Imp. Sci. St.-Pétersbourg, Ser. 6, Sci. Math. 1. 626. 1831
Section: *P.* [subg. *Xeractis*] sect. *Pleurophyllon* Hensold
Distribution: Brazil (Minas Gerais - Espinhaço Range)

180. Paepalanthus huancabambensis **Hensold, PhytoKeys 64: 30. 2016.**
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Cryptanthella*
Distribution: Peru (Piura, Cordillera de Huancabamba)

181. Paepalanthus hydra **Ruhland, Pflanzenr. IV.30: 202. 1903.**
Section: *P.* [subg. *Platycaulon*] sect. *Divisi* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Brazil (Minas Gerais; Paraná; Rio de Janeiro)

182. Paepalanthus hymenolepis **Silveira, Floral. Mont.: 183. 1928.**
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Actinocephaloides*
Distribution: Brazil (Minas Gerais – Diamantina Plateau)
Comments: This species is known only from type specimen.

183. Paepalanthus implicatus **Silveira, Floral. Mont.: 158. 1928.**
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*
Distibution: Brazil (Minas Gerais)

184. Paepalanthus inopinatus **Moldenke, Phytologia 45: 475. 1980.**
Unplaced
Distibution: Brazil (Bahia)

185. Paepalanthus intermedius **Körn., Fl. Bras. 3: 372. 1863.**
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*
Distibution: Peru

186. Paepalanthus itacambirensis **Silveira, Floral. Mont.: 123. 1928.**
Series: *P.* [subsect. *Paepalanthus*] ser. *Rosulati*
Distibution: Brazil (Minas Gerais – Itacambira)

187. Paepalanthus itambeensis **Silveira, Floral. Mont.: 46. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais – Santo Antônio do Itambé)

188. Paepalanthus itatiaiensis **Ruhland, Pflanzenr. IV.30: 211. 1903.**
Section: *P.* [subg. *Platycaulon*] sect. *Conferti* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Brazil (Minas Gerais; Rio de Janeiro; São Paulo)

189. Paepalanthus itremensis **(Morat) Stützel Pl. Syst. Evol. 156: 135. 1987.** ≡ *Moldenkeanthus bosseri* Morat, Adansonia, n.s. 15(4): 466. 1976.
Unplaced
Distribution: Madagascar
Comments: This species is known only from type specimen.

190. Paepalanthus jordanensis **Silveira, Floral. Mont.: 92. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Rio de Janeiro; São Paulo)

191. Paepalanthus kanaii **Satake, Journal of Japanese Botany 53: 111. 1978.**
Doubtful Taxon
Distribution: Japan.

192. Paepalanthus karstenii **Ruhland, Pflanzenr. IV. 30: 155. 1903.**
Doubtful Taxon
Distribution: Colombia.
Comments: Hensold (2016) pointed out that the type of this species appears intermediate between *P. pilosus* and *P. dendroides,* which are sympatric to this locality. This may need closer study.

193. Paepalanthus kleinii **(Moldenke & L.B.Sm) Trovó, Phytotaxa 162(4): 218. 2014.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Santa Catarina)

194. Paepalanthus klotzschianus **Körn., Fl. Bras. 3: 389. 1863.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Bahia; Espírito Santo; Rio de Janeiro)

195. Paepalanthus koernickei **(Ruhland) Trovó, Phytotaxa 14: 53. 2010.** ≡ *Paepalanthus* speciosus (Bong.) Körn var. koernickei Ruhland, Pflanzenr. IV.30: 187. 1903.

Section: *P.* [subg. *Paepalanthus*] sect. *Diphyomene*

Distribution: Brazil (Federal District; Goiás)

196. Paepalanthus kunhardtii **Moldenke, Mem. New York Bot. Gard. 8: 97. 1953.**

Subgenus: *P.* subg. *Monosperma*

Distibution: Venezuela.

197. Paepalanthus lamarckii **Kunth., Enum. Pl. III: 506. 1841.**

Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali* (Ruhland) Giul.

Distribution: Belize, Bolivia; Brazil (Acre; Bahia; Ceará; Goiás; Maranhão; Minas Gerias; Pará; Paraíba; Pernambuco; Piauí; Roraima; Tocantins); Colombia; Cuba; Ecuador; French Guiana; Guyana; Gabon; Guinea; Honduras; Mexico; Nicarágua; Panamá, Senegal; Suriname; Tanzânia; Venezuela.

198. Paepalanthus lanatus **Silveira, Floral. Mont.: 42. 1928.**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais)

199. Paepalanthus langsdorffii **(Bong.) Körn., Fl. Bras. 3: 338. 1863.** ≡ *Eriocaulon langsdorffii* Bong., Mém. Acad. Imp. Sci. St.-Pétersbourg, Ser. 6, Sci. Math. 1. 632. 1831

Series: *P.* [subg. *Xeractis* sect. *Xeractis*] ser. *Albidi* Hensold

Distribution: Brazil (Minas Gerais)

200. Paepalanthus latifolius **Körn.**, Fl. Bras. 3: 344. 1863.

Section: *P.* [subg. *Xeractis*] sect. *Chrysostegis* Hensold

Distribution: Brazil (Minas Gerais – Diamantina Plateau)

201. Paepalanthus latipes **Silveira, Floral. Mont.: 230. 1928.**

Section: *P.* [subg. *Platycaulon*] sect. *Divisi* (Ruhland) Tissot-Squalli ex Hensold

Distribution: Brazil (Minas Gerais – Espinhaço Range)

202. Paepalanthus laxifolius **Körn., Fl. Bras. 3: 395. 1863.**

Section: *P.* [subg. *Platycaulon*] sect. *Divisi (Ruhland) Tissot-Squalli ex Hensold*

Distribution: Brazil (Minas Gerais)

203. Paepalanthus leiothricoides **Silveira, Floral. Mont.: 127. 1928.**
Series: *P.* [unranked] *Vivipari*
Distibution: Brazil (Minas Gerais)

204. Paepalanthus leiseringii **Ruhland, Pflanzenr. IV.30: 216. 1903.**
Section: *P.* sect. *Paepalanthus* (*Paepalanthus* sect. *Eriocaulopsis* Ruhland)
Subsection: *Unplaced*
Series: *Unplaced*
Distribution: Brazil (Minas Gerais)
Comments: Placed by Ruhland (1903) in *P.* subg. Xeractis, from which it was removed by Hensold (1988).

205. Paepalanthus lepidus **Silveira, Fl. Ser. Min.: 57. 1908.**
Series: *P.* [subg. *Xeractis,* sect. *Xeractis*] ser. *Fuscati* Hensold
Distribution: Brazil (Minas Gerais – Serra do Cipó)

206. Paepalanthus leucoblepharus **Körn., Fl. Bras. 3: 388. 1863.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

207. Paepalanthus leucocephalus **Ruhland, Pflanzenr. IV.30: 200. 1903.**
Subgenus: *P.* subg. *Thelxinöe*
Distibution: Brazil (Minas Gerais– Espinhaço Range)

208. Paepalanthus lindenii **Ruhland, Pflanzenr. IV.30: 206. 1903.**
Section: *P.* [subg. *Platycaulon*] sect. *Divisi* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Colombia

209. Paepalanthus linearis **Trovó, Novon** 22:325. 2013
Section: *P.* [subg. *Paepalanthus*] sect. *Diphyomene*
Distribution: Brazil (Minas Gerais)

210. Paepalanthus linearifolius **Silveira, Floral. Mont.: 57. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais; São Paulo)
Comments: This species is known only from type specimen.

211. Paepalanthus lingulatus **(Bong.) Kunth., Enum. Pl. III: 522. 1841.** ≡ *Eriocaulon lingulatum* Bongard, Mém. Acad. Imp. Sci. St.-Pétersbourg: 626. 1831.

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

212. Paepalanthus lodiculoides **Moldenke**, Bull. Torrey Bot. Club 68: 68. 1940.
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Cryptanthella* Suess
Distribution: Colombia (Eastern Cordillera); Venezuela (Paramo de Tamá); Ecuador; Peru.

213. Paepalanthus lombensis **Silveira, Floral. Mont.: 180. 1928.**
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Actinocephaloides*
Distribution: Brazil (Minas Gerais)
Comments: This species is known only from type specimen.

214. Paepalanthus longicaulis **Silveira, Floral. Mont.: 236. 1928.**
Section: *P.* [subg. *Platycaulon*] sect. *Divisi* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Brazil (Minas Gerais)

215. Paepalanthus longiciliatus **Trovó, Syst. Bot. 36(3): 614. 2012.**
Section: *P.* [subg. *Paepalanthus*] sect. *Diphyomene*
Distribution: Brazil (Goiás)

216. Paepalanthus longivaginatus **Tissot-Squalli, Feddes Repert. 108: 367. 1997.**
Section: *P.* [subg. *Platycaulon*] sect. *Conferti* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Peru

217. Paepalanthus luetzelburgii **Herzog, Repert. Spec. Nov. Regni Veg. 20: 84. 1924.**
Subsection: *P.* subsect. *Paepalanthus*
Series: *unplaced*
Distribution: Brazil (Bahia)

218. Paepalanthus lundii **Körn., Fl. Bras. 3: 385. 1863.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Paraná; São Paulo)

219. Paepalanthus luteolus **Silveira, Floral. Mont.: 86. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais – Diamantina Plateau)
Comments: This species is known only from type specimen.

220. Paepalanthus lycopodioides **Silveira, Floral. Mont.: 160. 1928.**
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*

Series: *unplaced*
Distibution: Brazil (Minas Gerais – Diamantina Plateau)

221. Paepalanthus macaheensis **Körn., Fl. Bras. 3: 311. 1863.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Espírito Santo; Minas Gerais; Rio de Janeiro)

222. Paepalanthus macarenensis **Moldenke, Mutisia 6: 2. 1952.**
Unplaced
Distribution: Colombia

223. Paepalanthus macer **Trovó, Syst. Bot. 36(3): 616. 2012.**
Section: *P.* [subg. *Paepalanthus*] sect. *Diphyomene*
Distribution: Brazil (Goiás)

224. Paepalanthus macrocaulon **Silveira, Floral. Mont.: 169. 1928.**
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*
Series: *unplaced*
Distibution: Brazil (Bahia; Minas Gerais – Itacambira; Grão-Mogol)

225. Paepalanthus macrocephalus **(Bong.) Körn., Fl. Bras. 3: 379. 1863.** ≡ *Eriocaulon macrocephalum* Bong., Mém. Acad. Imp. Sci. St.-Pétersbourg, Ser. 6, Sci. Math. 1. 630. 1831
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais – Espinhaço Range)
Comments: *Paepalanthus macrocephalus* (Bong.) Körn., belonged to *Paepalanthus* subsect. *Aphorocaulon*, which was transferred to the genus *Actinocephalus* by Costa & Sano (2013). However, the authors points out that the species do not present morphological characteristics that allow them to be grouped in *Actinocephalus* and it was placed in *Paepalanthus* ser. *Variabiles* Ruhland.

226. Paepalanthus macropodus **Ruhland, Pflanzenr. IV.30: 212. 1903.**
Section: *P.* [subg. *Platycaulon*] sect. *Conferti* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Brazil (Minas Gerais; São Paulo)

227. Paepalanthus maculatus **Silveira, Floral. Mont.: 167. 1928.**
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*
Series: *unplaced*
Distibution: Brazil (Minas Gerais – Itacambira)

228. Paepalanthus magalhaesii **Silveira, Fl. Ser. Min.: 43. 1908.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

229. Paepalanthus magistrae **Sano, F.N. Costa, Trovó & Echtern., Rodriguésia 66 (2): 299. 2015**

Subsection: *P.* [sect. *Paepalanthus*] subsect. *Dichocladus* Ruhland

Distribution: Brazil (Piauí)

230. Paepalanthus major **(Moldenke) Hensold, Ann. Missouri Bot. Gard. 78(2): 432. 1991.** ≡ *Paepalanthus convexus var. major* Moldenke, Phytologia 15: 463. 1968.

Subgenus: *P.* subg. *Monosperma*

Distibution: Venezuela, Brtish Guayana, Brazil (Amazonas, Roraima)

231. Paepalanthus manicatus **Pouls. ex Malme, Bih. Kongl. Svenska Vetensk.-Akad. Handl. 27: 28. 1901**

Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali*

Distribution: Brazil (Bahia; Federal Disrict; Goiás; Minas Gerais; Piauí; Rio Grande do Norte; São Paulo)

232. Paepalanthus melaleucus **(Bong.) Kunth., Enum. Pl. III: 510. 1841.** ≡ *Eriocaulon melaleucum* Bongard, Mém. Acad. Imp. Sci. St.-Pétersbourg: 629. 1831.

Section: *P.* [subg. *Platycaulon*] sect. *Divisi* (Ruhland) Tissot-Squalli ex Hensold

Distribution: Brazil (Bahia; Minas Gerais)

233. Paepalanthus melanolepis **Silveira, Fl. Serr. Min.: 35. 1908.**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais)

234. Paepalanthus melanthus **Silveira, Floral. Mont.: 74. 1928.**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais)

235. Paepalanthus mellii **Moldenke, N. Amer. Fl. 19(1): 41. 1937.**

Unplaced

Distribution: Mexico

Comments: This is synonym of *Syngonanthus caulescens* and is being combined by Echternacht (Pers. com.)

236. Paepalanthus mendoncianus **Ruhland, Pflanzenr. IV.30: 129. 1903.**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais)

237. Paepalanthus meridensis **Klotzsch ex Körn., Fl. Bras. 3: 407. 1863.**
Section: *P.* [subg. *Platycaulon*] sect. *Conferti* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Venezuela (Merida)

238. Paepalanthus mexiae **Moldenke, Phytologia 7: 89. 1959.**
Unplaced
Distribution: Brazil (Minas Gerais – Diamatina Plateau)

239. Paepalanthus michaelii **Silveira, Floral. Mont.: 39. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

240. Paepalanthus microcaulon **Ruhland, Pflanzenr. IV.30: 159. 1903.**
Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali*
Distribution: Brazil (Goiás; Tocantins)

241. Paepalanthus microphorus **Silveira, Floral. Mont.: 149. 1928.**
Series: *P.* [subsect. *Paepalanthus*] ser. *Dimeri*
Distibution: Brazil (Minas Gerais)
Comments: *Paepalanthus microphorus* Silveira belonged to *Paepalanthus* subsect. *Aphorocaulon*, which was transferred to the genus *Actinocephalus* by Costa & Sano (2013). However, the authors points out that the species does not have paraclades, and the flowers are dimerous, a marked contrast to the trimerous flowers and paraclades in *Actinocephalus.* So, *P. microphorus* was allocated in *Paepalanthus* [subsect. *Paepalanthus*] ser. *Dimeri* by Costa (2013).

242. Paepalanthus microphyllus **(Guill.) Kunth., Enum. Pl. 3: 519. 1841.** ≡ *Eriocaulon microphyllum* Guill., Icon. Sel. Pl. 3: 58. 1837.
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*
Distibution: Brazil (Minas Gerais – Serra do Cipó

243. Paepalanthus milhoverdensis **Silveira, Floral. Mont.: 131. 1928.**
Series: *P.* [subsect. *Paepalanthus*] ser. *Dimeri*
Distibution: Brazil (Minas Gerais – Milho Verde)
Comments: This species is known only from type specimen.

244. Paepalanthus minasensis **Moldenke, Phytologia 3: 420. 1951.**
Unplaced

Distribution: Brazil (Minas Gerais)

245. Paepalanthus minimus **Silveira, Floral. Mont.: 107. 1928.**
Series: *P.* [subsect. *Paepalanthus*] *ser. Leptocephali*
Distribution: Brazil (Minas Gerais – Diamantina Plateau)

246. Paepalanthus minutulus **Mart. ex Körn., Fl. Bras. 3: 359. 1863.**
Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali*
Distribution: Brazil (Bahia; Goiás; Minas Gerais – Diamantina Plateau)

247. Paepalanthus miser **Ruhland, Pflanzenr. IV.30: 133. 1903.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

248. Paepalanthus moaensis **Gonzales Geigel Feddes Repert. 96: 513. 1985.**
Unplaced
Distribution: Cuba

249. Paepalanthus modestus **Trovó, Phytotaxa 316 (3): 272**
Series: *P.* [subsect. *Paepalanthus*] ser. *Dimeri*
Distibution: Brazil (Goiás)

250. Paepalanthus moedensis **Silveira, Floral. Mont.: 234. 1928.**
Section: *P.* [subg. *Platycaulon*] sect. *Divisi* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Brazil (Minas Gerais)

251. Paepalanthus mollis **Kunth, Enum. Pl. 3: 507. 1841.**
Series: *P.* [subg. *Xeractis* sect. *Xeractis*] ser. *Fuscati* Hensold
Distribution: Brazil (Minas Gerais - Espinhaço Range)
Comments: This species has two varieties

252. Paepalanthus montanus **Silveira, Floral. Mont.: 76. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais – Diamantina Plateau)

253. Paepalanthus multicapitatus **A.M.Giul. & E. Miranda, Kew Bull. 64: 532. 2009.**
Section: *P.* sect. *Paepalanthus* (*Paepalanthus* sect. *Eriocaulopsis* Ruhland)
Subsection: *Unplaced*
Series: *Unplaced*
Distribution: Brazil (Bahia)

254. Paepalanthus multistellaris **Andrino & Sano, Phytotaxa 278: 56. 2016.**
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Actinocephaloides*
Distribution: Brazil (Minas Gerais)

255. Paepalanthus muscosus **Körn., Fl. Bras. 3: 348. 1863.**
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Dichocladus* Ruhland
Distribution: Colombia; Venezuela.
Comment: This species has two varieties

256. Paepalanthus myocephalus **(Mart.) Körn., Fl. Bras. 3: 356. 1863.** ≡ *Eriocaulon myocephalum* Mart., Flora 24: 60. 1841.
Series: *Paepalanthus* [subsect. *Paepalanthus*] ser. *Leptocephali*
Distribution: Brazil (Alagoas; Amazonas; Bahia; Ceará; Paraiba; Pernambuco; Sergipe)

257. Paepalanthus nanus **Silveira, Floral. Mont.: 52. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)
Comments: This species is known only from type specimen.

258. Paepalanthus neglectus **Körn., Fl. Bras. 3: 368. 1863.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Bahia; Minas Gerais)

259. Paepalanthus neopulvinatus **Moldenke, Known Geogr. Distrib. Eriocaul. 53: 140. 1946.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)
Comments: This species is known only from type specimen.

260. Paepalanthus nigrescens **Silveira, Fl. Ser. Min.: 62. 1908.**
Series: *P.* [subg. *Xeractis* sect. *Xeractis*] ser. *Albidi* Hensold
Distribution: Brazil (Minas Gerais - Espinhaço Range)

261. Paepalanthus nigricans **Silveira, Floral. Mont.: 89. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais; São Paulo)
Comments: This species is known only from type specimen.

262. Paepalanthus nigricaulis **Silveira, Floral. Mont.: 88. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais – Diamantina Plateau)

263. Paepalanthus nigriflorus **Silveira, Floral. Mont.: 25. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais - Itacambira)
Comments: This species is known only from type specimen.

264. Paepalanthus nipensis **Gonzales Geigel, Feddes Repert. 96: 515. 1985.**
Gonzáles Géigel, L. (1985), *P.* 515.
Unplaced
Distribution: Cuba

265. Paepalanthus obconicus **Silveira, Floral. Mont.: 111. 1928.**
Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali*
Distribution: Brazil (Minas Gerais – Diamantina Plateau)

266. Paepalanthus oblongifolius **A.M.Giul. & E. Miranda, Kew Bull. 64: 530. 2009.**
Section: *P.* sect. *Paepalanthus* (*Paepalanthus* sect. *Eriocaulopsis* Ruhland)
Subsection: *Unplaced*
Series: *Unplaced*
Distribution: Brazil (Bahia)

267. Paepalanthus obnatus **Tissot-Squalli, Feddes Repert. 108: 369. 1997.**
Section: *P.* [subg. *Platycaulon*] sect. *Conferti* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Peru

268. Paepalanthus obtusifolius **(Steud.) Körn.,, Fl. Bras. 3: 368. 1863.** ≡ *Eriocaulon obtusifolium* Steud, Syn. Pl. Glumac. 2: 277. 1855.
Unplaced (*Insertae Sedis*)
Distribution: Brazil (Bahia; Ceará)

269. Paepalanthus ocreatus **Silveira, Floral. Mont.: 165. 1928.**
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*
Series: *unplaced*
Distibution: Brazil
Comments: This species is known only from type specimen.

270. Paepalanthus oerstedianus **Körn., Fl. Bras. 3: 374. 1863.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (São Paulo)

271. Paepalanthus oligocephalus **Körn., Fl. Bras. 3: 402. 1863.**
Section: *P.* [subg. *Platycaulon*] sect. *Divisi (Ruhland) Tissot-Squalli ex Hensold*
Distribution: Colombia.

272. Paepalanthus orthogonalis **Silveira, Floral. Mont.: 85. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais – Espinhaço Range)

273. Paepalanthus ovatus **Körn., Fl. Bras. 3: 367. 1863.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Rio de Janeiro)

274. Paepalanthus oxyphyllus **Körn., Fl. Bras. 3: 313. 1863.**
Series: *Paepalanthus* [subsect. *Paepalanthus*] ser. *Dimeri*
Distibution: Brazil (Federal District; Goiás)

275. Paepalanthus oyapockensis **Herzog, Repert. Spec. Nov. Regni Veg. 29: 206. 1931.**
Subsection: *P.* subsect. *Paepalanthus (P.* subsect. *Eupaepalanthus* Ruhland)
Series: *Unplaced*
Distibution: Brazil (Amapá; Rondônia); Guyana; French Guiana; Suriname; Venezuela)
Comments: This species is quite similar to *Paepalanthus lamarckii* and should be placed in *Paepalanthus* ser. *Leptocephali.*

276. Paepalanthus pallidus **Silveira, Floral. Mont.: 44. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

277. Paepalanthus parallelinervius **Silveira, Floral. Mont.: 65. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)
Comments: This species is known only from type specimen.

278. Paepalanthus paramensis **Moldenke, Bull. Torrey Bot. Club 68: 69. 1940.**
Section: *P.* [subg. *Platycaulon*] sect. *Conferti (Ruhland) Tissot-Squalli ex Hensold*
Distribution: Colombia; Peru

279. Paepalanthus parvicephalus **(Moldenke) Hensold, Ann. Miss. Bot. Gard. 78(2): 432. 1991.**
≡ *Paepalanthus convexus* var. *parvicephalus* Moldenke Phytologia 52: 19. 1982.

Subgenus: *P.* subg. *Monosperma*

Distibution: Venezuela

Comment: This species has two varieties

280. Paepalanthus parviflorus **(Hensold) Hensold, Phytologia 81(1): 25. 1997.** ≡ *Paepalanthus chlorocephalus* fo. *parviflorus* Hensold , Syst. Bot. Monogr. 23: 117. 1988.

Series: *Paepalanthus* [subg. *Xeractis sect.* Xeractis] ser. *Fuscati* Hensold

Distribution: Brazil (Minas Gerais - Espinhaço Range)

281. Paepalanthus parvifolius **Silveira, Floral. Mont.: 91. 1928.**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais - Espinhaço Range)

282. Paepalanthus parvus **Ruhland, Pflanzenr. IV.30: 154. 1903.**

Series: *Paepalanthus* [subsect. *Paepalanthus*] ser. *Leptocephali*

Distribution: Brazil (Bahia)

283. Paepalanthus paulensis **Ruhland, Pflanzenr. IV.30: 211. 1903.**

Section: *P.* [subg. *Platycaulon*] sect. *Conferti* (Ruhland) Tissot-Squalli ex Hensold

Distribution: Brazil (Minas Gerais; Paraná; São Paulo)

284. Paepalanthus paulinus **Ruhland, Pflanzenr. IV.30: 215. 1903.**

Section: *P.* sect. *Paepalanthus* (*Paepalanthus* sect. *Eriocaulopsis* Ruhland)

Subsection: *Unplaced*

Series: *Unplaced*

Distribution: Brazil (Minas Gerais - Espinhaço Range)

Comments: Placed by Ruhland (1903) in *P.* subg. Xeractis, from which it was removed by Hensold (1988).

285. Paepalanthus pauper **Moldenke Bull. Torrey Bot. Club 75: 198. 1948**

Unplaced

Distribution:

Comment: This species is certainly a *Syngonanthus* but the material is in bud and unidentifiable (Hensold, pers. comm.)

286. Paepalanthus perpusillus **Kunth., Enum. Pl. III: 503. 1841.**

Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali*

Distribution: Brazil (Amazonas)

287. Paepalanthus petraeus **Körn., Fl. Bras. 3: 403. 1863.**

Section: *P.* [subg. *Platycaulon*] sect. *Divisi (Ruhland)* Tissot-Squalli ex Hensold

Distribution: Colombia

288. Paepalanthus phelpsiae **Moldenke, Mem. New York Bot. Gard. 23: 852. 1972.**

Subgenus: *P.* subg. *Monosperma*

Distibution: Venezuela, Bolívia

289. Paepalanthus pilosus **(Kunth) Kunth, Enum. Pl. III: 518. 1841.** ≡ *Eriocaulon pilosum* Kunth, Nov. Gen. Sp. Pl. (4) 1: 251. 1815.

Subsection: *P.* [sect. *Paepalanthus*] subsect. *Cryptanthella* Suess

Distribution: Costa Rica (Cerro Talamanca); Panama; Colombia (Cordillera); Venezuela (Cordillera de Merida and Ramal de Guaramacal); Ecuador; Peru.

Comments: This species has two varieties.

290. Paepalanthus piresii **Moldenke. Bol. Mus. Paraense "Emílio Goeldi", Bot. 3: 2. 1960.**

Series: *unplaced*

Distibution: Brazil (Pará)

291. Paepalanthus piscatorum **Hensold, Fieldiana, Life Earth Sci. 10: 5. 2017.**

Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*

Series: *unplaced*

Distibution: Ecuador, Peru

Comment: This species has two varieties.

292. Paepalanthus plagiostigma **Silveira, Floral. Mont.: 117. 1928.**

Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali*

Distribution: Brazil (Minas Gerais)

293. Paepalanthus planifolius **(Bong.) Körn., Fl. Bras. 3: 413. 1863.** ≡ *Eriocaulon planifolium* Bong., Mém. Acad. Imp. Sci. St.-Pétersbourg, Ser. 6, Sci. Math. 1. 629. 1831

Section: *P.* [subg. *Platycaulon*] sect. *Conferti* (Ruhland) Tissot-Squalli ex Hensold

Distribution: Brazil (Minas Gerais; Paraná; Rio de Janeiro; Santa Catarina; São Paulo)

294. Paepalanthus plantagineus **(Bong.) Körn., Fl. Bras. 3: 369. 1863.** ≡ *Eriocaulon langsdorffii* Bong., Mém. Acad. Imp. Sci. St.-Pétersbourg, Ser. 6, Sci. Math. 1. 625. 1831

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais)

295. Paepalanthus platycaulis **Silveira, Floral. Mont.: 27. 1928.**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais)

Comments: This species is known only from type specimen.

296. Paepalanthus plumosus **(Bong.) Körn., Fl. Bras. 3: 337. 1863.** ≡ *Eriocaulon plumosum* Bong., Mém. Acad. Imp. Sci. St.-Pétersbourg, Ser. 6, Sci. Math. 1. 632. 1831

Series: *P.* [subg. *Xeractis sect.*. Xeractis] ser. *Fuscati* Hensold

Distribution: Brazil (Minas Gerais - Espinhaço Range)

297. Paepalanthus polycladus **Silveira, Floral. Mont.: 189. 1928.**

Section: *P.* [subg. *Paepalanthus*] sect. *Diphyomene*

Distribution: Brazil (Minas Gerais)

298. Paepalanthus polygonus **Körn., Fl. Bras. 3: 393. 1863.**

Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polycladus*

Distibution: Brazil (Minas Gerais – Diamantina Plateau)

299. Paepalanthus polytrichoides **Kunth., Enum. Pl. III: 504. 1841.**

Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali*

Distribution: Brazil (Amazonas; Amapá; Goiás; Maranhão; Mato Grosos; Pará; Rondônia; Tocantins); Colombia; Guyana; Suriname; Venezuela.

300. Paepalanthus praedensatus **Silveira, Floral. Mont.: 120. 1928.**

Series: *P.* [subsect. *Paepalanthus*] ser. *Rosulati*

Distibution: Brazil (Minas Gerais)

Comments: This species is known only from type specimen.

301. Paepalanthus praemorsus **Ruhland, Pflanzenr. IV.30: 172. 1903.**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais – Espinhaço Range)

Comments: Placed by Ruhland (1903) in *P.* [sect *Paepalanthus*] subsect *Aphorocaulon*, from which it was removed by Costa & Sano (2013) and placed in *P.* ser. *Paepalanthus*.

302. Parpalanthus prostratus **Körn., Fl. Bras. 3: 350. 1863.**

Series: *Paepalanthus* [subsect. *Paepalanthus*] ser. *Leptocephali* (Ruhland) Giul.

Distribution: Brazil (Minas Gerais)

303. Paepalanthus pruinosus **Ruhland, Pflanzenr. IV.30: 210. 1903.**

Section: *P.* [subg. *Platycaulon*] sect. *Conferti (Ruhland)* Tissot-Squalli ex Hensold

Distribution: Brazil (Minas Gerais; São Paulo; Santa Catarina)

304. Paepalanthus pseudoelongatus **Ruhland, Pflanzenr. IV.30: 141. 1903.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais – Espinhaço Range)

305. Paepalanthus pseudotortilis **Ruhland, Pflanzenr. IV.30: 155. 1903.**
Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali*
Distribution: Brazil (Rio de Janeiro; São Paulo)

306. Paepalanthus pubescens **Körn., Fl. Bras. 3: 384. 1863.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)
Comment: This species has three varieties

307. Paepalanthus pulchellus **Herzog, Repert. Spec. Nov. Regni Veg. 20: 85. 1924.**
Herzog, Th. (1924), *P.* 85-86.
Subsection: *P.* subsect. *Paepalanthus (P.* subsect. *Eupaepalanthus* Ruhland)
Series: *Unplaced*
Distibution: Brazil (Bahia – Espinhaco Range)

308. Paepalanthus pullus **Körn., Fl. Bras. 3: 366. 1863.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)
Comments: This species is known only from type specimen.

309. Paepalanthus pulvinatus **N.E.BR., Fl. Trop. Afr. 8: 263. 1901.**
Unplaced
Distribution: Brazil (Bahia – Espinhaço Range)

310. Paepalanthus pungens **Grieseb., Cat. Pl. Cub.: 224. 1866**
Series: *Paepalanthus* [subsect. *Paepalanthus*] ser. *Dimeri*
Distibution: Cuba
Comments: This species has two varieties.

311. Paepalanthus rectifolius **Trovó, Echtern. & Sano, PhytoKeys 10: 7. 2012.**
Series: *unplaced*
Distibution: Brazil (Goiás)

312. Paepalanthus reflexus **Silveira, Floral. Mont.: 157. 1928.**

Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*
Series: *unplaced*
Distibution: Brazil (Minas Gerais – Serra do Cabral)

313. Paepalanthus refractifolius **Silveira, Floral. Mont.: 171. 1928.**
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*
Series: *unplaced*
Distibution: Brazil

314. Paepalanthus regalis **Mart. ex Körn., Fl. Bras. 3: 393. 1863.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Bahia; Minas Gerais; - Espinhaço Range)

315. Paepalanthus regelianus **Körn., Fl. Bras. 3: 386. 1863.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais – Diamantina Plateau)

316. Paepalanthus repens **(Lam.) Körn., Fl. Bras. 3: 371. 1863.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Dominican Republic; Haiti

317. Paepalanthus retusus **Wright, Anales Acad. Ci. Med. Habana 8: 50. 1871.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Cuba.

318. Paepalanthus revolutus **Hensold, Syst. Bot. Monogr. 23: 94. 1988.**
Series: *P.* [subg. *Xeractis* sect. *Xeractis*] ser. *Fuscati* Hensold
Distribution: Brazil (Minas Gerais - Espinhaço Range)

319. Paepalanthus rhizocephalus **Silveira, Floral. Mont.: 126. 1928.**
Series: *P.* [unranked] *Vivipari*
Distibution: Brazil (Goiás; Mato Grosso)

320. Paepalanthus riedelianus **(Bong.) Körn., Fl. Bras. 3: 383. 1863. ≡** ***Eriocaulon riedelianum*** **Bong., Mém. Acad. Imp. Sci. St.-Pétersbourg, Ser. 6, Sci. Math. 1. 630. 1831**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)
Comments: This species is known only from type specimen.

321. Paepalanthus rigidifolius **Silveira, Floral. Mont.: 66. 1928.**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)
Comments: This species is known only from type specimen.

322. Paepalanthus rigidulus **Mart. Ann. Sci. Nat., Bot., sér. 2, 2: 29. 1834**
Section: *P.* [subg. *Platycaulon*] sect. *Divisi* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Brazil (Bahia)

323. Paepalanthus riparius **Moldenke, N. Amer. Fl. 19(1): 42. 1937.**
Unplaced
Distribution: Cuba

324. Paepalanthus roraimensis **Moldenke, Fieldiana, Bot. 28: 121. 1951.**
Subgenus: *P.* subg. *Monosperma*
Distibution: Guyana; Venezuela

325. Paepalanthus rufescens **Silveira, Floral. Mont.: 104. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)
Comments: This species is known only from type specimen.

326. Paepalanthus ruficeps **Ruhland, Pflanzenr. IV.30: 144. 1903.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais – Espinhaço Range)

327. Paepalanthus rufoalbus **Silveira, Floral. Mont.: 94. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais – Diamantina Plateau)

328. Paepalanthus rupestris **Gardner Hooker's Icon. Pl. 6: 525.1843.**
Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali*
Distribution: Brazil (Minas Gerais – Diamantina Plateau)

329. Paepalanthus saxatilis **(Bong.) Körn., Fl. Bras. 3: 365. 1863.** ≡ *Eriocaulon saxatile* Bong., Mém. Acad. Imp. Sci. St.-Pétersbourg, Ser. 6, Sci. Math. 1. 625. 1831
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

330. Paepalanthus scandens **Ruhland, Pflanzenr. IV.30: 175. 1903.**

Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*
Distibution: Brazil (Federal District; Goiás)

331. Paepalanthus schlimii **Körn., Fl. Bras. 3: 405. 1863.**
Section: *P.* [subg. *Platycaulon*] sect. *Conferti* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Colombia

332. Paepalanthus scholiophyllus **Ruhland, Pflanzenr. IV.30: 172. 1903.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Federal District; Goiás)
Comments: Placed by Ruhland (1903) in *P.* [sect *Paepalanthus*] subsect *Aphorocaulon*, from which it was removed by Costa & Sano (2013) and placed in *P.* ser. *Paepalanthus*.

333. Paepalanthus schomburgkii **Klotzsch ex Körn., Fl. Bras. 3: 375. 1863.**
Subgenus: *P.* subg. *Monosperma*
Distibution: Venezuela

334. Paepalanthus schuechianus **Körn., Fl. Bras. 3: 369. 1863.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Bahia)

335. Paepalanthus scirpeus **Mart. ex Körn., Fl. Bras. 3: 364. 1863.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

336. Paepalanthus scleranthus **Ruhland, Pflanzenr. IV.30: 199. 1903.**
Subgenus: *P.* subg. *Thelxinöe*
Distibution: Brazil (Minas Gerais e Bahia – Espinhaço Range)

337. Paepalanthus scopulorum **Moldenke Fieldiana, Bot. 28: 122. 1951.**
Subgenus: *P.* subg. *Monosperma*
Distibution: Venezuela

338. Paepalanthus sedoides **Körn., Fl. Bras. 3: 352. 1863.**
Series: *P.* [subsect. *Paepalanthus*] ser. *Rosulati*
Distibution: Brazil (Mato Grosso)

339. Paepalanthus senaeanus **Ruhland, Pflanzenr. IV.30: 219. 1903.**
Series: *Paepalanthus* [subg. *Xeractis* sect. *Xeractis*] ser. *Fuscati* Hensold

Distribution: Brazil (Minas Gerais - Espinhaço Range)

340. Paepalanthus sericeus **Silveira, Floral. Mont.: 84. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

341. Paepalanthus sericiscapus **Trovó, Novon 22: 329. 2013**
Section: *Paepalanthus* [subg. *Paepalanthus*] sect. *Diphyomene*
Distribution: Brazil (Minas Gerais)

342. Paepalanthus serpens **Echtern. & Trovó, PhytoKeys 48: 43. 2015.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

343. Paepalanthus serrinhensis **Silveira, Floral. Mont.: 44. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

344. Paepalanthus seslerioides **Grieseb., Cat. Pl. Cub.: 224. 1866.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Cuba
Comments: This species has two varieties.

345. Paepalanthus sessiliflorus **Mart. ex Körn., Fl. Bras. 3: 361. 1863.**
Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali*
Distribution: Brazil (Amazonas; Bahia; Goiás; Maranhão; Rio de Janeiro) Guyana; Venezuela.
Comments: This species has two varieties

346. Paepalanthus sicaefolius **Silveira, Floral. Mont.: 54. 1928.**
Section: *P.* [subg. *Platycaulon*] sect. *Divisi (Ruhland)* Tissot-Squalli ex Hensold
Distribution: Brazil (Minas Gerais)

347. Paepalanthus silveirae **Ruhland, Pflanzenr. IV.30: 131. 1903.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

348. Paepalanthus singularius **Moldenke, Phytologia 7: 90. 1959.**
Unplaced
Distribution: Brazil (Mato Grosso; Pará)

349. Paepalanthus spathulatus **Körn., Fl. Bras. 3: 389. 1863.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Bahia; Espírito Santo; Minas Gerais)

350. Paepalanthus speleicolus **(Silveira) M.J.G.Andrade & Giul., Taxon 60 (1): 183. 2011.** ≡ Blastocaulon speleicola Silveira, Floral. Mont. 1: 274. 1928.
Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali*
Distribution: Brazil (Minas Gerais – Diamantina Plateau)

351. Paepalanthus sphaerocephalus **Ruhland, Pflanzenr. IV.30: 182. 1903.**
Section: *P.* [subg. *Paepalanthus*] sect. *Conodiscus* Ruhland
Distribution: Brazil (Bahia; Goiás; Minas Gerais)

352. Paepalanthus sphaeroides **Trovó, Echtern. & Sano, Blumea 57(2): 105. 2012.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

353. Paepalanthus sphaerulifer **Silveira, Floral. Mont.: 103. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)
Comments: This species is known only from type specimen.

354. Paepalanthus spirophorus **Silveira, Floral. Mont.: 175. 1928.**
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*
Series: *unplaced*
Distribution: Brazil (Minas Gerais – Espinhaço Range)

355. Paepalanthus spixianus **Mart. Ann. Sci. Nat., Bot., sér. 2: 28. 1834.**
Section: *P.* [subg. *Platycaulon*] sect. *Divisi (Ruhland)* Tissot-Squalli ex Hensold
Distribution: Brazil (Minas Gerais)

356. Paepalanthus squamuliferus **Moldenke, Fieldiana, Bot. 28: 124. 1951.**
Subgenus: *P.* subg. *Monosperma*
Distibution: Venezuela

357. Paepalanthus stannardii **Giul. & L.R.Parra, Kew Bull. 49(3): 444. 1994**
Unplaced
Distribution: Brazil (Bahia)

358. Paepalanthus stegolepoides **Moldenke, Mem. New York Bot. Gard. 9: 409. 1957.**
Subgenus: *P.* subg. *Monosperma*
Distibution: Venezuela

359. Paepalanthus stellatus **Trovó, Syst. Bot. 36(3): 616. 2012.**
Section: *P.* [subg. *Paepalanthus*] sect. *Diphyomene*
Distribution: Brazil (Goiás)

360. Paepalanthus stenolepis **Silveira, Floral. Mont.: 43. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)
Comments: This species is known only from type specimen.

361. Paepalanthus stephanophorus **Silveira, Floral. Mont.: 40. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

362. Paepalanthus striatus **Ruhland, Pflanzenr. IV.30: 149. 1903.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Bahia; Minas Gerais; São Paulo)

363. Paepalanthus strictus **Körn., Fl. Bras. 3: 319. 1863.**
Unplaced
Distribution: Brazil (Bahia; Minas Gerais)
Comments: This species was excluded from *Paepalanthus* [subg. *Paepalanthus*] sect. *Diphyomene* Ruhland to which it belonged originally (Ruhland, 1903) in the review carried out by Trovó (2010). After that, it was not included in any other infrageneric taxa.

364. Paepalanthus stuetzelii **Hensold, Phytologia 81: 25. 1996**
Section: *P.* [subg. *Xeractis*] sect. *Pleurophyllon* Hensold
Distribution: Brazil (Minas Gerais - Espinhaço Range)

365. Paepalanthus subcaulescens **N.E.BR., Trans. Linn. Soc. London, Bot. 6: 71. 1901.**
Subgenus: *P.* subg. *Monosperma*
Distibution: Venezuela

366. Paepalanthus subfalcatus **Ruhland, Pflanzenr. IV.30: 151. 1903.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais)

367. Paepalanthus subtilis **Miq., Stirp. Surinam. Select. ser. 2(7): 221. 1850.**
Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali*
Distribution: Brazil (Amazonas; Amapá; Bahia; Federal District; Goiás; Maranhão; Minas Gerais; Pará, Paraíba; Piauí; Rio Grande do Norte; Roraima; Tocantins); Guyana; Suriname; Venezuela.

Comments: This species has two varieties.

368. Paepalanthus succisus **Mart. ex Körn., Fl. Bras. 3: 384. 1863.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

369. Paepalanthus suffruticans **Ruhland, Pflanzenr. IV.30: 138. 1903.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)
Comments: This species is known only from type specimen.

370. Paepalanthus sulcatus **Hensold Ann. Miss. Bot. Gard. 76: 958. 1989.**
Subgenus: *P.* subg. *Monosperma*
Distibution: Venezuela

371. Paepalanthus superbus **Ruhland, Pflanzenr. IV.30: 218. 1903.**
Series: *P.* [subg. *Xeractis* sect. *Xeractis*] ser. *Fuscati* Hensold
Distribution: Brazil (Minas Gerais - Espinhaço Range)
Comments: This species has two varieties

372. Paepalanthus supinus **Körn., Fl. Bras. 3: 352. 1863.**
Series: *P.* [subsect. *Paepalanthus*] ser. *Rosulati*
Distibution: Bolivia; Brazil (Minas Gerais; Mato Grosso; Pará)

373. Paepalanthus tenuicaulis **Silveira, Floral. Mont.: 113. 1928.**
Series: *P.* [subsect. *Paepalanthus*] *ser. Leptocephali*
Distribution: Brazil (Minas Gerais)

374. Paepalanthus tessmannii **Moldenke, Phytologia 3: 169. 1949.**
Unplaced
Distribution: Brazil (Paraná; Santa Catarina; São Paulo)

***375. Paepalanthus tortilis* (Bong.) Körn., Fl. Bras. 3: 354. 1863.** ≡ *Eriocaulon tortile* Bong., Mém. Acad. Imp. Sci. St.-Pétersbourg, Ser. 6, Sci. Math. 1. 624. 1831

Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali*

Distribution: Bolivia; Brazil (Alagoas; Amazonas; Amapá; Bahia; Ceará, Espírito Santo; Federal District; Goiás; Minas Gerais; Pará, Paraíba; Pernambuco; Rio de Janeiro; Roraima; São Paulo; Sergipe); Colombia; Guyana; Suriname; Venezuela;

***376. Paepalanthus triangularis* (L.) Körn., Fl. Bras. 3: 470. 1863.** ≡ *Eriocaulon triangulare* L. Species Plantarum, Editio Secunda 128. 1762.

Doubtful Taxon

Distribution: Brazil

Comments: There's a problem with typification of this species. The genus is uncertain. Further studies needed.

***377. Paepalanthus tricholepis* Silveira, Floral. Mont.: 32. 1928.**

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)

Distribution: Brazil (Minas Gerais)

Comments: This species is known only from type specimen.

***378. Paepalanthus trichopetalus* Körn., Fl. Bras. 3: 399. 1863.**

Section: *P.* [subg. *Platycaulon*] sect. *Divisi (Ruhland)* Tissot-Squalli ex Hensold

Distribution: Brazil (Minas Gerais)

***379. Paepalanthus trichophyllus* (Bong.) Körn., Fl. Bras. 3: 318. 1863.** ≡ *Eriocaulon trichophyllum* Bong., Mém. Acad. Imp. Sci. St.-Pétersbourg, Ser. 6, Sci. Math. 1. 636. 1831

Unplaced

Distribution: Brazil (Bahia; Federal District; Goiás; Mato Grosso)

Comments: This species was excluded from *Paepalanthus* [subg. *Paepalanthus*] sect. *Diphyomene* Ruhland to which it belonged originally (Ruhland, 1903) in the review carried out by Trovó (2010). After that, it was not included in any other infrageneric taxa.

***380. Paepalanthus tuberosus* (Bong.) Kunth., Enum. Pl. III: 508. 1841.** ≡ *Eriocaulon tuberosum* Bongard, Mém. Acad. Imp. Sci. St.-Pétersbourg: 629. 1831.

Section: *P.* [subg. *Playcaulon*] sect. *Divisi* (Ruhland) Tissot-Squalli ex Hensold

Distribution: Brazil (Minas Gerais)

***381. Paepalanthus turbinatus* (Gleason) Hensold, Ann. Missouri Bot. Gard. 78(2): 433. 1991.** ≡ Leiothrix turbinata Gleason, Bull. Torrey Bot. Club 58: 331. 1931.

Subgenus: *P.* subg. *Monosperma*

Distibution: Venezuela

382. Paepalanthus uleanus **Ruhland, Pflanzenr. IV.30: 146. 1903.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais; Rio de Janeiro)

383. Paepalanthus umbrosus **Giul. & E.B.Miranda, Kew Bull. 64: 532. 2009.**
Section: *P.* sect. *Paepalanthus* (*Paepalanthus* sect. *Eriocaulopsis* Ruhland)
Subsection: *Unplaced*
Series: *Unplaced*
Distribution: Brazil (Bahia)

384. Paepalanthus uncinatus **Gardner in Hooker, Icon. Pl. pl.: 523. 1855.**
Series: *P.* [subg. *Xeractis* sect. *Xeractis*] ser. *Albidi* Hensold
Distribution: Brazil (Minas Gerais - Espinhaço Range)
Comment:This species has two varieties

385. Paepalanthus undulatus **Ruhland, Pflanzenr. IV.30: 150. 1903.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

386. Paepalanthus urbanianus **Ruhland, Pflanzenr. IV.30: 188. 1903.**
Section: *P.* [subg. *Paepalanthus*] sect. *Diphyomene*
Distribution: Brazil (Goiás)

387. Paepalanthus usterii **Beauverd, Bull. Herb. Boissier, sér. 2, 8: 295. 1908.**
Section: *P.* [subg. *Platycaulon*] sect. *Conferti* (Ruhland) Tissot-Squalli ex Hensold
Distribution: Brazil (São Paulo)

388. Paepalanthus vaginans **Silveira, Floral. Mont.: 166. 1928.**
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Polyactis*
Series: *unplaced*
Distibution: Brazil (Minas Gerais)

389. Paepalanthus vaginatus **Körn., Fl. Bras. 3: 313. 1863.**
Series: *P.* [subsect. *Paepalanthus*] ser. *Dimeri*
Distibution: Brazil (Minas Gerais)

390. Paepalanthus vauthierianus **(Guill.) Kunth, Enum. Pl. 3: 500, 1841.** ≡ *Eriocaulon vauthierianum* Guill., in Deless., Ic. Sel. 3: 57. fig. 95, 1837.

Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

391. Paepalanthus vellozioides **Körn., Fl. Bras. 3: 401. 1863.**
Section: *P.* [subg. *Platycaulon*] sect. *Divisi (Ruhland)* Tissot-Squalli ex Hensold
Distribution: Brazil (Minas Gerais)

392. Paepalanthus velutiphyllus **F.N.Costa, Andrino & Sano, Phytotaxa 247: 118. 2016**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais – Serra do Ambrósio)

393. Paepalanthus venustus **Moldenke, Mem. New York Bot. Gard. 9: 281. 1957.**
Subgenus: *P.* subg. *Monosperma*
Distibution: Venezuela

394. Paepalanthus vestitus **Ruhland, Pflanzenr. IV.30: 150. 1903.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais)

395. Paepalanthus villosulus **Mart. ex Körn., Fl. Bras. 3: 400. 1863.**
Section: *P.* [subg. *Platycaulon*] sect. *Divisi (Ruhland)* Tissot-Squalli ex Hensold
Distribution: Brazil (Minas Gerais)

396. Paepalanthus viridipes **Silveira, Floral. Mont.: 115. 1928.**
Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali*
Distribution: Brazil (Minas Gerais – Diamantina Plateau)

397. Paepalanthus viridis **Körn. Martius & Eichler, Fl. Bras. 3: 317. 1863.**
Series: *P.* [subsect. *Paepalanthus*] ser. *Leptocephali* (Ruhland) Giul.
Distribution: Brazil (Minas Gerais – Diamantina Plateau)

398. Paepalanthus viridulus **Ruhland, Pflanzenr. IV.30: 165. 1903.**
Series: *Paepalanthus* [unranked] *Vivipari*
Distibution: Brazil (Minas Gerais)

399. Paepalanthus warmingianus **Körn. ex Poulsen, Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn: 313. 1888.**
Unplaced
Distribution: Venezuela, Brazil

400. Paepalanthus weberbaueri **Ruhland, Bot. Jahrb. Syst. 37: 519. 1906.**
Unplaced
Distribution: Peru

401. Paepalanthus weddellianus **Körn., Fl. Bras. 3: 317. 1863.**
Section: *P.* [subg. *Paepalanthus*] sect. *Diphyomene*
Distribution: Brazil (Goiás)

402. Paepalanthus xanthopus **Silveira, Floral. Mont.: 70. 1928.**
Series: *P.* ser. *Paepalanthus* (*Paepalanthus* [unranked] *Variabiles* Ruhland)
Distribution: Brazil (Minas Gerais – Serra do Cabral)

403. Paepalanthus xiphophyllus **Ruhland, Pflanzenr. IV.30: 218. 1903.**
Series: *P.* [subg. *Xeractis* sect. *Xeractis*] ser. *Fuscati* Hensold
Distribution: Brazil (Minas Gerais - Espinhaço Range)

404. Paepalanthus yapacanensis **(Moldenke) Hensold, Ann. Miss. Bot. Gard. 78(2): 433. 1991.**
≡ *Syngonanthus yapacanensis Moldenke*, Mem. New York Bot. Gard. 8: 102. 1953.
Subsection: *P.* [sect. *Paepalanthus*] subsect. *Dichocladus* Ruhland
Distribution: Venezuela
Comments: This species has two varieties.

References

Andrade, M. J. G. de, A.M. Giulietti, A. Rapini, L.P. de Queiroz, A. de S. Conceição, P.R.M. de Almeida, C. Van den Berg. 2010. A comprehensive phylogenetic analysis of Eriocaulaceae: Evidence from nuclear (ITS) and plastid (psbA-trnH and trnL-F) DNA sequences. *Taxon* 59: 379–388.

Angiosperm Phylogeny Group (APG). 2016. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV. *Bot. J. Linn. Soc.* 181: 1-20.

Beauverd, G. (1908). Plantae damazianae brasiliensis. *Bull. Herb. Boiss.* Ser. 2, vol. VIII. 283-299

Bongard, M. (1831) Essai monographique sur les espèces d'Ériocaulon du Brésil. *Mém Acad. Imp. Sci. St-Pétersbourg,* Sér. 6, Sci Math.: 601–655.

Bouchenak-Khelladi, Y; Muasya, A.M.; Linder, H.P. (2014). A Revised evolutionary history of Poales: origins and diversification. *Bot. J. Linn. Soc.*, 175: 4-16.

Britton, N. (1917). Studies of West Indian plants. *Bull. Torr. Bot. Cl.*, vol. 44: 31-33

Brown, N.E. (1902). Eriocaulaceae in Thieselton Deyer, W.T., Flora of Tropical Africa . Asford: L. Reeve & Co, vol. III: 230-264

Costa, F.N. & Sano, P.T. (2013) New Circumscription of the Endemic Brazilian Genus *Actinocephalus* (Eriocaulaceae). *Novon* 22: 281–287.

Desvaux, N.A. 1828. Observations Sur Quelques Families De Plantes Monocotyledones, D'apres Les Manuscrits De Feu Le Baron Palisot De Beauvois. *Ann. Sci. Nat.*, 13: 37-52.

Diogo, J.C. (1923). Eriocaulaceae *Bol. Mus. Nac. Rio de Janeiro*, vol. 1.

Echternacht, L., P.T. Sano, M. Trovó, J.-Y. Dubuisson. (2011). Phylogenetic analysis of the Brazilian microendemic *Paepalanthus* subgenus *Xeractis* (Eriocaulaceae) inferred from morphology. *Bot. J. Linn. Soc.* 167: 137–152.

Gardner (1843). Eriocaulaceae in Hooker, W.J., Icones Plantarum Tab.DX DXXVIII

Giulietti, A. M., Amaral, M. C. & Bittrich, V. (1995). Phylogenetic analysis of inter- and infrageneric relationships of Leiothrix Ruhl. (Eriocaulacaceae). *Kew Bull.* 50: 55–71.

Giulietti, A.M., J.R. Pirani & R.M. Harley. (1997). Espinhaço range region. Eastern Brazil. In: S.D. Davis, V.H. Heywood, O. Herrera-MacBryde, J. Villa-Lobos & A.C. Hamilton (eds). Centres of

plant diversity. A guide and strategies for the conservation, Vol. 3. The Americas. pp. 397-404. WWF/IUCN, Cambridge.

Giulietti, A. M., Harley, R. M. & Phillips, S. (1998). (1368) Proposal to change the type of *Paepalanthus*, nom. cons. (Eriocaulaceae). *Taxon* 47: 743–744.

Giulietti, A.M., Andrade, M.J.G, Scatena, V.L., Trovó, M., Coan, A.I., Sano, P.T., Santos, F.A.R, Borges, R.L.B. & van den Berg, C. (2012) Molecular phylogeny, morphology and their implications for the taxonomy of Eriocaulaceae. *Rodriguésia* 63: 1–19.

Gleason (1931). The Tyler Duida Expedition *Bull. Torr. Bot. Cl.*, vol. 58: 326-331

Gonzáles Géigel, L. (1985). Dos nuevas especies de *Paepalanthus* Kunth Feddes ReP., vol. 96: 513-516

Grisebach, A.H.R. (1866). Catalogus Platarum Cubensium Leipzig: P. 224 226

Guillemin (1837). Eriocauleae in Dellesert, Icones selectae Plantarum, vol. III. 57-61 Tab. 95 98

Hensold, N. (1988) Morphology and Systematics of *Paepalanthus* Subgenus Xeractis (Eriocaulaceae). In: Anderson, C. (ed.), Systematic Botany Monographs 23. The American Society of Plant Taxonomists. Michigan. 150 pp.

Hensold, N. (1988). Morphology and systematics of *Paepalanthus* subgenus Xeractis (Eriocaulaceae) *Syst. Bot. Monograph.*, vol. 23.

Hensold, N. (1991) Revisionary studies in the Eriocaulaceae of Venezuela. *Ann. Mo. Bot. Gard.* 78(2): 426–440.

Hensold, N. (2016) The Andean *Paepalanthus pilosus* complex (Eriocaulaceae): a revision with three new taxa. *PhytoKeys* (64): 1-57.

Herzog, T. (1931). Neue und weniger bekannte Eriocaulaceae aus Nordbrasilien und dem angrenzenden Venezuela Feddes ReP., vol. XXIX: 202-213. Tab. CXX, CXXI.

Herzog, Th. (1924). Neue südamerikanische Eriocaulaceae Feddes ReP. P. 82-88.

Huber (1898). *Bol. Mus. Para. Hist. Nat. Ethnogr.* P. 499

Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.F., Donoghue, M.J. Sistemática Vegetal: Um Enfoque Filogenético. 3. Ed. Porto Alegre: Artmed, 2009. 612p.

Klotzsch, F. (1847). Enantioblastae in Schomburgk, R., Reisen in Britisch Guiana Leipzig: Verlagsbuchhandlung von J.J.Weber, vol. III.

Koernicke, F. (1863) Eriocaulaceae. In: Martius, K.F.P. & Eichler, A.W. (eds.) Flora brasiliensis, vol. 3(1). Typographia Regia. Munique, pp. 271–508.

Koernicke, F. (1863). Eriocaulaceae in Martius, C.F.Ph. von, Flora Brasiliensis München, vol. III(1). 273 508 Taf. 38 63

Koernicke, F. (1871) Eriocaulaceae in Warming, E. (2), Symbolae ad floram Brasiliae centralis cognosendum, Particula IX Videsnk. Medd. naturh. Foren. P. 316.

Kunth, C. S. (1841). Eriocauleae. Pp. 498–539 in *Enumeratio Plantarum*, vol. 3. J. G. Cottae, Stuttgart.

Kuntze, O. (1891) Rev. Gen. Leipzig: Arthur Felix, vol. II. 746 p.

Lamarck (1789) Encyclopédie méthodique. Botanique. Paris: Panckoucke, vol. III). 274 277 Pl. 50

Macbride, J.Francis (1931) Peruvian Plants. Publications of the Field Museum of Natural History, Chicago, vol. X 2). 43

Malme, G. (1901) Adjumenta ad floram phanerogamicam brasiliae terrarumque adjacentium cognoscendam, vol. 27(III). 1 38 Tab. 1, 2

Martius, C. F. P. von. 1841. Herbarium Florae Brasiliensis, 24(2): 275. Monachii, Typographia Regia, München.

Martius, C.F.P. (1834) Die Eriocauleae als selbstständige Pflanzen-Familie aufgestellt und erläutert. *Ann. Sci. Nat.*, Botanique, Sér. 22: 25–43.

Martius, C.F.Ph. von (1841) Herbarium Flora brasiliensis (continuatio). Beiblätter zur Flora (Regensburg), vol. II). 1 112

Meikle, R.D. (1968,1) Eriocaulaceae in Hepper, F.N., Flora of west tropical Africa, second edition London and Tonbridge: Whitefriars Press LTD. 57 67

Miquel, F.A.G. (1850) Stirpes Surinamenses selectae Leiden: Arnz. & Soc.

Moldenke, H.N. & Lyman B. Smit (1976) Eriocaulaceas in Reitz, R., *Flora Ilustrada Catarinense*, Itajai.

Moldenke, H.N. (1937) Eriocaulaceae, North American Flora, vol. 19(1): 17–50

Moldenke, H.N. (1939) Eriocaulaceae in Gleason & Killip, Flora of Mount Auyan Tepui Brittonia, vol. III: 157–159

Moldenke, H.N. (1946) Nomenclatural notes, vol. 2(4) 132-142.

Moldenke, H.N. (1946,2) Known Geographic Distribution of Eriocaulaceae p. 62.

Moldenke, H.N. (1947) New and noteworthy plants. *Phytologia*, vol. 2(7): 369 p.

Moldenke, H.N. (1948) Eriocaulaceae in Maguire, B. et al., Plant explorations in Guiana in 1944, chiefly to the Tabberg and the Kaieteur Plateau II Bull. Torr. Bot. Cl., vol. 75: p. 194 – 203.

Moldenke, H.N. (1948) Notes on new and noteworty plants. VI. *Phytologia*, vol. 3(1): p. 35 – 45.

Moldenke, H.N. (1948) Eriocaulaceae in Maguire, B. et al., Plant explorations in Guiana in 1944, chiefly to the Tab.berg and the Kaieteur Plateau II *Bull. Torr. Bot. Cl.,* vol. 75.

Moldenke, H.N. (1950) Notes on new and noteworthy plants. XI. *Phytologia*, vol. 3(6).

Moldenke, H.N. (1950,5) Verbenaceous novelties, mostly from Madagascar and miscellaneous taxonomic notes. Lloydia, vol. 13(3).

Moldenke, H.N. (1951) New and Noteworthy Plants. *Phytologia*, vol. 3(8).

Moldenke, H.N. (1951) Eriocaulaceae, Botanical Exploration in Venezuela Fieldiana Bot., vol. 28: 114-129.

Moldenke, H.N. (1952) A collection of plants from the macarena mountains, Colombia. Mutisia, vol. 6.

Moldenke, H.N. (1953) Eriocaulaceae, Botany of the Guayana Highland *Mem. N.Y. Bot. Gard.*, vol. 8(2).

Moldenke, H.N. (1953) Eriocaulaceae *Bot. Mus. Leafl. Havard Univ.*, vol. 16.

Moldenke, H.N. (1957) Eriocaulaceae, Botany of the Chimanta Massif 1 *Mem. N.Y. Bot. Gard.*, vol. 9(3).

Moldenke, H.N. (1957) Three new species of the Family Eriocaulaceae. *Acta Biol. Venez.*, Caracas, vol. 2.

Moldenke, H.N. (1959) New and noteworthy plants, *Phytologia*, vol. 7(2).

Moldenke, H.N. (1960) Eriocaulaceae novae collectae Serra do Cachimbo Para, Brasil. *Bol. Mus. Para. E. Goeldi*, Bot., vol. 3.

Moldenke, H.N. (1960) Notes on new and noteworthy plants. XXV. *Phytologia*, vol. 7(3).

Moldenke, H.N. (1962) New and noteworthy plants. *Phytologia*, vol. 8(8).

Moldenke, H.N. (1962) Notas sobre Eriocaulacea de Venezuela, Boll. Soc. Venez., Ciencias Naturales, vol. 23.

Moldenke, H.N. (1963) New and noteworthy plants, *Phytologia*, vol. 9(4). 186.

Moldenke, H.N. (1971) More new pipeworts from Brazil, a chaste-tree from Ceylon, and new names in Premna. *Phytologia* 21(6): 418.

Moldenke, H.N. (1972) Novelties from Brazil, Peru, Venezuela, and Thailand. *Phytologia* 23(1): 181.

Moldenke, H.N. (1972) Eriocaulaceae in Steyermark, J.A. & B. Maguire, The flora of the Meseta del Cerro Jaua. *Mem. N.Y. Bot. Gard.*, vol. 23: 850 854

Moldenke, H.N. (1972) Four novelties from Brazil. *Phytologia*, vol. 24(5). 498 499.

Moldenke, H.N. (1972) Two new pipeworts from Brazil. *Phytologia*, vol. 24(1). 19.

Moldenke, H.N. (1973) Notes on new and noteworthy plants. *Phytologia*, vol. 27(1).

Moldenke, H.N. (1974) Notes on new and noteworthy plants. *Phytologia*, vol. 29(2).

Moldenke, H.N. (1975) Notes on new and noteworthy plants. *Phytologia*, vol. 32(4). 336 p.

Moldenke, H.N. (1975) Notes on new and noteworthy plants. LXXVIII *Phytologia*, vol. 31(2).

Moldenke, H.N. (1976) New and noteworthy plants. LXXXVII *Phytologia*, vol. 33(6).

Moldenke, H.N. (1976) Notes on new and noteworthy plants. XCIII *Phytologia*, vol. 34(5). 485 p.

Moldenke, H.N. (1976,3) Additional notes on the Eriocaulaceae. *Phytologia*, vol. 33(3).

Moldenke, H.N. (1976) Additional notes on the Eriocaulaceae. *Phytologia*, vol. 35(1).

Moldenke, H.N. (1976) New and noteworthy plants. *Phytologia*, vol. 35(2).

Moldenke, H.N. (1977) Notes on new and noteworthy plants XCVII *Phytologia*, vol. 35(4).

Moldenke, H.N. (1978) Notes on new and noteworthy plants. CXV *Phytologia*, vol. 40(3).

Moldenke, H.N. (1979) Notes on new and noteworthy plants. CXIII *Phytologia*, vol. 43(1).

Moldenke, H.N. (1980) Notes on new and noteworthy plants. CXXXVII, vol. 45(6). 478 p.

Moldenke, H.N. (1981) Notes on new and noteworthy plants. CL *Phytologia*, vol. 49(3). 293

Moldenke, H.N. (1982) Notes on new and noteworthy plants. CLVIII *Phytologia*, vol. 51(4).

Moldenke, H.N. (1983) Notes on new and noteworthy plants. CLXVII *Phytologia*, vol. 53(5).

Moldenke, H.N. (1983) Notes on new and noteworthy plants. CLXIX. *Phytologia*, vol. 54(1).

Moldenke. H.N. (1940) New or noteworthy south american Eriocaulaceae, *Bull. Torr. Bot. Cl.*, vol. 68.

Morat, Ph. (1976) Sur la presence a Madagascar d'un genre endemique d'Eriocaulacées: Moldenkeanthus Adansonia, vol. 15(4).

Oriani, A, Scatena, V.L. Floral anatomy of xyrids (Poales): contributions to their reproductive biology, taxonomy, and phylogeny. *Intern. J. Plant Sci.* 173 (7), 767-779.

Parra, L.R., Giulietti, A.M., Andrade, M.J.G. & van den Berg, C. (2010) Reestablishment and a new circumscription of Comanthera (Eriocaulaceae). *Taxon* 59: 1135–1146.

Rickett, H.W.; Stafleu, F.A. (1959). Nomina generica conservanda et rejicienda spermatophytorum. *Taxon*, 8: 213-243.

Roemer, M.D. et J.A. Schultes (1824) Mantissa Stuttgart: Cotta, vol. 2.

Ruhland, W. (1903) Eriocaulaceae. in: Engler, A. (ed.), Das Pflanzenreich 4(3): 1–249. Wilhelm Engelmann. Leipzig, pp. 1–294.

Saint-Hilaire, A. F. C. P. (1833). Voyage Dans le District des Diamants et sur le Littoral du Brésil, vol. 1. Librairie- Gide, Paris.

Sanderson MJ, Driskell AC, Ree RH, Eulenstein O, Langley S (2003). Obtaining maximal concatenated phylogenetic data sets from large sequence databases. *Mol. Biol. Evol.* 20:1036–42.

Sano, P.T., Giulietti, A.M., Trovó, M., Parra, L.R. & Müller, G. (2010) Flora de Grão Mogol, Minas Gerais: Eriocaulaceae. *Bol. Bot. Universidade de São Paulo* 28: 125–140.

Satake, Y. (1978) A strange plant of Eriocaulaceae collected in Gunema Pref., *Japan J. JaP. Bot.*, vol. 53(4) 107 –111

Schultes, R.E. (1954) Eriocaulaceae *Bot. Mus. Leafl. Havard Univ.*, vol. 16). 187 189

Silveira, A. (1908) Flora e serras mineiras. Imprensa Official. Bello Horizonte. 79 pp.

Silveira, A. (1928) Floralia montium. vol. 1. Imprensa Official. Bello Horizonte. 206 pp.

Smith, L.B. (1937) A new genus of Eriocaulaceae. Contribution from the Gray Herbarium 117: 38–39.

Steudel, E.G. (1855) Synopsis Plantarum Glumacearum Stuttgart: Metzler, vol. II). 267 283

Steudel, E.T. (1840) Nomenclator botanicus, ed.II Stuttgart: J.G.Cotta, vol. 1 :

Steyermark, J.A. (1988) Flora of the Venezuelan Guyana IV *Ann. Miss. Bot. Gard.,* vol. 75). 311 – 351

Stutzel, (1990). Appendices am Gynoeceum der Xyridaceen, *Beitr. Biol. Pflanzen* 65: 275-299.

Stützel, T. (1987) On the morphological and systematic position of the genus Moldenkeanthus (Eriocaulaceae) *Pl. Syst. Evol.*, vol. 156: 133 – 141

Suessenguth, K. (1942) Neue Pflanzen aus Costa Rica Bot. Jahrb. Syst., vol. 72). 293 – 294.

Thiers, B. (2018) Continuously Updated. Index Herbariorum: A Global Directory of Public Herbaria and Associated Staff. New York Botanical Garden's Virtual Herbarium.

Trovó, M., Andrade, M.J.G., Sano, P.T., Ribeiro, P.L. & van den Berg, C. (2013a) Molecular phylogenetics and biogeography of Neotropical Paepalanthoideae with emphasis on Brazilian *Paepalanthus* (Eriocaulaceae). *Bot. J. Linn. Soc.* 171: 225–243.

Vellozo, J.M.C. [1825]. 1829. Florae Fluminensis. Rio de Janeiro: Typographia Nationali. 352 p.

Vellozo, J.M.C. [1827]. 1831. Florae Fluminensis Icones I. Paris: Lithogr. Senefelder. 153 p.

Chapter 2

Taxonomic study of *Paepalanthus* ser. *Paepalanthus* (=*P.* [unranked] *Variabiles*): is it really so variable?

Abstract

Paepalanthus ser. *Paepalanthus* (=*P.* [unranked] *Variabiles*) is the largest infrageneric taxon of the genus, concentrating about one third of its species, and has never been studied comprehensively. This great number of species, summed with a deficient circumscription, has resulted in an increasing number of species being included in this taxon, creating an artificial grouping lacking information. A synopsis of *Paepalanthus* ser. *Paepalantus* is here presented, synthesizing data as a basis for future studies. One hundred and twelve species are recognized and, for each taxon, taxonomic status, typification, synonymy, nomenclatural notes, comments, and distribution data are provided, along with photographs when available. A total of 61 lectotypifications and 30 new synonyms are here proposed. Two species complexes were identified, and 14 species remain known only by the type collection.

Resumo

Paepalanthus ser. *Paepalanthus* (=*P.* [unranked] *Variabiles*) é o maior táxon infragenérico do gênero, concentrando cerca de um terço das suas espécies e nunca foi estudado de forma abrangente. Esse grande número de espécies, somado a uma circunscrição deficitária, resultou em um número crescente de espécies incluídas neste táxon, gerando um agrupamento artificial e carente de informações. Uma sinopse de *Paepalanthus* ser. *Paepalantus* é aqui apresentada, sintetizando dados como base para futuros estudos. São reconhecidas cento e doze espécies e, para cada táxon, status taxonômico, tipificação, sinonímia, notas nomenclaturais, comentários. e dados de distribuição, além de fotografias, quando disponíveis, são fornecidas. Um total de 61 lectótipos e 30 novos sinônimos são aqui propostos. Foram identificados dois complexos de espécies, e 14 espécies permanecem conhecidas apenas pelo material-tipo.

Introduction

Paepalanthus Mart. is the third-largest genus of Brazilian angiosperms and the largest among monocotyledons occurring in that country (BFG, 2015). The genus currently comprises 405 species (see Chapter 1) distributed principally in the Neotropics, with few species in Africa. *Paepalanthus* comprised 230 species when the most recent revision of the family was made by Ruhland (1903), who divided the genus into various infrageneric categories. The groups composing *Paepalanthus* were divided based on characteristics such as the stem's branching pattern and floral characteristics. One of those categories, however, comprised species displaying apparent morphological uniformity that did not fit well within any particular group or demonstrate any particularly distinctive characteristics. That taxon was named "*Variabiles*" by Ruhland (1903), and was placed within the most diverse subgenus, *Paepalanthus* subg. *Paepalocephalus* Ruhland, within the subsection *P.* subsect. *Eupaepalanthus* Ruhland. Ruhland (1903) defined *P.* [unranked] *Variabiles* as having short aerial stem, or only slightly elongated sub-horizontally, generally lignified, rarely vertical; leaves congested cespitose, and scapes never fasciculate. Sixty-six species were included within the taxon, defined by characteristics encountered throughout the family and that could therefore easily be incorrectly interpreted. As such, Silveira (1908, 1928) later described more 72 species and 11 varieties in *P.* [unranked] *Variabiles,* but without providing an identification key. As taxonomic revisions began to be conducted within *Paepalanthus*, species that did not fit well within the concepts of the different groups were removed and placed in *P.* [unranked] *Variabiles* – resulting in eight more species and five varieties being included in that group (Hensold, 1988; Costa et al., 2013). Parallel to that, when the conservation of the name *Paepalanthus* Mart. was proposed, as opposed to *Paepalanthus* Kunth (Giulietti *et al.,* 1998), with the consequent indication of another conserved type, the species *Paepalanthus erigeron* Mart. was chosen, which belonged to *P.* ser. *Variabiles.* As such, the most numerous and poorly defined taxon of *Paepalanthus* also came to include the type species of the genus. Additionally, as new species were discovered, the absence of infrageneric categories that contemplated them resulted in their allocation to *Paepalanthus* ser. *Paepalanthus* (=P. [unranked] *Variabiles*), so that the group presently comprises 136 species.

That series therefore currently holds one third of all species of *Paepalanthus*, and they have never been closely studied, which signifies that we currently know very little about the genus as a whole. That lack of detailed information concerning those species likewise makes phylogenetic analyses more difficult, as the identities of many of the taxa remain obscure. *P.* ser. *Paepalanthus* has

emerged as polyphyletic in all of the phylogenetic analyses undertaken until now, but the widest sampling of the group included only 13 species, which obviously complicates a precise understanding of their evolutive relationships. A taxonomic study of *Paepalanthus* ser. *Paepalanthus* is therefore necessary (even if it is found to be polyphyletic) to better understand its composition and help elucidate the taxonomy of the group. Such an analysis would necessarily include as many taxa as possible to produce a more inclusive phylogeny.

The objective of the present taxonomic study was, above all, to identify the component taxa. Many of the names presented here are valid but forgotten in older works, many others are applied incorrectly, some are synonyms, and there are a large number of species only known from their type specimens. Our study therefore aims to help clarify each case and to determine if a given species is truly rare, if a name is not used because it has been forgotten in older works and not cited in herbaria, or if it represents a micro-endemic species that requires greater collection efforts. This study therefore represents the first tentative step to establish smaller groups for more detailed morphological, taxonomic, and evolutive studies in *Paepalanthus*.

Although the current classification is known to be artificial, we do not propose inclusion of any species of *P.* ser. *Variabiles* into other categories, as that could result in greater instability. We intend to address nomenclatural problems and indicate new directions for understanding the genus that can be used for future examinations of new infrageneric classifications.

Our study provides an overview of taxonomic status and geographic distributions for all species of *P.* ser. *Paepalanthus.* Furthermore, we will be able to identify which taxa deserve more attention, and which regions deserve more fieldwork. Unfortunately, it was not possible to undertake deeper morphological and taxonomic studies, but we do indicate species complexes or groups to be studied in the future.

Materials and methods

Firstly, a taxonomic survey was undertaken for all species assigned to *Paepalanthus* ser. *Paepalanthus* by Ruhland (1903) and Silveira (1908; 1928). In addition to these, were included the names assigned to *P.* subg. *Paepalanthus* and *P.* sect. *Paepalanthus* without specifying lower categories and new species described in the group.

Data sources

We observed 17105 herbarium specimens, including types, held in 36 herbaria: ALCB, B, BHCB, BM, CEN, CESJ, CEPEC, DIAM, ESA, F, HB, HAC, HBG, HRCB, HUEFS, HUFU, IAN, IBGE, K, LE, LL, M, MO, NY, OUPR, P, R, RB, S, SP, SPF, TEX, UB, UEC, US, W (acronyms according to Thiers, continuously updated). We used the Global Plants portal (plants.jstor.org) to check types stored in herbarium collections not visited.

For each species we present nomeclatural notes when necessary, comments on morphology and taxonomic issues, distribution notes and a list of selected representative specimens examined. For widely distributed species, at least one specimen for each locality of occurrence is cited.

Field expeditions were conducted to the known distribution areas of *Paepalanthus* ser. *Paepalanthus* species. The morphological terminology used in the comments follows the Radford *et al.* (1976) and Harris & Harris (2001), as well as Weberling (1989) for inflorescence typology and Scatena & Rosa (2001) for features specific to *Eriocaulaceae.*

Typification

The criteria for designating the Lectotypes were: specimens annotated by the author; or material known to have been among items studied by the author; or material that best illustrates the author's description of the species. Körnicke's (1863) explicitly states which herbarium held the collection of each author (see Körnicke 1863; Fl. Bras., Footnote p. 303). If that type had been lost or destroyed and duplicates remained, the one that best illustrated the species description were designated as the lectotype. In the case of Silveira (1908, 1928), as many specimens had already been designated as holotypes by the herbarium in which they were deposited (R), the choice of that herbarium was disregarded when photographs of another material was available in the original work. Thus, each specimen was checked against the photograph and then the lectotype was selected. When a photograph was not available, the material that best represented the characteristics of the species description was chosen.

Taxonomic information

Species type citations are given following the original publications. When necessary, additional information concerning the type specimens that was not provided in the original publication was added, and/or corrections were indicated or briefly explained.

Results and discussion

A list with 161 names was obtained for *Paepalanthus* ser. *Paepalanthus*, of which 111 species are accepted here, and 20 taxa were temporarily defined as *doubtful taxa*. A total of 59 lectotypifications and 30 new synonyms are here proposed, being 14 species names and 16 varieties names. Among the 44 species of *Paepalanthus* known only by their type colletionn (see chapter 1), 25 belong to *Paepalanthus* ser. *Paepalanthus*. Of these, nine synonyms are proposed here, and two names were valid but with another name published later being the most used. Two species complexes were identified, and 14 species remain known only by their type collection.

Some species of *Paepalanthus* ser. *Paepalanthus* do not appear to be related to *Paepalanthus*, nor any other species of the series. Those species were placed in the section "Taxa of Doubful Placement" at the end of the synopsis, and are discussed below. Some varieties of species that seem to belong to the species in question were placed in another section, "Taxa of Uncertain Status".

Three species of *P.* ser. *Paepalanthus* that occur in Cuba and the Dominican Republic (*Paepalanthus retusus* Wright, *Paepalanthus repens* Körn., and *Paepalanthus seslerioides* Grieseb.) appear to be morphologically more similar to the other *Paepalanthus* species occurring in Central America. Among the nine species of *Paepalanthus* listed for Cuba, those three species show greater similarity to *Paepalanthus nipensis* Gonz.Géigel, *Paepalanthus pungens Griseb.*, and *Paepalanthus riparius* Moldenke, which are not included in any infrageneric category, but share the same geographic distributions and many morphological characteristics (such as short stems, lanceolate to linear membranaceous leaves in basal rosettes, scapes much larger than the leaves, and capitulum hemispherical).

Among the *P.* ser. *Paepalanthus*, the occurrences of three species are restricted to southern Brazil (*Paepalanthus caldensis* Malme, *Paepalanthus catharinae* Ruhland, and *Paepalanthus balansae* Ruhland); the first two share morphological features that place them closer to the *Paepalanthus* subsect *Cryptanthella* Suess. from the Andean Paramos (Hensold, 2016) than to *P.* ser. *Paepalanthus* (as they form cushion-like groups or flat mats of rosettes, and their capitula are solitary in the axils of normal rosette leaves). In depth morphological studies of this species and *Paepalanthus balansae,* and

principally their examination in the field, will be necessary to determine if they share similar characteristics.

There are also species within *Paepalanthus* ser. *Paepalanthus* that would be better circumscribed and taxonomically delimited if compared to the species of *P.* ser. *Leptocephali* (Ruhland) Giul. It is possible, a priori, to identify two groups along the species of *P.* ser. *Leptocephali* and *P. ser. Paepalanthus* that resemble the former series: species with a short stem and leaves in basal rosettes, usually with restricted distributions, and species with an elongated stem, fasciculated scapes, and generally with wide distributions. The series appears to be polyphyletic, but comprises morphologically similar groups of species that deserve further study.

Stem branching patterns are an important character in *Paepalanthus* according to Ruhland's (1903) concepts. Three species described in *P.* ser *Paepalanthus* by Silveira (1928) (*Paepalanthus accrescens* Silveira, *Paepalanthus lanatus* Silveira, and *Paepalanthus rufoalbus* Silveira), however, have very different phenologies than those described as characteristic of the group (such as a short stem, never ramified), and they show elongated aerial stems branched dichotomously, resembling the species included in *P.* subsect. *Polycladus*, *P.* subsect. *Dichocladus,* and sometimes *P.* subsect. *Polyactis.*

Unlike those groups and species that seem to more resemble other groups and genera, there are other morphologically distinguishable groups that are probably closely related.

A group of about 20 species included in *Paepalanthus* ser. *Paepalanthus* demonstrate similar morphological characteristics and continuous geographical distributions, possibly being closely related. They are robust species, more than 30 cm tall, with short aerial stems and lignified subterranean stems, usually vertical, leaves flat, persistent, lanceolate, disposed in rosettes, scapes 15-30 per individual and usually twice as long as the leaves. Although some of those characteristics were defined as rare in the group by Ruhland (1903), they are found in a considerable number of species within that series. The species are distributed in the Diamantina Plateau, in the Espinhaço Range from Minas Gerais State to Bahia State, with many species in the mountains of northern Minas Gerais and the northern portion of the Espinhaço Range in Bahia. That group is composed of the following species: *Paepalanthus barbulatus* Herzog, *Paepalanthus carvalhoi* Giul. & E.B.Miranda, *Paepalanthus diversifolius* Silveira, *Paepalanthus erigeron* Mart. ex Körn., *Paepalanthus fastigiatus* (Bong.) Körn., *Paepalanthus luetzelburgii* Herzog, *Paepalanthus multicapitatus* Giul. & E. Miranda, *Paepalanthus nigricaulis* Silveira, *Paepalanthus oblongifolius* Giul. & E. Miranda, *Paepalanthus parallelinervius*

Silveira, *Paepalanthus regalis* Mart. ex Körn., *Paepalanthus regelianus* Körn, *Paepalanthus serrinhensis* Silveira, *Paepalanthus spathulatus* Körn., *Paepalanthus stenolepis* Silveira, *Paepalanthus stephanophorus* Silveira, *Paepalanthus umbrosus* Giul. & E.B.Miranda, and *Paepalanthus cuspidatus* Silveira.

It is possible to identify three more groups within the series that are probably related. The first, designated here as the *Paepalanthus falcatus* complex, includes 27 names, 20 species, and 7 varieties; the second consists of species of the *Paepalanthus aequalis* complex, *Paepalanthus riedelianus,* and *Paepalanthus blepharophorus*; the third includes the species that occur mainly in altitudinal fields in the Mantiqueira Mountains.

The *Paepalanthus falcatus* complex includes twenty of the currently recognized *Paepalanthus* species: *Paepalanthus albovillosus* Silveira, *Paepalanthus batalensis* Silveira, *Paepalanthus brevicaulis* Silveira, *Paepalanthus callocephalus* Silveira, *Paepalanthus falcatus* (Bong.) Körn., *Paepalanthus globosus* Ruhland, *Paepalanthus melanthus* Silveira, *Paepalanthus praemorsus* Ruhland, *Paepalanthus pubescens* Körn., *Paepalanthus sericeus* Silveira, *Paepalanthus silverae* Ruhland, *Paepalanthus sphaerulifer* Silveira, *Paepalanthus subfalcatus* Ruhland, *Paepalanthus succisus* Mart. ex Körn., *Paepalanthus tricholepis* Silveira, *Paepalanthus uleanus* Ruhland, and *Paepalanthus vestitus* Ruhland. The species of that complex are the ones that most fit Ruhland's (1903) concept for the series. They are species with short aerial stems, generally restricted to the rosette, sub-horizontal subterranean stems, scapes never fasciculated, axillary to leaves or central and solitary. It is probably not possible to elucidate this complex considering only their morphological characteristics, and anatomical studies (Francino *et al.*, in prep) are therefore being developed in this group.

A unique group in *Paepalanthus* ser. *Paepalanthus* is the group composed of species with short, lignified stems, leaves disposed in rosettes, and numerous free scapes equal in length to or slightly larger than the leaves. About 15 species fit this description and need to be phylogenetically tested. Among those species, four synonyms and a species complex (the *Paepalanthus aequalis* complex) are recognized here. With about 10 names, the *Paepalanthus aequalis* complex comprises morphologically very similar species, although the type specimens do not bring together much information, either because the material is degraded, because of inaccurate descriptions and localities are indicated, or because there are no duplicates. In any case, in-depth anatomical and morphological studies are likewise being developed for that complex (Francino *et al.* in prep).

Synopsis

The species were organized in alphabetical order. Synonyms, nomenclatural notes, comments on taxonomic and morphology issues, and the material analyzed are provided in each species.

Paepalanthus Mart. Ann. Sci. Nat., Bot. sér. 2, 2: 28. 1834, **nom. cons.**

CONSERVED TYPE: (designated by Giulietti et al. 1998): *Paepalanthus erigeron* Martius ex Körnicke, Fl. Bras. 3: 390 (1863).

Paepalanthus Mart. subg. ***Paepalanthus***

Paepalanthus subg. *Paepalocephalus* Ruhland, Pflanzenr. IV.30:122, 1903.

TYPE: *Paepalanthus erigeron* Mart. ex. Körnicke, Fl. Bras. 3: 390 (1863).

Paepalanthus Mart. sect. ***Paepalanthus***

Paepalanthus sect. *Eriocaulopsis* Ruhland, Pflanzenr. IV.30: 122, 1903.

TYPE: *Paepalanthus erigeron* Mart. ex. Körnicke, Fl. Bras. 3: 390 (1863).

Paepalanthus Mart. subsect. ***Paepalanthus***

Paepalanthus subsect. *Eupaepalanthus* Ruhland, Pflanzenr. IV.30: 123, 1903.

TYPE: *Paepalanthus erigeron* Mart. ex. Körnicke, Fl. Bras. 3: 390 (1863).

Paepalanthus Mart. ser. ***Paepalanthus***

Paepalanthus [unranked] *Variabiles* Ruhland, Pflanzenr. IV.30: 123, 1903.

TYPE: *Paepalanthus erigeron* Mart. ex. Körnicke, Fl. Bras. 3: 390 (1863).

1. ***Paepalanthus accrescens*** Silveira, Floral. Mont.: 96, fig. LXII & LXIII, 1928.
   TYPE: BRAZIL. Minas Gerais: sub rupibus quartzitosis, locis siccis, prope Curraes, Serra do Cipó, April 1909, *Silveira 560* (**Lectotype** R000181790! **here designated**; Isolectotypes R!) = *Paepalanthus accrescens* var. *glabrescens* Silveira, Floral. Mont.: 98, 1928. TYPE: BRAZIL. Minas Gerais: Bandeirinhas, Serra do Cipó, Inter saxa quartzitosa, campis arenosis. April 1909, *Silveira 561* (**Lectotype** R000181791! **here designated**; Isolectotypes R!) **syn. nov.**

Nomenclatural notes: Silveira (1928) distinguishes the two varieties based on the pilosity of the leaves. When analyzing the material, it is possible to verify that these characteristics overlap, so they are considered synonyms.

Comments: This species is known only by their type collection and has an elongated branched stem, clearly a characteristic that would exclude it from the concept of Ruhland for *Paepalanthus* ser. *Paepalanthus*.

Distribution: Occurs in *Serra do Cipó*, Espinhaço Range in Minas Gerais state (Brazil).

2. ***Paepalanthus aculeatus*** Silveira, Fl. Ser. Min.: 65. 1908.

   TYPE: BRAZIL. Minas Gerais: Vaccaria, Serra do Cipó, Apr 1905, *Silveira 360* (**Lectotype:** R000181787! **here designated**; Isolectotype: R!)

   = *Paepalanthus acuminatus* var. *longipilosus* Moldenke, Phytologia 3: 314. 1950. TYPE: BRAZIL. Minas Gerais; Jaboticatubas; Serra do Cipó, 29 April, 1945, *H. L. de Mello Barreto 15011* (Holotype: NY!) **syn. nov.**

Nomenclatural notes: Moldenke (1950) describes *Paepalanthus acuminatus* var. *longipilosus* based exactly on the characteristics that differ *Paepalanthus acuminatus* from *Paepalanthus aculeatus* (see below), as a smaller capitula, scapes very densely pilose with ascending subapressed hairs and involucral bracts stramineous. Thus, we propose the synonimization of *Paepalanthus acuminatus* var. *longipilosus.*

Comments: This name was excluded from *Paepalanthus* subg. *Xeractis* by Hensold (1988), who placed it in *P.* sect. *Paepalanthus*. It was included in this treatment because it has characteristics defined by Ruhland as *P.* ser. *Variabiles*.

Distribution: Occurs in *Serra do Cipó*, Espinhaço Range in Minas Gerais state (Brazil).

Additional specimens examined:— **Brazil. Minas Gerais: Santana do Riacho**, 22 February 2008, *L. Echternacht 1600* (SPF); **Santana do Riacho**, Serra do Cipó, 10 December 1976, *P. E. Gibbs CFSC 5375* (B, F, MBM, NY, RB, SPF); **Santana do Riacho**, Serra do Cipó, 102 km by road from Lagoa Santa (2 km W of Hotel Chapeu de Sol), on road to Conceição do Mato Dentro, 1982, *N. Hensold 702* (SPF, NY); **Santana do Riacho**, Serra do Cipó, 13 April 1982, *N. Hensold 4201* (SPF); **Santana do Riacho**, Serra do Cipó, 21 July 1987, *J. R. Pirani 10313* (SPF); **Santana do Riacho**, Serra do Cipó, 8 May 1987, *R. Simão-Bianchini 10106* (SPF).

3. ***Paepalanthus acuminatus*** Ruhland, Pflanzenr. IV.30: 217. 1903.

   TYPE: BRAZIL. Minas Gerais: Serra de Ibitipoca, Jun 1896, *Magalhaes 1369* (Holotype: B!; Isotypes: R!, F! photo, LL! fragment)

Comments: This name was also excluded from *Paepalanthus* subg. *Xeractis* by Hensold (1988) and placed in *P.* sect. *Paepalanthus*. It was included in this treatment because it has characteristics defined

by Ruhland as *P.* ser. *Variabiles*. This species is similar to *Paepalanthus aculeatus*, but in addition to the characteristics mentioned above, differ by the involucral bracts widely ovate with acuminate apex in *P. acuminatus*.

Distribution: This species is endemic to *Serra do Ibitipoca*, in the southeast of Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Lima Duarte, 24 March 2002, *A. S. M. Valente 173* (RB); **Lima Duarte**, 29 March 2006, *F. M. Ferraira 1101* (RB); **Lima Duarte**, Parque Estadual do Ibitipoca, 13 July 2005, *M. Trovó 175* (SPF); **Lima Duarte**, Parque Estadual do Ibitipoca, 23 July 2009, *L. Echternacht 2074* (BHCB, P, SPF); **Lima Duarte**, Parque Estadual do Ibitipoca. Trilha Cachoeira dos Macacos - Ponte de Pedra, 16 March 2005, *R. Dias-Melo 205* (RB); **Lima Duarte**, Parque Estadual do Ibitpoca, December 1998, *G. Martinelli 15268* (RB); **Lima Duarte**, Parque Estadual do Ibitpoca. Pico do Pião, 14 May 1970, *D. Sucre 6793* (RB).

4. ***Paepalanthus aequalis*** (Vellozo) J.F. Macbr., Publ. Field Mus. Nat. Hist. Bot., Ser 11(2): 43, 1931. ≡ *Dupatya aequalis* Vell, Fl. Flumin, 36, 1829 [1825, publ. 7 Sep-28 Nov 1829].

Lectotype – designated by Chagas *et al.* 2017: [Illustration] Original parchment plate of Florae Fluminensis deposited at the Manuscripto Section of the Biblioteca Nacional of Rio de Janeiro, and later published in Vellozo (Fl. Flumin. Icon 1: t. 87. 1831)

= *Paepalanthus loefgrenianus* Ruhland, Pfanzenr. IV.30: 142. 1903 – TYPE: BRAZIL. São Paulo, "campo S.J. Boa Vista", June 1893, *A. Löfgren & G. Edwall 2227* (Holotype: C100110007!; Isotypes: B!, R!, SP003222!).

= *Paepalanthus blepharocnemis* Mart. ex Körn., Fl. Bras. 3: 376. 1863. = TYPE: BRAZIL. Minas Gerais: Ouro Branco, no date, *L. Riedel, 1474* (**Lectotype**: BR! **here designated**; Isolectotype: K!)

Comments: *Paepalanthus aequalis* is here considered part of a complex of species and names still little studied, composed by the species *Paepalanthus cachambuensis* Silveira, *Paepalanthus chloropus* Silveira, *Paepalanthus henriquei* Silveira, *Paepalanthus linearifolius* Silveira, *Paepalanthus magalhaesii* Silveira, *Paepalanthus mendoncianus* Ruhland, *Paepalanthus michaelii* Silveira, *Paepalanthus nigriflorus* Silveira, *Paepalanthus rigidifolius* Silveira, briefly discussed separately at the beginning of this treatment. Many of these names are probably synonymous, fruit of collections in different stages of the development of the plant. Anatomical morphological studies have been performed to elucidate this complex (Francino

et al., in prep.). This species is distinguished by the presence of linear leaves with the same-sized scapes and sheaths with a truncated apex.

Distribution: Occurs in quartzitic and ferruginous *campos rupestres* in Minas Gerais, Rio de Janeiro and São Paulo states (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Belo Horizonte, 18 November 1994, *M. F. Vasconcelos s.n.* (SPF); Belo Horizonte, Serra Taquaril, 1933, *H. L. de M. Barreto 2565* (NY); **Brumadinho**, Serra Azul, Serra das Farofas, 08 January 2016, *F. D. Gontijo 1087* (BHCB); **Caeté**, 03 February 2015, *F. D. Gontijo 836* (BHCB); **Caldas**, 6 October 1845, *A. F. Regnell II/290* (US); **Carrancas**, Serra do Perdizes, 02 December 2007, *P. L. Viana 3319* (BHCB); **Conselheiro Lafaete**, 1936, *H. L. Barreto 5180* (BHCB, NY); **Itabirito**, Serra da Moeda, Em frente ao condomínio Vila Bela, 28 February 2013, *M. S. Mendes s.n.* (BHCB); **Itambé do Mato Dentro**, Serra do Cipó, (Sa. das Bandeirinhas), about 18 km by foot trail WNW of settlement of Serra das Alves, N. Sra. do Carmo, 1982, *N. Hensold 814* (NY); **Itambé do Mato Dentro**, Serra do Cipó, 11 May 1982, *N. Hensold 4227* (SPF); **Moeda**, Serra da Moeda, Entrada para Moeda, 07 December 2007, *J. A. N. Batista 2255* (BHCB, CEN); **Moeda**, Serra da Moeda, Entrada para Moeda, campos na escostas acima, 07 December 2007, *J. A. N. Batista 2290* (BHCB); **Moeda**, Serra da Moeda, Entrada para o Condomínio Retiro do Chalé, 12 October 2008, *R. L. R. M. Leite 90* (BHCB); **Nova Lima**, Serra do Curral, 02 December 1950, *M. Magalhães s.n.* (UB); **Ouro Branco**, 16 October 2009, *D. T. Souza 964* (BHCB); **Ouro Preto**, Villa Rica, no date, *Sellow* (P); **Poços de Caldas**, 11 July 2014, *J. P. L. Braga 465* (RB); **Poços de Caldas**, Morro S. Domingos, no date, *J. T. Motta 1244* (MBM); **Rio Acima**, Serra do Gandarela, 04 November 1968, *A. P. Duarte 11165* (BHCB); **Santa Bárbara**, Serra de Gandarela, 26 November 2008, *F. F. Carmo 4980* (BHCB); **São João del Rei**, Agua geral- Serra do Lenheiro, 1936, *H. L. de M. Barreto 4669* (BHCB, F, NY); **São Thomé das Letras**, 3 November 1984, *L. Rossi CFCR 5873* (B, BHCB, SPF); **Serra do Curral**,1840, *G. Gardner 5267* (BM). **São Paulo: Areias**, 7 May 2011, *C. L. Silva-Luz 151* (RB, SPF); **Campos do Jordão**, 1 1/2 km SW of Campos do Jordão, 40 km north-northwest of Sao José dos Campos, 1965, *M. Rolla 6909* (NY); **Campos do Jordão**, Sanatorio S. Paulo, Campos de Jordão, 1948, *B. J. Pickel 1365* (NY); **São João da Boa Vista**, 10 June 1893, *A. Lofgren 2227* (R).

5. ***Paepalanthus albotomentosus*** Herzog, Repert. Spec. Nov. Regni Veg. 20: 83. 1924.

   TYPE: BRAZIL. Bahia: Rio Bromado, 1500 meters, auf Conglomerat. August 1913. *Luetzelburg, P. von 279* (**Lectotype** M **here designated**; Isolectotype K000189955!; remaining syntype: *Luetzelburg, P. von 488*, M!)

Nomenclatural notes: Herzog (1933) cites two syntypes in the original description of this species. We choose *Luetzelburg, P. von 279* at M as the lectotype.

Comments: This species is characterized by its densely tomentose indumentum on both surfaces of leaves, in contrast to generally glabrous and golden scapes. It is similar to *Paepalanthus argyrotrychus* (see sp. 8), which also shows this contrast of pilosity and color between leaves and spathes, but can be distinguished by the sericeous indumentum of the leaves and involucral bract in *Paepalanthus argyrotrychus*.

Distribution: Occurs in *campos rupestres* in Espinhaço Range in Bahia state (Brazil).

Additional specimens examined:— **Brazil. Bahia: Abaíra**, 14 July 1992, *W. Ganev 645* (HUEFS); **Abaíra**, Campo de Ouro Fino, 24 January 1992, *J. R. Pirani 50777* (HUEFS, SPF); **Abaíra**, Campo do cigano, 05 February 1992, *B. Stannard 51194* (HUEFS, NY, SPF); **Abaíra**, Campos de Ouro Fino, próximo a Serra dos Bicanos, 16 July 1992, *W. Ganev 657* (HUEFS, K, NY, SPF); **Belmonte**, 9 July 1980, *L. A. Mattos-Silva 972* (SPF); Bom Jesus1813, *C. Gobrich 488* (M); **Morro do Chapéu**, Piemonte da Diamantina, 10 November 2007, *N. Roque CFCR 1732* (ALCB); **Mucuri**, 14 September 1978, *S. Mori 10484* (CEPEC); **Piatã**, Serra de Santana, 10 February 1992, *L. P. Queiroz 51513* (B, HUEFS, K, SPF); **Piatã**, Serra de Santana, 3 November 1996, *H. P. Bautista 4017* (SPF). **Minas Gerais: Jequitinhonha**, Reserva Biológica da Mata Escura, 25 March 2008, T. E. Almeida 1298 (SPF).

6. ***Paepalanthus albovillosus*** Silveira, Floral. Mont.: 33, fig. XV. 1928.

   TYPE: BRAZIL. Minas Gerais: In campis arenosis, inter Serro et Diamantina, 1925, *Silveira 769* (**Lectotype** R00181786a! **here designated**; Isolectotypes R!)

Comments: *Paepalanthus albovillosus* is here considered part of the *Paepalanthus falcatus* complex, which includes about twenty names and needs revision.

Distribution: Occurs in Diamantina Plateau, Espinhaço Range in Minas Gerais state (Brazil).

Additional specimens examined:— **Brazil. Minas Gerais: Diamantina**, 1 May 2001, *F. N. Costa 265* (SPF); **Diamantina**, 12 July 1996, *L. R. Parra 48* (SPF); **Diamantina**, 9 July 2001, *F. N. Costa 308* (SPF); **Rio Vermelho**, Morro do Ambrósio, 15 July 1984, A. M. Giulietti 4516 (SPF).

7. ***Paepalanthus aleurophyllus*** Trovó, Blumea 58: 77, 2013.

   TYPE: BRAZIL. Minas Gerais: Santo Antônio do Itambé, Início da estrada para o pico do Itambé. 800-1200 m, 12 March 1995, *V.C.Souza, P.H.Miyagi, J.P.Souza 8400* (Holotype: SPF!; Isotypes: B, ESA, HUEFS, NY, P, UB, UFMG)

Comments: This species is distinguished from other by its densely ciliate leaves with dolabriform to fusiform trichomes on the adaxial surface and its trichomes between the scape ribs. The general habit and floral features are also useful for their identification considering that they are unusual in this area of occurrence.

Distribution: *Paepalanthus aleurophyllus* is restricted to a mountain known as *Pico do Itambé*, in the central portion of the Espinhaço Range, in municipality of Santo Antônio do Itambé, Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Santo Antônio do Itambé, 1 April 1985, *A. M. Giulietti 7787* (SPF); Serra do Espinhaço, South-eastern drainage of Pico do Itambé, about 5 km directly west and north of Santo Antonio do Itambé,1972, *W. R. Anderson 35679* (NY).

8. ***Paepalanthus argyrotrychus*** F.N. Costa, Andrino & Echtern., Phytotaxa 247 (2): 118–126.

   TYPE: BRAZIL. Minas Gerais: Rio Vermelho, Serra do Ambrósio, Vargem do Anjo, próximo à comunidade de Pedra Menina, 1334 m elev., 18°08'02.4"S, 43°01'02.3"W, 26 June 2012, *F.N. Costa, A.B. Sampaio, R. Ramos & S.N. Fonseca 1542* (Holotype: DIAM!, Isotypes: B!, SPF!) (Fig. 1)

Comments: *Paepalanthus argyrotrychus* is characterized by its densely sericeous indumentum on both surface of leaves and spathes, sparsely villous or more frequently glabrous and golden-colored scapes, and brown involucral bracts.

Distribution: This species is microendemics, known from a single locality in Rio Vermelho municipality, in Serra do Ambrósio, Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Rio Vermelho, Pedra Menina, 10 June 1991, *R. Mello-Silva 421* (SPF); **Rio Vermelho**, Pedra Menina, 13 October 1984, *E. M. Isejima 5469* (SPF); **Rio Vermelho**, Serra do Ambrósio, 1 August 1985, *R. Mello-Silva CFCR 7884* (SPF).

9. ***Paepalanthus barbulatus*** Herzog, Repert. Spec. Nov. Regni Veg. 20: 83. 1924.

TYPE: BRAZIL. Bahia: Serra das Almas, 1800 meters, *Luetzelburg 212* (**Lectotype**: M 0165280! **here designated**; Isolectotypes M!, JE! Photo, R!, LL!) (Fig. 2)

= *Paepalanthus erigeron* var. *pubescens* Moldenke, Phytologia 56: 380. 1984. TYPE: BRAZIL. Bahia: Mucugê, Rio Mucugê, Jun 16th, 1984, *Hatschbach 47956* (Holotype: LL!). **syn. nov.**

Nomenclatural notes: Moldenke (1984) indicates that *Paepalanthus erigeron* var. *pubescens* differs from the typical form of the species chiefly in the involucral bracts being very densely appressed-pubescent on the outer surface. However, the most striking feature of *Paepalanthus erigeron* is its glabrous bracts on the abaxial surface. After analyzing the type deposited in the herbarium LL, it was possible to conclude that the variety is actually the species *Paepalanthus barbulatus*, which has widely different hairy bracts diagnostic of the species.

Comments: *Paepalanthus barbulatus* can be distinguished by the robust habit, leaves in basal rosettes with numerous scapes. The capitula are hemispherical and the involucral bracts triangular and hairy.

Distribution: This species is endemic to the state of Bahia, occurs in Chapada Diamantina, in the municipalities of Rio de Contas, Abaíra and Mucugê, in Espinhaço Range (Brazil).

Additional specimens examined:— Brazil. Bahia: Abaíra, 18 November 1992, *W. Ganev 1488* (HUEFS, K, SPF); **Abaíra**, 21 July 1993, *W. Ganev 1932* (HUEFS, K, SPF); **Abaíra**, Campo de Ouro Fino, 29 January 1992, *J. R. Pirani 51109* (SPF); **Abaíra**, Campo do Cigano, 24 February 1992, *P. T. Sano H52167* (HUEFS, M, NY, P, SPF, W); **Ibicoara**, 21 July 1998, L. P. Félix 8733 (RB); **Itubira**, Carrasco-Gebiet, August 1914, *F. Landstein 212* (M); **Mucugê**, 11 July 2009, *C. N. Fraga 2680* (SPF); **Mucugê**, Alto da Serra da Pina, estrada Mucugê - Guiné, a 25km NO, 20 July 1981, *A. M. Giulietti CFCR 1507* (F, HUEFS, MBM, NY, RB, SPF); **Mucugê**, Rio Mucugê, 1984, *G. Hatschbach 47956* (NY); **Piatã**, Estrada Catolés-Abaíra, próximo 2 irmaos. Serra do Santana, 22 September 1992, *W. Ganev 1164* (HUEFS, K, NY, SPF); **Rio de Contas**, Kaiambola, na trilha para o Pico de Itobira. Em solo escuro, úmido, com pedras quartzíticas, 02 January 2003, *R. M. Harley 54534* (HUEFS); **Rio de Contas**, Pico das Almas, 14 December 1984, *A. M. Giulietti 6909* (SPF); **Rio de Contas**, Trilha Catolés-Caiambola, próximo ao cruzamento para o Bicho, 23 March 1999, *F. H. F. Nascimento 141* (HUEFS).

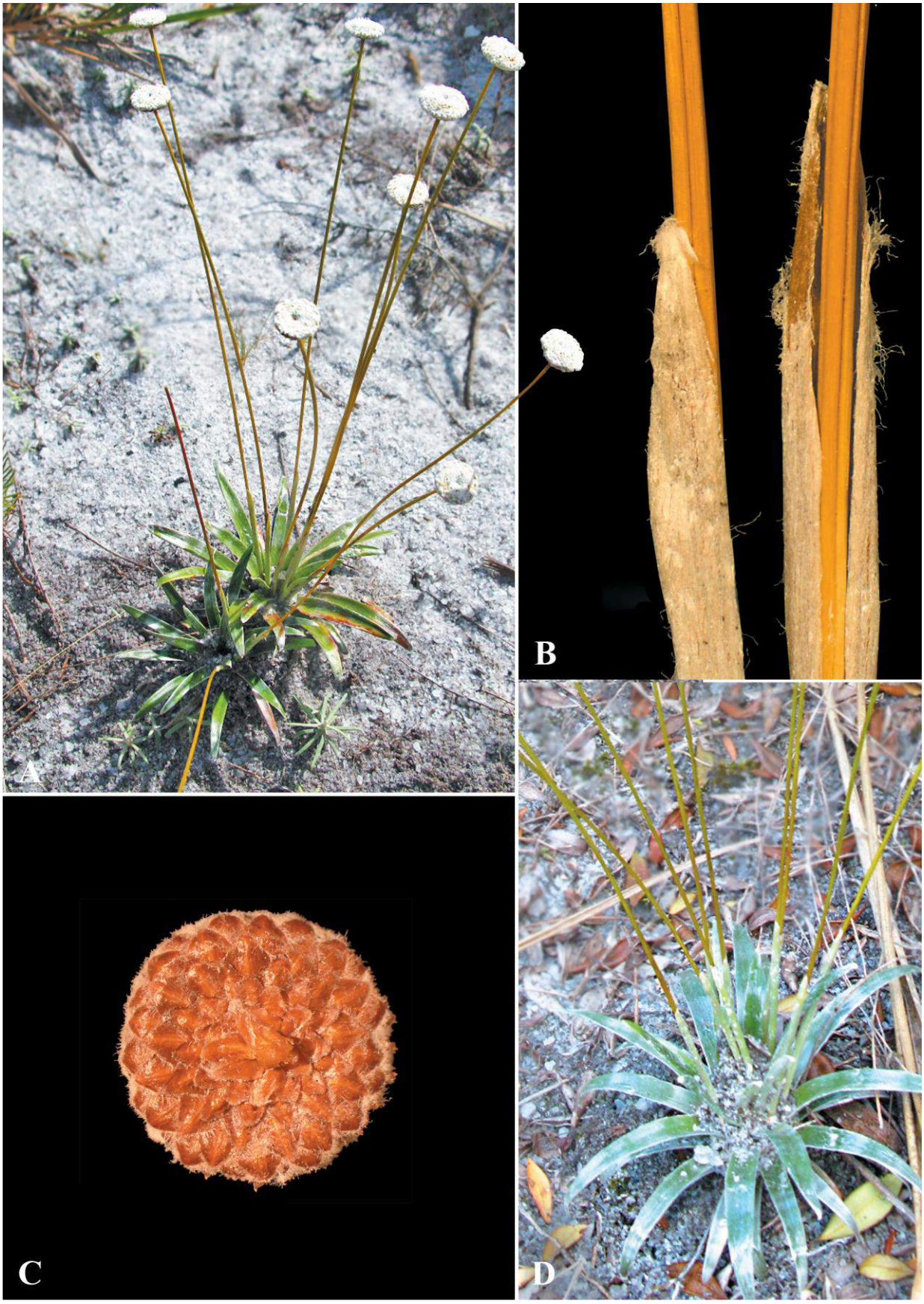


Fig. 1. *Paepalanthus argyrotrychus*. A: Habit; B: Spathe detail; C: Involucral bracts. D: Leaves detail, showing the contrast with the color of the scapes. Photos: A;D: Fabiane Costa. B;C: Caroline Andrino.

10. ***Paepalanthus batatalensis*** Silveira, Floral. Mont.: 77, fig. XLV. 1928.TYPE: BRAZIL. Minas Gerais: Serra do Batatal. Prope Capanema, Serra do Cipó, Serra do Riacho de Vento, Silveira 340 (Holotype: R!)

Nomenclatural notes: In *Paepalanthus batatalensis*, Silveira (1928) cites the protologue: *In campis prope Capanema in Serra do Batatal, Minas, 1906; in Serra do Cipó, 1905, et campis arenosis in Serra do Lenheiro, 1896, et in Serra do Riacho de Vento, 1918: Alvaro da Silveira; n. 340 in herbario Silveira.* The *Silveira 340* specimen, deposited in the Herbarium R, has the three localities and dates on the label, so it is impossible to say whether these are three mixed collections or only one collection associated with three registers of occurrence. Given the existence of a single specimen, which contains the complete information of the prototype, it is clear that this was the specimen studied by Silveira (1928) in his description and, therefore, is the holotype.

Comments: This species belongs to the *Paepalanthus falcatus* complex and the group needs revision.

Distribution: Occurs in Espinhaço Range in Minas Gerais state (Brazil), but it is not possible to precise localities.

Additional specimens examined:— Brazil. Minas Gerais: Diamantina, 1 May 2001, *F. N. Costa 265* (SPF); **Itabirito**, Serra de Capanema, 12 March 2009, *L. Echternacht 1945* (BHCB, SPF).

11. ***Paepalanthus blepharophorus*** (Bong.) Kunth, Enum. Pl. III: 499, 1841. ≡ *Eriocaulon blepharophoron* Bong., Mém. Acad. Imp. Sci. St.-Pétersbourg: 626, tab XVI, 1831. ≡ *Paepalanthus blepharophorus* (Bong.) Kunth. var. *ß humilis* Kunth, Enum. Pl. III: 499, 1841. ≡ *Dupatya blepharophora* (Bong.) Kuntze, Revis. gen. pl. 2. 745. 1891.

    TYPE: BRAZIL. Minas Gerais, "in paludosis Serra da Lapa", Nov 1824, *L. Riedel 1041* (Holotype: LE00001139!; Isotypes: B!, NY!, P!, F!, G! photo, U! photo)

    = *Paepalanthus dichromolepis* Silveira, Fl. Serr. Min.: 42, fig. XXXIII. 1908.

    TYPE: BRAZIL. Minas Gerais: Serra do Cipó, in pratis arenosis prope Lapinha: April 1905, Silveira 351 (Holotype R!) **syn. nov.**

Nomenclatural notes: *Paepalanthus dichromolepis* has the same habit, size, lanceolate form of leaves as *Paepalanthus blepharophorus*. Due to these morphological characteristics and sympatric occurrence, we propose here the synonymization of *Paepalanthus dichromolepis* with *Paepalanthus blepharophorus*.

Fig. 2. *Paepalanthus barbulatus*. A: Habit; B: Involucral bracts; C: Side view of the Capitula. Photos: Matheus Cota.

Comments: Both are distinguished from *Paepalanthus riedelianus* by the acute and recurved apices of the leaves and dark hairy brown involucral bracts. It may be a gradient of variation, but it requires a thorough morphological analysis.

Distribution: This species occurs in *campos rupestres* of the Espinhaço Range in Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Caeté, 28 January 2015, *A. M. Barros 2516* (BHCB); **Congonhas do Norte**, Serra Capão Grande, 24 April 2004, *A. B. Amaral 24* (SPF); **Congonhas do Norte**, Serra Talhada, 21 April 1982, *N. Hensold 3891* (SPF); **Diamantina**, 17 April 1987, *V. L. Scatena CFCR 10584* (RB, SPF); **Diamantina**, 18 August 1990, *R. Mello-Silva 312* (SPF); Fechados, Serra do Cipó, 22 March 1982, *N. Hensold 4172* (SPF), **Fechados**, Serra do Cipó, 23 April 1982, *N. Hensold 3919* (SPF); **Fechados**, Serra do Cipó, 23 March 1982, *N. Hensold 4184* (SPF); **Gouveia**, 22 May 1989, *G. Hatschbach 53064* (SPF); **Gouveia**, 9 April 1982, *N. Hensold 3828* (SPF); **Gouveia**, In vicinity of radio tower just W of Fazenda Contagem, 9 April 1982, *N. Hensold 640* (NY); **Santa Bárbara**, 17 July 2013, *E. Tameirão Neto 5373* (BHCB); **Santana de Pirapama**, 14 February 2010, *L. Echternacht 2123* (BHCB).

12. ***Paepalanthus bombacinus*** Silveira, Floral. Mont.: *82-83.*, fig. XLIX. 1928.

TYPE: BRAZIL, Minas Gerais: Inter Serro e Pouso Alto, April, 1918, *Silveira 513* (**Lectotype:** R000181810b! **here designated**; Isolectotypes: R!)

Nomenclatural notes: The original Silveira's label with his handwriting and the holotype tag is in the material R000181810. However, the photo available for *Paepalanthus bombacinus* in Silveira (1928) is from material R000181810b, which was therefore chosen as lectotype.

Comments: *Paepalanthus bombacinus* has a robust habit, with more than 30 cm tall, short aerial stem, leaves in rosettes and numerous scapes. Appears to be closely related to *Paepalanthus regalis*, *Paepalanthus regelianus*, *Paepalanthus serrinhensis* and other species of this group mentioned at the beginning of this treatment. It can be recognized by its dark brown and hairy involucral bracts, contrasting with its pubescent scapes and leaves.

Distribution: This species occurs in *campos rupestres* of the Espinhaço Range in Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Botumirim, Serra da Canastra, 23 July 1985, *G. Martinelli 11279* (BHCB, RB, SPF); **Felício dos Santos**, Comunidade do Gavião, 19 June 2002, *F. N. Costa 408* (DIAM); **Santa Luzia**, no date, *H. L. Barreto 2534* (BHCB); **Santana do**

Riacho, 11 May 1987, *T. Fontoura 115* (RB); **São Gonçalo do Rio Preto**, Parque Estadual do Rio Preto, 3 June 2011, *F. N. Costa 1438* (DIAM); **Serro**, Parque Estadual do Pico do Itambé, 21 April 2010, *F. N. Costa 1269* (SPF); **Serro**, PEPI, 21 April 2010, *F. N. Costa 1269* (DIAM).

13. ***Paepalanthus brevicaulis*** Silveira, Floral. Mont.: *28-29.*, fig. XII. 1928.

TYPE: BRAZIL, Minas Gerais: Serra da Moeda, Aug 1926, *Silveira 705* (Holotype: R000181811!)

Comments: This species belongs to the *Paepalanthus falcatus* complex and the group needs revision.

Distribution: It occurs in Serra da Moeda and Serra dos Alves, Iron Quadrangle (an important iron, gold, and gem mining district), in the vicinity of Belo Horizonte, Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Itabira, Serra dos Alves, 4 July 2008, L. Echternacht 1720 (SPF)

14. ***Paepalanthus brunnescens*** Ruhland, Pflanzenr. IV.30: 136, 1903.

TYPE: BRAZIL. Minas Gerais: Biribiry, 30 Mar 1892, A.F.M. Glaziou 19984 (Holotype: B!; Isotypes: C, P!, NY!).

Comments: According to Ruhland (1903), the distinctive features of the species are the olivaceous leaves and light brown scapes and involucral bracts. However, it is not sufficient to distinguish the species from a large number of other species, resulting in the misapplication of the name in materials of distinct regions and even distinct biomes. The identity of this species will be better elucidated when compared to the similar species allocated in *P.* ser. *leptocephali* and the others of *P.* ser. *Paepalanthus*, such as *P. miser*, *P. undulatus*, *P. uleanus*, among others.

Distribution: It occurs in Biribiri state park, in the municipality of Diamantina, Espinhaço Range.

Additional specimens examined:— Among the materials examined, there are none that correspond to the characteristics of the description and the type collection, so we chose not to mention any of these materials. Certainly, the taxon is not known only by type, but possibly there is more than one name for this species.

15. ***Paepalanthus cachambuensis*** Silveira, Floral. Mont.: *50*, fig. XXVII. 1928.

TYPE: BRAZIL, Minas Gerais: Morro do Cachambú, in campis siccis, nov. 1916, *Silveira 641* (Lectotype: R! barcodde R000139230 here designated; Isolectotypes: R!)

Comments: This species also belongs to the *Paepalanthus aequalis* complex and the group needs further revision.

Distribution: This species is reported only for the municipality of Cachambu, in the southern of the state of Minas Gerais (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Baependi, Toca dos Urubus, 10 August 2005, *F. M. Ferreira 869* (HUEFS); **Belo Horizonte**, Acaba Mundo- Serra do Curral, 1933, *H. L. de M. Barreto 2563* (NY); **Belo Horizonte**, Serra do Curral, 1933, *H. L. de M. Barreto 2566* (NY); **Belo Horizonte**, no date, *H. L. Barreto 2563* (BHCB), *H. L. Barreto 2564* (BHCB); **Betim**, 1945, *L. O. Williams 7489* (NY); **Cachambu**, In monte Itabira do Campo, 1 November 1839, *P. Claussen 97* (P); **Nova Lima**, Serra do Curral, 1936, *H. L. de M. Barreto 5083* (NY). **São Paulo**: São Caetano do Sul, São Caetano, 1912, *A. C. Brade 6584* (NY)

16. ***Paepalanthus caespititius*** Mart. ex Körn. *in* Fl. Brazil. 3: 365. 1863. ≡ *Dupatya caespititia* (Mart. ex Körn) Kuntze., Revis. gen. pl. 2. 745. 1891.

TYPE: BRAZIL. *Mart. 1082* (**Lectotype**: M! **here designated**; Isolectotype: NY!, P!, K!, BM!)

Comments: This species is similar to *P. scirpeus*, but has longer scapes, with twice the leaf length, and larger capitula (0.6 cm in diameter, compared to 0.2 cm in *P. scirpeus*).

Distribution: It occurs in the *campos rupestres* of the Espinhaço Range, in Bahia and Minas Gerais States.

Additional specimens examined:— Brazil. Bahia: Abaíra, Bicota, 1992, *B. L. Stannard s.n.* (NY); **Abaíra**, Bicota, 21 March 1992, *B. Stannard 52762* (HUEFS, SPF); **Abaíra**, Distrito de Catolés: caminho Capao - Bicota, garimpo novo do Bicota, 1992, *W. Ganev 152* (K, NY); Abaíra, Serra dos Cristais, 1994, *W. Ganev 3340* (NY); **Rio de Contas**, 2 September 1993, *W. Ganev 2196* (K, SPF). **Minas Gerais:** 1 January 1841, *P. Claussen 1818* (P); 1840, *P. Claussen 281* (BM); agosto-abril 1840, *P. Claussen 166* (BM), *P. Claussen 6* (BM).

17. ***Paepalanthus callocephalus*** Silveira, Floral. Mont.: *29-31.*, fig. XIII. 1928.

TYPE: BRAZIL, Minas Gerais: Entre Serro e Diamantina, Serra Geral, Silveira 709 (**Lectotype**: R000139228 **here designated**, Isolectotypes: R000139228a, R000139228b)

= *Paepalanthus callocephalus var. ciliata* Silveira, Floral. Mont.:31. 1928. TYPE: BRAZIL, Minas Gerais: Serra da Canastra, Silveira 749 (**Lecttotype**: R000139239 **here designated**, Isolectotypes: R000139239a) **syn. nov.**

= *Paepalanthus callocephalus var. glabra* Silveira, Floral. Mont.: *31.* 1928. BRAZIL, Minas Gerais: Entre Serro e Diamantina, Serra Geral, Silveira 768 (Holotype: R!) **syn. nov.**

= *Paepalanthus callocephalus var. villosa* Silveira, Floral. Mont.: *31.* 1928. TYPE: BRAZIL, Minas Gerais: Entre Serro e Diamantina, Serra Geral, Silveira 767 (Holotype: R!) **syn. nov.**

Nomenclatural notes: *Paepalanthus callocephalus var. ciliata, Paepalanthus callocephalus var. glabra,* and *Paepalanthus callocephalus var. villosa* are distinguished by features that overlap in specimens, which may be the result of environmental variations such as leaf size and pilosity. Hence, we propose the synonymization of these names with *P. callocephalus.*

Comments: *Paepalanthus callocephalus* belongs to the *Paepalanthus falcatus* complex and requires a future revision.

Distribution: This species occurs in *campos rupestres* in the Espinhaço Range in Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Diamantina, 2 May 2003, *F. N. Costa 695* (SPF); **Diamantina**, 26 July 2002, *F. N. Costa 659* (SPF), *F. N. Costa 671* (SPF); **Jequitinhonha**, 7 February 2005, *J. Paula-Souza 5637* (SPF)

18. ***Paepalanthus calvus*** Körn., Fl. Bras. 3: 391, 1863. ≡ *Dupatya calva* (Körn.) Kuntze, Revis. gen. pl. 2. 745. 1891.

TYPE: BRAZIL. Minas Gerais: Minas Geraes, alt 7000 ped. s.d., *G.H. Langsdorff* s.n. (**Lectotype**: LE! **here designated**; Isolectotype: B!)

= *Paepalanthus ibitipocensis* Silveira, Fl. Serr. Min.: 41. 1908.

TYPE: BRAZIL. Minas Gerais: Serra de Ibitipoca: June 1896, *H. de Magalhães s.n.* (*267 in Herb. Silveira*) (Holotype R!)

= *Paepalanthus multicostatus* Ruhland, Pflanzenr. IV.30: 148. Tab. 17, 1903.

TYPE: BRAZIL. Minas Gerais: Serra da Piedade, 20 Nov 1893, A.F.M. *Glaziou 20532* (Holotype: B!; Isotypes: C, K!, P!)

Comments: This species presents as diagnostic features the glabrescent leaves, long scapes supporting the capitula with dark brown involucral bracts. It is possible to observe in some specimens, spathes quite long, larger than the leaves and with truncated apex, rare characteristics in the species occurring in the Matiqueira mountains.

Distribution: *Paepalanthus calvus* is endemic to the Atlantic Forest Biome, occurring in the *campos de altitude* of Minas Gerais, São Paulo and Rio de Janeiro states, in southeastern of Brazil.

Additional specimens examined:— Brazil. Minas Gerais: Alagoa, Parque Estadual da Serra do Papagaio, 10 November 2007, *L. Echternacht 1563* (SPF); **Bom Jardim de Minas**, 21 March 1988, *L. Krieger 24376* (SPF); **Caeté,** Serra Piedade, 1933, *H. L. de M. Barreto 2541* (BHCB, K); **Ibitipoca**, Serra, June 1896, *H. Magalhães* (R); **Itamonte**, Serra Fina, 13 March 2007, *L. D. Meireles 2812* (SPF); **Itamonte**, Serra Fina, 24 November 2006, *L. D. Meireles 2680* (SPF); **Lima Duarte**, Parque Estadual do Ibitipoca, 18 September 2008, *C. Sarquis 7* (RB); **Lima Duarte**, Parque Estadual do Ibitipoca, 23 July 2009, *L. Echternacht 2073* (BHCB, SPF); **Passa Quatro**, Serra Fina, 10 June 2005, *L. D. Meireles 1767* (SPF); **Serra da Piedade**, May 1865, *E. Warming 539* (B); **Serra de Ibitipoca**, 1 November 1973, *U. C. Câmara 155* (SPF); Serra do Espinhaço, middle and upper slopes South side of Serra da Piedade, ca. 5 km N. of Caeté, 1971, *H. S. Irwin 28748* (NY). **Rio de Janeiro**: no date, *R. R. de Oliveira 274* (RB). **São Paulo: Campos do Jordão**, 10 February 1980, *R. A. A. Bareto 80* (RB); **Campos do Jordão**, Parque Estadual de Campos do Jordão, 5 December 2000, *P. Fiaschi 510* (SPF); **Campos do Jordão**, 14 September 1958, *R. Schnell 8943* (P); **Pindamonhangaba**, 20 August 1992, *S. A. Nicolau 2150* (SPF); **Pindamonhangaba**, 22 January 1998, *S. A. Nicolau 1589* (SPF); **Piquete**, 1 July 2004, *S. E. Martins 850* (SPF); **Piquete,** 25 May 1996, *I. Koch 607* (SPF); **Piquete,** 5 June 1995, *A. M. Giulietti 1104* (RB, SPF).

19. ***Paepalanthus candidus*** Silveira, Fl. Serr. Min.: *38.*, fig. XVII. 1928.

TYPE: BRAZIL. Minas Gerais: Capão Redondo, Serra do Cipó, in campis arenosis, prope Lapinha: April 1905, *Silveira 358* (Lectotype R! here designated, barcode R000139234!; Isolectotype: B!, LL!, R!)

Comments: *Paepalanthus candidus* has short stem, linear to lanceolate leaves with rounded apex, Scapes two or three times longer than the leaves and dark brown involucral bracts.

Distribution: This species is endemic to Serra do Cipó, in Espinhaço Range in Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Itambé do Mato Dentro, Serra do Cipó, (Sa. das Bandeirinhas), about 18 km by foot trail WNW of settlement of Serra das Alves, N. Sra. do Carmo, 1982, *N. Hensold 803* (NY); **Itambé do Mato Dentro**, Serra do Cipó, 11 May 1982, *N. Hensold 4215* (SPF); **Itambé do Mato Dentro**, Serra do Cipó, no date, *N. Hensold 803* (MBM).

20. ***Paepalanthus caparoensis*** Ruhland, Pflanzenr. IV.30: 145, 1903.

TYPE: BRAZIL. Minas Gerais: Serra do Caparaó, in rup. humidis frequens, 9 Feb 1890, C.A.W. Schwacke 6712 (Lectotype: B designated by Trovó & Sano 2010)

= *Paepalanthus scopulifer* Silveira, Floral. Mont.: 98, fig. 251. 1928. TYPE: BRAZIL, Minas Gerais: Serra do Caparaó, in locis humidis humosisque, *Silveira 611* (Holotype R!)

Comments: This species can be distinguished from the others of the area by the glabrous linear leaves with a recurvate, acute apex, in rosettes usually forming clumps. Frequently confused with *Paepalanthus uleanus*, which has much shorter scapes than *Paepalanthus caparoensis*.

Distribution: This species is endemic to Serra do Caparaó, at the border between the states of Minas Gerais and Espírito Santo, southeastern of Brazil.

Additional specimens examined:— Brazil. Espírito Santo: Dores do Rio Preto, Serra do Caparaó, stream side, 25 November 1929, *Y. Mexia 4022* (NY, P, US); **Pico da Bandeira**, Serra Caparaó, no date, H. S. Irwin 2758 (US). **Minas Gerais: Alto Caparaó**, Parna do Caparaó, 5 July 2006, *M. Trovó 249* (SPF); **Campos Altos**, PNCaparaó, 1 April 1989, *L. Krieger 876* (SPF); **Campos de Caparaó**, 08 February 1890, *C. A. W. Schwacke* (R); **Caparaó,** 16 November 1996, *P. Nolasco 84* (RB); **Caparaó**, 17 February 2000, *V. C. Souza 23280* (RB), *V. C. Souza 23304* (RB); **Caparaó**, Parque Nacional do Caparaó, 2 January 1993, *L. S. Leoni 2060* (RB, SPF); Caparaó, 2 January 1998, J. M. A. Braga 4673 (RB); Caparaó, 2 September 1996, V. C. Souza 12208 (RB, SPF), *V. C. Souza 12209* (RB, SPF); **Caparaó,** June 1888, J. *T. de Moura 944* (B, NY); Serra do Caparaó, *L. Krieger 15068* (SPF). **Rio de Janeiro: Macaé**, 16 September 1982, *G. Martinelli 8700* (RB); **Nova Friburgo**, 2 June 1987, *L. C. Giordano 296* (RB); **Nova Friburgo**, 8 August 1989, *A. Amorim 155* (RB); **Petrópolis**, 13 March 2006, *G. Martinelli 16063* (RB); **Petrópolis,** 25 August 1983, *G. Martinelli 9337* (RB); **Petrópolis,** Parque Nacional da Serra dos Órgãos, 10 October 1993, *F. Rivadavia Lopes 239* (SPF).

21. ***Paepalanthus capillaris*** (Bong.) Körn., Fl. Bras. 3: 367. 1863. ≡ *Eriocaulon capillare* Bong. *in* Mém. Acad. Imp. Sci. St.-Pétersbourg, VI, 1: 625, fig. XLVII, 1831. ≡ *Dupatya capillaris* (Bong.) O. Kuntze, Rev. gen. 2: 745. 1891.

TYPE: BRAZIL. Goiás. In saxosis umbrosis pr. Agua-Quente, *L. Riedel* 497 (**Lectotype:** LE00002806! **here designated**; Isolectotype: B!, BR!, U!, K!, G!, P!)

Comments: This species is known only by its type collection.

Distribution: Occurs in savannas of Goias state (Brazil).

22. ***Paepalanthus capillatus*** Silveira, Floral. Mont.: *79,* fig. XLVI. 1928.

TYPE: BRAZIL, Minas Gerais: Curraes, Serra do Cipó, *Silveira 562* (**Lectotype** R000139233 **here designated**; Isolectotype: R!)

Additional specimens examined:— Brazil. Minas Gerais: Diamantina, 25 February 1987, *D. C. Zappi 10404* (SPF); **Diamantina**, PARNA Sempre Vivas, Próximo à localidade de Vau, ao lado da casa do IBAMA. Campos Santo Agostinho, 18 June 2008, *L. Echternacht 1677* (BHCB); **Fechados**, Serra do Cipó, 23 March 1982, *N. Hensold 4185* (SPF); **Itambé do Mato Dentro**, Serra do Cipó, (Sa. das Bandeirinhas), about 18 km by foot trail WNW of settlement of Serra das Alves, N. Sra. do Carmo, 11 April 1982, *N. Hensold 804* (NY, RB); **Jaboticatubas**, Serra do Cipó, Bifurcação para Morro do Pilar, 01 June 2005, *P. G. Oliveira s.n.* (BHCB); **Santana do Riacho**, Estrada Belo Horizonte - Conceição do Mato Dentro, no date, *A. B. Joly 2129* (MBM, SPF); **Santana do Riacho**, Serra do Cipó, 15 August 1979, *A. M. Giulietti 5645* (SPF); **Santana do Riacho**, Serra do Cipó, 3 November 1981, *N. Hensold 8490* (SPF); **Santana do Riacho**, Serra do Cipó, 30 April 1973, *J. Semir 4131* (B, SPF); **Santana do Riacho**, Serra do Cipó, 30 April 1988, *A. L. Dokkedal 11121* (SPF).

23. ***Paepalanthus capito*** Körn., Fl. Bras. 3: 387. 1863. ≡ *Dupatya capito* (Körn.) Kuntze, Revis. Gen. Pl. 2: 745. 1891.

TYPE: BRAZIL. Minas Gerais: Serro Frio, prope Tejuco in saxis schistoso-arenariis locis udis, May 1818, *Martius s.n.* (Holotype: M!) (Fig. 3)

= *Paepalanthus ruficeps* Ruhland, Pflanzenr. IV.30: 144, 1903.

TYPE: BRAZIL. Minas Gerais: Serra dos Cristaes, près de Diamantina, 4 Apr 1892, A.F.M. *Glaziou 19959* (**Lectotype**: B! **here designated**, Isolectotypes: C, K!, LE!, P!) **syn. nov.**

= *Paepalanthus luteolus* Silveira, Floral. Mont.: 86, fig. LII. 1928.

TYPE: BRAZIL, Minas Gerais: Baraunas, Serra Geral, Silveira 766 (**Lectotype**: R000181855! **here designated**; Isolectotype: R!) **syn. nov.**

Nomenclatural notes: *Paepalanthus capito, Paepalanthus luteolus* and *Paepalanthus ruficeps* show the same morphological features, such as the capitula yellow collored. *Paepalanthus capito* and *Paepalanthus luteolus* was known only from the type collection, since the name was not applied, but *Paepalanthus ruficeps.* However, *Paepalanthus capito* has priority. For this reason, we synonymize *P. luteolus* and *P. ruficeps* with *P. capito.*

Fig. 3. *Paepalanthus capito*. A. Leaves. B. Involucral bracts. C. Capitulum.

Comments: *Paepalanthus capito* can be recognized by the conduplicated leaves and by the yellow capitula.

Distribution: This species is endemic to the Diamantina Plateau, in the central portion of Espinhaço Range in Minas Gerais.

Additional specimens examined:— Brazi. Minas Gerais: Datas, 25 March 1984, *A. M. Giulietti CFCR 4281* (SPF); **Diamantina**, 10 September 2008, *C. O. Andrino 12* (DIAM); **Diamantina**, 11 June 2010, *M. P. Tannure 29* (DIAM); **Diamantina**, 2-15 km from Diamantina, on road to Biri-Biri, in valley of Ribeirão das Pedras, 1982, *N. Hensold 635* (NY); **Diamantina**, 2 May 2001, *F. N. Costa 267* (SPF); **Diamantina**, 8 April 1982, *N. Hensold 635* (SPF); **Diamantina**, 9 September 2009, *F. N. Costa 1141* (DIAM); **Diamantina**, Biribiri, no date, *C. A. W. Schwacke 8481* (BHCB); **Diamantina**, Campus II da UFVJM, 14 July 2011, *I. M. Franco 868* (DIAM); **Diamantina**, Campus II da UFVJM, 25 August 2009, *C. J. Costa 2* (DIAM); **Diamantina**, Parque Estadual do Biribiri, 16 July 2008, *L. Echternacht 1788* (SPF); **Diamantina**, Parque Estadual do Biribiri, 16 May 2011, *C. O. Andrino 158* (DIAM, SPF); **Diamantina**, Parque Estadual do Biribiri, 19 May 2011, *C. O. Andrino 166* (DIAM, SPF); **Diamantina**, Parque Estadual do Biribiri, 2 May 2001, *F. N. Costa 267* (SPF); **Diamantina**, Prope Guinda, in Diamantina, April 1908, *A. Silveira 484* (R); **Diamantina**, no date, *F. N. Costa 267* (BHCB); Serra do Cipó, April 1892, *C. A. W. Schwacke 8480* (B, BHCB); **Serro**, 8 April 2010, *M. P. Tannure 15* (DIAM).

24. ***Paepalanthus capixaba*** Trovó, Fraga & Sano, Phytotaxa 258 (1): 083–088, fig. 2, 2016.

TYPE: BRAZIL, Espírito Santo: Vargem Alta, 18 January 2008, *L. Kollmann, A.P. Fontana, C.N. Fraga, M. Simonelli 10303* (Holotype RB!; Isotype MBML)

Comments: *Paepalanthus capixaba* has an inconspicuous aerial stem, membranaceous to chartaceous leaves, the indument of leaves and spathes not tightly adpressed, sericeous brown scapes, and hemispherical to spherical capitula. The species has many common characteristics of *P.* ser. *Paepalanthus* from Minas Gerais state, and needs to be sampled in phylogeny to assess whether it is more closely related to the species of restinga or Minas Gerais.

Distribution: This is a microendemic species, restricted to municipality of Vargem Alta, Espírito Santo state.

Additional specimens examined:— Brazil. Espírito Santo: Cachoeiro de Itapemirim, May 1949, *A. C. Brade 19995* (RB); **Cachoeiro de Itapemirim**, 21 August 1948, *A. C. Brade 19336* (RB);

Vargem Alta, 25 April 2009, *L. Kollmann 11599* (RB); **Vargem Alta**, 29 April 2015, *R. Goldenberg 2138* (RB).

25. ***Paepalanthus carvalhoi*** Giul. & E. Miranda, Kew Bulletin 64: 525–536. 2009.

TYPE: BRAZIL. Bahia, Palmeiras, Morro do Pai Inácio, fl., fr., 25 Sept. 1994, Giulietti, Guedes & Bautista PCD 722 (Holotype: HUEFS!; Isotype: ALCB!, CEPEC!, K!)

Comments: It is morphologically similar to *P. stephanophorus*, especially in leaf-shape (linear to linearlanceolate) and possession of glabrous scapes.

Distribution: Although *P. carvalhoi* is restricted to Bahia, it is relatively widely distributed from Palmeiras to Mucugê and Barra da Estiva municipalities, in Chapada Diamantina, Brazil.

Additional specimens examined:— Brazil. Bahia: Barra da Estiva, Estrada Barra da Estiva-Mucuje Km 7, 1983, *L. Coradin 6387* (NY); **Barra da Estiva**, no date, *Pedro Varillant* (RB); **Ibicoara**, Serra do Sincorá, 12 July 2000, *M. Araújo-Nóbrega 123* (SPF); **Ituaçu**, Estrada Ituaçu-Barra da Estiva. 8 Km de Barras da Estiva. Morro do Ouro, 19 July 1981, *A. M. Giulietti 18180* (HUEFS); **Lençóis**, 23 August 1986, *J. D. C. Arouck Ferreira 372* (RB); **Lençóis**, Chapada Diamantina, Serra da Chapadinha, 08 July 1996, *A. M. Giulietti 3478* (ALCB); **Lençois**, Orquidário. Caminho para cachoeira do Pai Inácio, 1 February 2015, *C. O. Andrino 345* (SPF); **Mucugê**, 15 September 1984, *G. Hatschbach 48265* (RB); **Mucugê**, Alto do Morro do Pina. Estrada de Mucugê a Guiné, a 25 km NO de Mucugê, 20 July 1981, *A. M. Giulietti CFCR 1555* (HUEFS, SPF); **Palmeiras**, 23 December 1979, *S. Mori 13210* (CEPEC, NY); **Palmeiras**, Chapada Diamantina, Morro do Pai Inácio, 25 September 1994, *A. M. Giulietti 722* (ALCB, HUEFS); **Palmeiras**, Chapada Diamantina, Morro do Pai Inácio, 29 August 1994, *M. L. Guedes 499* (ALCB), *R. Orlandi 418* (ALCB); **Palmeiras**, Pé do Morro do Pai Inácio, Chapada Diamantina, 22 August 2002, *M. J. G. Andrade 94* (HUEFS).

26. ***Paepalanthus cephalotrichus*** Silveira, Fl. Serr. Min.: 39, fig. XIV. 1908.

TYPE: BRAZIL. Minas Gerais: Capão Redondo, Serra do Cipó, in campis arenosis, prope Lapinha, et prope: April 1905, *Silveira 349* (Holotype R000139237; Isotype: B!, LL! fragment)

Comments: *Paepalanthus chlorophyllus* and *P. cephalotrichus* have a similar general habit, but *Paepalanthus chlorophyllus* has less and longer scapes.

Distribution: This species is endemic to Serra do Cipó, in Espinhaço Range in Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Santana do Riacho, 22 April 2006, *J. R. Pirani 5525* (SPF); **Santana do Riacho**, 22 February 2009, *L. Echternacht 1932* (SPF); **Santana do Riacho**, RPPN Brumas do Espinhaço e Ermo do Gerais, Campo no sopé do Brumoso, em direção ao Córrego do Quilombo, 28 November 2012, *C. A. Ferreira Júnior 818* (BHCB); **Santana do Riacho**, RPPN Brumas do Espinhaço e Ermo do Gerais, Em drenagem a cerca de 200 m a leste da sede da RPPN, 31 January 2013, *L. Echternacht 2302* (BHCB); **Santana do Riacho**, Serra do Cipó, 16 June 2000, *F. N. Costa 176* (SPF).

27. ***Paepalanthus chloroblepharus*** Ruhland, Pflanzenr. IV.30: 139, 1903.

TYPE: BRAZIL. Minas Gerais: in Sümpfen bei Caraça, Mar 1892, G. Ule s.n. (Holotype: B)

= *Paepalanthus langsdorffii* var *caracensis* Moldenke, Phytologia 25: 430. 1973.

TYPE: BRAZIL. Minas Gerais: summit of Serra do Caraça, 1780-1950 m, 25 Jan 1971, Irwin et al. 29110 (Holotype: LL; isotype: NY!) **syn. nov.**

= *Paepalanthus suffruticans* Ruhland, Pflanzenr. IV.30: 138, 1903.

TYPE: BRAZIL. Minas Gerais: Caraça, au Morro da Carapuça, 11 Jun 1884, A.F.M. Glaziou 15529 (Holotype: B!; Isotypes: C, K!, LE!, P!) **syn. nov.**

= *Paepalanthus suffruticans* Ruhland var. *angustifolius* Silveira, Floral. Mont.: 43, fig. 251. 1928.

TYPE: BRAZIL, Minas Gerais: Serra do Caraça Quebra-ossos, Silveira 564 (**Lectotype**: R000181907! **here designated**; Isolectotype: R!) **syn. nov.**

Nomenclatural notes: *Paepalanthus langsdorffii* var. *caracensis* was excluded from *Paepalanthus* subg. *Xeractis* in which it was originally placed by Silveira (1908), because it did not agree with the concept of *P.* subg. *Xeractis* according to the review carried out by Hensold (1988), who states that the variety is not related to *P. langsdorffii* nor a member of *P.* subg. *Xeractis.*

After careful morphological analysis, we conclude that the sympatric taxa *Paepalanthus langsdorffii* var. *caracensis, P. suffruticans* and *P. suffruticans* var. *angustifolius* share the same diagnostic characteristics and should be merged with *Paepalanthus chloroblepharus.*

Comments: This species has an elongated stem, lanceolate-linear leaves arranged along the stem, acute, multi-costate escapes and ovate dark brown involucral bracts.

Distribution: This species is endemic to Serra do Caraça, in the south of the Espinhaço Range in Minas Gerais state.

Additional specimens examined:— Brazil. Minas Gerais: Caraça, 1972, *L. Emygdio de Mello Filho 3521* (NY); **Catas Altas**, RPPN Santuário do Caraça, Pico do Sol,29 June 2009, *C. T. Oliveira 513* (BHCB, RB); **Catas Altas**, RPPN Santuário do Caraça, Pico do Sol, 29 June 2009, *C. T. Oliveira 513* (BHCB); **Diamantina**, 24 April 2007, *M. Trovó 370* (SPF); **Morro de Carapuça**, à Caraça, 11 June 1884, *A. Glaziou 15529* (K, P); **Santa Bárbara**, Serra do Caraça, 17 December 1982, *J. R. Pirani 348* (SPF); **Santa Bárbara**, Serra do Caraça, 9 January 1982, *N. Hensold 2773* (SPF); **Santa Bárbara**, Serra do Caraça, no date, *H. F. Leitão Filho 9777* (MBM); **Santa Bárbara**, Serra do Caraça, Trilha para Capelinha e Gruta de Lourdes, 09 January 1982, N. Hensold 539. (BHCB, NY); **Santa Bárbara**, Serra do Caraça. Serrote de Cangerana (max. alt. 1900 m) and the level sandy campo de Fora (alt. 1550 m) at its base, 1982, *N. Hensold 543* (NY); **Santa Bárbara**, Serra do Caraça. Trilha do Pico do Carapuça, 23 May 1997, *A. Rapini 306* (F, NY); **Santana do Riacho**, Serra do Cipó, 17 April 1981, *N. M. Castro CFSC 7291* (B); **Santana do Riacho,** no date, *G. C. P. Pinto 100/82* (K); **Santo Antônio do Itambé**, 16 July 1987, *C. Kameyama 11244* (SPF); Serra de Caraça, March 1892, E. Ule s.n. (B, R).

28. ***Paepalanthus chlorophyllus*** Silveira, Floral. Mont.: 80., fig. XLVIII. 1928.

TYPE: BRAZIL, Minas Gerais: Morro da Garça (Serra do Cipó), *Silveira 563* (**Lectotype** R000181820! **here designated**; Isolectotype: R!)

Comments: *Paepalanthus cephalotrichus* is similar to *P. chlorophyllus* and can be distinguished by the numerous and smaller scapes in *P. cephalotrichus*.

Distribution: This species is endemic to Serra do Cipó, in Espinhaço Range in Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Itambé do Mato Dentro, Serra do Cipó, 11 May 1982, *N. Hensold 829* (SPF)

29. ***Paepalanthus chloropus*** Silveira, Floral. Mont.: *24.*1928.

TYPE: BRAZIL, Minas Gerais: Serra da Moeda, August 1926, Silveira 809 (Holotype R000181817!)

Comments: This species also belongs to the *Paepalanthus aequalis* complex. It is reported only from the type, but the group needs revision.

Distribution: It occurs in Serra da Moeda, Iron Quadrangle, in the city of Belo Horizonte, Minas Gerais state (Brazil)

30. ***Paepalanthus ciliolatus*** Ruhland, Pflanzenr. IV.30: 147, 1903.

TYPE: BRAZIL. Minas Gerais: Cachoeira de Caraça, 13 Jun 1884, *A.F.M. Glaziou 15527* (Holotype: B!; Isotype: BR, C, G, K, LE, P)

= *Paepalanthus albociliatus* Silveira, Fl. Serr. Min.: 40, fig. XIV. 1928.

TYPE: BRAZIL. Minas Gerais. Serra do Ouro Branco, in campis siccis, 1500 m. alt. February 1905, *Silveira 269* (Lectotype: R0001817792 here designated; Isolectotype: R)

Comments: *Paepalanthus ciliolatus* and *P. diplobetor* have a similar general habit, but *Paepalanthus ciliolatus* has scapes bigger and chestnuts involucral bracts (vs. dark brown).

Distribution: It occurs in the south of the Espinhaço Range, in Minas Gerais state (Brazil).

Additional specimens examined:— **Brazil. Minas Gerais: Catas Altas**, RPPN Santuário do Caraça, 6 May 2008, *L. Echternacht 1639* (SPF); **Itambé do Mato Dentro**, Cabeça de Boi, 7 July 2008, *L. Echternacht 1739* (BHCB, SPF); **Ouro Branco**, Serra do Ouro Branco, 29 July 1988, *M. M. N. Braga s.n.* (BHCB); **Ouro Branco**, Serra do Ouro Branco, 20 February 1982, *N. Hensold 413* (B, NY); **Ouro Preto**, no date, *L. Damazio 704* (B); **Santa Bárbara**, Serra do Caraça, 18 December 1982, *J. R. Pirani 363* (SPF).

31. ***Paepalanthus crateriformis*** Silveira, Floral. Mont.: 60. 1928.

TYPE: BRAZIL, Minas Gerais: Serra do Cabral, Retiro da Tapera, Silveira 588 (**Lectotype:** R000181834 **here designated**; Isolectotype: R!)

Comments: This species is easily recognized by its robust habit, linear leaves in rosettes, numerous scapes, hemispherical capitula and chestnut to brown involucral bracts.

Distribuiton: Endemic to the Serra do Cabral, in Minas Gerais state (Brazil).

Additional specimens examined:— **Brazil. Minas Gerais: Joaquim Felício**, 8 July 2001, *F. N. Costa 291* (SPF); **Joaquim Felício**, Serra do Cabral, 20 May 1990, *M. M. Arbo 4574* (SPF).

32. ***Paepalanthus cuspidatus*** Silveira, Floral. Mont.: 49, fig. XXVI. 1928.

TYPE: BRAZIL, Minas Gerais: Serra do Cipó, Curraes, in campis ad saxa quartizitosa, Silveira 558 (**Lectotype**: R000181829 **here designated**; Isolectotype: R!)

Comments: This species is known only by their type collection.

Distribution: Occurs in *Serra do Cipó*, Espinhaço Range in Minas Gerais state (Brazil).

33. ***Paepalanthus desperado*** Ruhland, Pflanzenr. IV.30: 138, 1903.

TYPE: BRAZIL. Minas Gerais: Serra de Lavras Novas, in campis glareosis, 3 Jul 1895, C.A.W. Schwacke 12046 (Holotype: B)

Comments: This species is morphologically similar to *Paepalanthus chloroblepharus*, but with hairy leaves.

Distribution: *Paepalanthus desperado* occurs in the South and Southwest of Minas Gerais State (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Andrelândia, no date, *H. L. Barreto 5301* (BHCB); **Andrelândia,** Serra de Andrelândia, 02 July 1949, *M. Magalhães s.n.* (UB).

34. ***Paepalanthus diamantinensis*** Moldenke, Phytologia 3: 314. 1950.

TYPE: BRAZIL. Minas Gerais; Diamantina; Serra do Gavião, 20 Nov. 1937, *H. L. de Mello Barreto 9920* (Holotype: NY!, Isotypes: BHCB!, F!)

Comments: This species is known only by their type collection.

Distribution: *Paepalanthus diamantinensis* occurs in Diamantina municipality, Espinhaço Range in Minas Gerais state (Brazil).

35. ***Paepalanthus diplobetor*** Ruhland, Pflanzenr. IV.30: 134, 1903.

TYPE: BRAZIL. Minas Gerais: Campo de São Sebastião, près d'Ouro Preto, 24 Jun 1884, A.F.M. Glaziou 15539 (**Lectotype**: B **here designated**, Isolectotypes: C, K, LE, P)

Comments: *Paepalanthus diplobetor* has pubescent menbranaceous leaves. It is similar to *P. ciliolatus*, but with a more delicate habit.

Distribution: It occurs in the south of the Espinhaço Range, in Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Belo Vale: entre as mineirações CSN e Nogueira Duarte, 25 March 2012, *T. V. Bastos s.n.* (BHCB, SPF); **Itabirito**, 10 March 2015, *A. E. Brina s.n.* (BHCB); **Ouro Preto**, July 1896, *A. Silveira 1538* (B); **Ouro Preto**, 25 July 1896, *M. M. Gonçalves 3038* (BHCB); **Ouro Preto**, Campo de San Sebastiao, as Camarinhos, sous les rochers , 24 June 1884, *A. Glaziou 15539* (B, K, NY, P); **Ouro Preto**, Serra das Camarinhas, about 2 km N of Ouro Preto, 1982, *N. Hensold 550* (NY); **Ouro Preto**; Morro de S. Sebastião,1894, *M. Gomes 2725* (F, NY); **Ouro Preto**, no date, *L. Damagis 701* (B), *M. M. Gonçalves 2725* (BHCB); Serra do Ouro Preto, March 1892, *E. Ule s.n.* (R).

Paepalanthus diversifolius Silveira, Floral. Mont.: 47, fig. XXV. 1928.

TYPE: TYPE: BRAZIL, Minas Gerais: Entre Campos do Jordão e Jaguary, Serra da Mantiqueira, Silveira 734 (**Lectotype**: R000181831! **here designated**; Isolectotype: R!)

Comments: This species is known only by the type specimen. However, there is a lot of undeterminate material from its area of occurrence and possibly this is one of the names forgotten in the literature.

Distribution: Occurs in the Mantiqueira mountains, Campos do Jordão (São Paulo, Brazil) municipality.

36. ***Paepalanthus elatissimus*** Silveira, Fl. Serr. Min.: 37, fig. XVI. 1908.

TYPE: BRAZIL. Minas Gerais: Capão Redondo, Serra do Cipó, in campis, locis succis humidisque: April 1905, *Silveira 347* (**Lectotype**: R000181848! **here designated**; Isolectotype: R!, B!, LL! fragment)

Comments: *Paepalanthus elatissimus* is a robust herb, with cartaceous leaves and can be recognized by the hirsute pilosity of the leaves.

Distribution: It is endemic to the Serra do Cipó, in Espinhaço Range in Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Santana do Riacho, Lapinha da Serra, Platô próximo à base do Pico do Breu, ao sul. Campo rupestre limpo, com solo quartzítico arenoso úmido escuro, 22 February 2009, *L. Echternacht 1933* (BHCB).

37. ***Paepalanthus erigeron*** Mart. ex. Körn., Fl. Bras. 3: 390 (1863). = *Dupatya erigeron* (Mart. ex Körn.) Kuntze, Revis. Gen. Pl. 2: 745. 1891.

TYPE: BRAZIL. Bahia: Serra Jacobina, no date, *Blanchet 2601* (**Lectotype**: BR! **here designated**; Isolectotypes: B!, P!, K!, BM!, F!, LE!) (Fig. 4)

Nomenclatural notes: In the type collection, there is a specimen annotated by Körnicke at LE and another one at BR, from Martius' herbarium with Martius annotation. Aware that one of these two specimens should be designated as a lectotype, we chose the one deposited at BR herbarium.

Comments: *Paepalanthus erigeron* is frequently identified as *Paepalanthus carvalhoi*, *Paepalanthus oblongifolius,* or *Paepalanthus spathulatus* and the opposite also occurs. Giulietti & Miranda (2009) highlights the main differences between *P. carvalhoi*, and *P. erigeron*, as follows: in *P. erigeron*, the leaves are broader (0.15 – 0.4 –) 0.5 – 1 cm, plane, ensiform, with base scarcely widened, leaf-margin strongly thickened, while in *P. carvalhoi*, the leaves are narrow, c. 0.1 cm, conduplicate to concave,

base strongly widened with the margin conspicuously white hyaline. The easiest feature to observe to distinguish *P. erigeron* from *P. spathulatus* and *P. oblongifolius* is also on the leaves. *P. erigeron* has ensiform leaves, while the others have leaves oblong to oblong-lanceolate, as the epithet says. **Distribution:** *Paepalanthus erigeron* occurs in the northernmost part of the Chapada Diamantina. In Espinhaço Range, Bahia state (Brazil).

Additional specimens examined:— Brazil. Bahia: Abaíra, Campo do Cigano, 1992, *P. T. Sano H52373* (NY); **Abaíra**, Serra do Bicota (vira saia), 1993, *W. Ganev 1809* (K, NY); **Andaraí,** 23 December 1979, *S. A. Mori 13190* (RB); **Andaraí**, 30 October 1978, *G. Martinelli 5454* (RB); **Andaraí,** Approx. 15 km N of Mucugé on road to Andaraí, 1977, *R. M. Harley 18888* (K, NY, SPF); **Barra da Estiva**, 23 November 1992, *M. M. Arbo 5739* (HUEFS, SPF); **Campo Formoso**, 21 October 1991, *N. L. Menezes s.n.* (SPF); **Jacobina**, 1944, *R. W. Schury 672* (NY); **Lençóis,** Estrada Lençóis - Seabra (BR - 242), km 8, 10 September 1992, *L. Coradin 8552* (CEN, SPF); **Lençóis**, Morro do Pai Inácio, 17 August 1996, *A. A. Conceição 72* (SPF); **Lençóis**, Nas margens do rio Lençóis e afloramentos rochosos da vegetação ciliar, September 2011, *B. F. Farias 75* (HUEFS); **Lençóis**, Rio Mandassaia, Barro Branco, Parque Nacional da Chapada Diamantina, 05 September 2000, *A. A. Ribeiro-Filho 107* (HUEFS); **Lençóis**, Serra da Chapadinha, no date, *A. M. Giulietti 871* (MBM); **Mucugê**, 06 December 1980, *A. Furlan 408* (HUEFS); **Mucugê**, 17 September 1984, *G. Hatschbach 48318* (MBM, NY, SPF, US); **Mucugê**, 21 July 1981, *J. R. Pirani 1662* (SPF); Mucugê, 26 July 1979, *S. A. Mori 12561* (SPF); **Mucugê**, 27 July 1979, S. A. Mori s.n. (RB); **Mucugê**, 8 September 1981, *A. Furlan 1567* (HUEFS, SPF), *A. Furlan CFCR 1591* (B, SPF); **Mucugê**, Arredores da cidade, trilha para o vale do Medonho. Na beira do rio, 02 November 2011, *R. P. Oliveira 2049* (HUEFS); **Mucugê**, Chapada Diamantina, Pico do Gobira. Área encharcada no sopé do morro, ás margens de um pequeno curso d'água, 20 January 2005, *E. B. Souza 986* (HUEFS); **Mucugê**, Guiné, Serra do Beco do Pati, 03 June 2009, *R. M. Harley 56036* (HUEFS); **Mucugê,** rodovia para Andaraí, entre km 5-15, no date, G. Hatschbach 48245 (MBM); **Mucugê**, Rio Mucugê, 16 June 1984, *G. Hatschbach 47956* (MBM); **Palmeiras**, 31 October 1979, *Scott Mori s.n.* (RB); **Palmeiras**, Cachoeira da Fumaça (Trabalho de Campo), no date, A. A. Conceição s.n. (HUEFS); Palmeiras, Chapada Diamantina, 31 August 1996, *A. A. Conceição 176* (SPF); **Palmeiras**, Morro da Mãe Inácia, 2 August 2000, *A. A. Conceição 880* (HUEFS, SPF); **Palmeiras**, Pai Inácio. BR 242, km 232, a cerca de 15 km ao NE de Palmeiras, 1979, *S. A. Mori 12909* (K, NY); **Palmeiras**, Parque Nacional Chapada Diamantina - trilha para Cachoeira da Fumaça, 21 July 2011, *G. Almeida-Silva 33* (HUEFS).

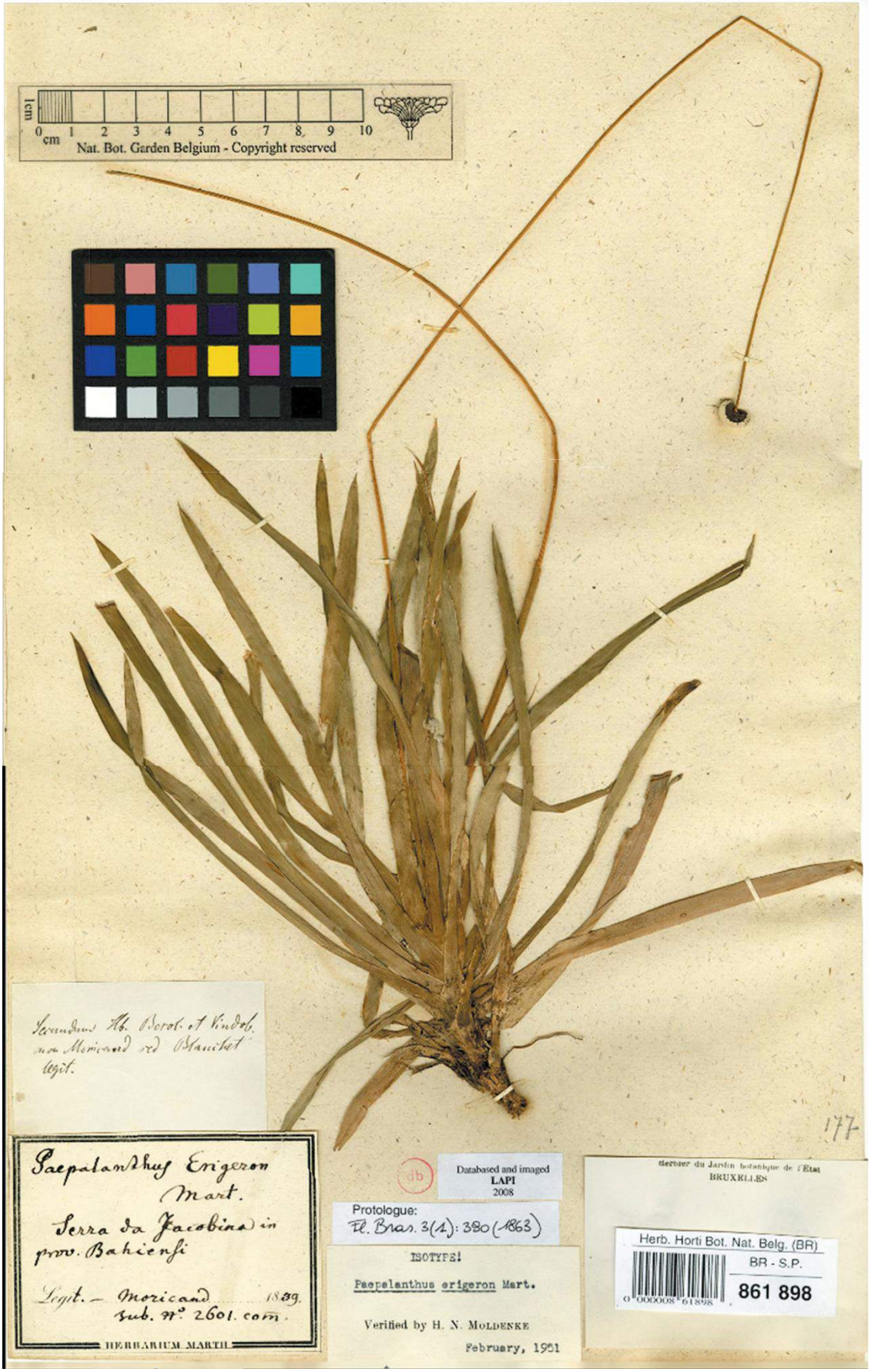


Fig. 4. Lectotype of *Paepalanthus erigeron.*

38. ***Paepalanthus falcatus*** (Bong.) Körn., Fl. Bras. 3: 387. 1863. ≡ *Eriocaulon falcatum* Bong., Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math.: 630. 183.

TYPE: BRAZIL. Minas Gerais, Serra da Lapa, November, *L Riedel s.n.* (**Lectotype:** LE00002849! **here designated**; Isolectotype: LE0001071)

= *Paepalanthus pedunculatus* Ruhland, Pflanzenr. IV.30: 146, 1903. *nom. illeg. superfl.*

= *Eriocaulon pedunculatum* Bong. *ex* Körn., Fl. Bras. 3: 387. 1863. *nom. nud.* pro syn., probably manuscript error for *Eriocaulon falcatum* Bong.

= *Dupatya pedunculata* Kuntze, Revis. gen. pl. 2. 745. 1891. *nom. nud.*

Nomenclatural notes: Apparently, Körnicke (1863) accidentally cited *Eriocaulon pedunculatum* Bong. (a non-existent name), instead of *Eriocaulon falcatum* Bong., in the synonymy of *Paepalanthus falcatus* Körn. He clearly intended otherwise, as shown by: (a) his annotation of the type specimen of *Eriocaulon falcatum* Bong. as *Paepalanthus falcatus*; and (b) his page citations for "E. pedunculatum Bong." in Bongard and Steudel, neither of which mention *E. pedunculatum*, but do list *E. falcatum*. This is sufficient for valid publication of new combination by Körnicke (ICN Art. 41.4), based on *E. falcatum* Bong. However, Körnicke's (1863) citation error confused both Kuntze (1891) and Ruhland (1903), who both assumed the name *Eriocaulon pedunculatum* Bong. as existing and having priority over *Paepalanthus falcatus* Körn., causing them to make new combinations, and place *Paepalanthus falcatus* Körn. in synonymy. But since *Eriocaulon pedunculatum* Bong. did not exist, *Dupatya pedunculata* is a *nomem nudum* and *Paepalanthus pedunculatus* Ruhland is a superfluous and illegitimate name. [nom. illeg. superfl.].

This confusion of names was observed by Stützel (1989) but not published, and due to lack of access to his work, the name *Pepalanthus pedunculatus* continued to be misapplied. Hensold (pers. com.) pointed to this common mistake in the collections and we intend to clarify this issue here. *Paepalanthus falcatus* is the correct name and its type collection is composed of two specimens in LE. Only one of these materials I could see personally during the visit to the LE herbarium, and although the other has a photo available online and has the mark "Bong!", it may be lost. Therefore, the material analyzed, LE00002849 was chosen as a lectotype, making sure that both materials in the same herbarium were analyzed by the author.

Comments: Besides the misunderstanding about the name, *Paepalanthus falcatus* is part of a complex of species and names that we can not elucidate based solely on external morphology. This complex includes 20 species and was briefly discussed at the beginning of this treatment.

Distribution: *Paepalanthus falcatus* is widely distributed species in the Espinhaço Range.

Additional specimens examined:— Brazil. Minas Gerais: Bocaina de Minas, Serra do Cipó, 28 February 1993, *V. L. Scatena s.n.* (BHCB); **Botumirim**, Serra do Canastra, caminho de Botumirim para Barra do Veado, 1985, *G. Martinelli 11279* (NY); **Buenópolis**, Serra do Cabral, Cuba, no date, *E. Guarçoni 1221* (MBM); **Conceição do Mato Dentro**, 20 April 1982, *N. Hensold 3876* (SPF); **Conceição do Mato Dentro**, 9 km NW of Congonhas do Norte, on road to Gouvêia, 1982, *N. Hensold 707* (NY); **Congonhas do Norte**, 10 July 2008, *L. Echternacht 1751* (SPF); **Congonhas do Norte**, Serra Talhada, 17 June 2000, *F. N. Costa 189* (SPF); **Couto de Magalhães de Minas**, Chapada do Couto, 17 July 1984, *A. M. Giulietti 4673* (SPF), *A. M. Giulietti 4688* (SPF); **Cristalina**, Estribo Bandeirinha, no date, *G. Hatschbach 53016* (MBM, SPF); **Cristalina**, Rodovia Guinda - Conselheiro Mata, no date, *G. Hatschbach 66492* (MBM); **Datas**, estrada Curvelo-Diamantina, Km 110, 5 April 1983, *G. Martinelli 9147* (M, NY, RB, SPF); **Datas**, Morro do Coco, 24 March 1986, *R. Mello-Silva CFCR 9757* (SPF); **Diamantina**, Entre Soupa e S. João da Chapada, no date, *G. Hatschbach 40925* (MBM, US); **Diamantina**, Estrada Corinto - Conceição da Mata, no date, *A. M. Giulietti 92380* (MBM); **Diamantina**, Serra do Espinhaço, 9 June 1973, *Ochioni 5681* (LL); **Diamantina**, Estrada Diamantina-Biribirí, 5,7km depois de Diamantina, 22 August 1994, *S. Splett 562* (SPF, UB); **Fechados**, Serra do Cipó, 22 March 1982, *N. Hensold 567* (W); **Gouveia**, Córrego do Tigre, 14 September 1985, *G. Hatschbach 49655* (MBM, SPF); **Gouveia**, 15 July 2006, *M. M. Lopes 974* (SPF); **Gouveia**, 9 April 1982, *N. Hensold 3829* (SPF), *N. Hensold 3845* (SPF), *N. Hensold 641* (SPF), *N. Hensold 660* (SPF); **Gouveia**, Serra do Brejo Grande, 9 April 1982, *E. M. Isejima CFCR 3576* (SPF); **Grão-Mogol**, 22 April 1978, *G. Hatschbach 41342* (MBM); **Itabirito**, 28 March 2001, *M. Groppo Jr 692* (SPF); **Itabirito**, 21 March 1963, *Edmundo Pereira 7273* (LL); Serra do Cipo, 14 February 1968, *H. S. Irwin 20076* (NY); **Itabirito**, Morros do Alto da Santa, km 47 da rodovia dos Inconfidentes, 28 March 2001, *M. Groppo Jr 692* (HUEFS); **Itambé do Mato Dentro**, Serra do Cipó, (Sa. das Bandeirinhas), about 18 km by foot trail WNW of settlement of Serra das Alves, N. Sra. do Carmo, 1982, *N. Hensold 796* (MBM, NY); **Itambé do Mato Dentro**, Serra do Cipó, 11 May 1982, *N. Hensold 4223* (SPF); **Jaboticatubas**, Parque Nacional da Serra do Cipó, 24 September 1999, *F. N. Costa 80* (SPF), *F. N. Costa 85* (SPF); Minarum, no date, *G. Gardner 5284* (B, K, NY, P, US); **Fechados**: Serra do Cipó, in the valleys of the Córrego dos Piões and Corrego Soberbo, about 5 km S of the Rio Preto, 1982, *N. Hensold 567* (NY); **Fechados**: Serra do Cipó, SW of Congonhas do Norte; just S of the Rio Preto and E of Córrego dos Piões, 1982, *N. Hensold 740* (NY); **Presidente Kubitschek**, 25 July 1998, *G. Hatschbach 60232* (MBM), *G. Hatschbach 68232* (MBM, W); **Santa Luzia**, Serra do Cipó, 1933, *H. L. de M. Barreto 2535* (NY); **Santana de Pirapama**, Serra do Cipó, 8

March 2009, *D. C. Zappi 1876* (SPF); **Santana do Pirapama**, Serra do Cipó, 8 March 2009, *Milliken W. 1876* (B); **Santana do Riacho**, 12 May 1987, *R. Marquete 28* (RB); **Santana do Riacho**, 6 June 1970, *A. B. Joly CFSC 166* (B, MBM, NY, RB); **Santana do Riacho**, km 110 ao longo da rodovia Belo Horizonte - Conceição do Mato Dentro, 17 April 1981, *N. M. Castro CFSC 7290* (NY, W, SPF); **Santana do Riacho**, Serra do Cipó, 17 April 1972, *A. B. Joly 1862* (SPF); **Santana do Riacho**, Serra do Cipó, 8 September 1974, *J. Semir 5187* (SPF); **São Gonçalo do Rio Preto**, Parque Estadual do Rio Preto, 26 March 2001, *J. A. Lombardi s.n.* (BHCB), *L. Bedê s.n.* (BHCB); **Sao Roque De Minas**, Parque Nacional da Serra da Canastra; caminho para Retiro das Pedras e Rolinhos. 20°13'19,9'' S; 46°33'40,7''W, no date, *B. M. Gomes 494* (CEN).

39. ***Paepalanthus fallax*** Beauverd, Bull. Herb. Boissier, sér. 2, 8: 288. 1908.

TYPE: BRAZIL. Minas Gerais, Ouro Preto. *Damazio, L., 1509* (Holotype: G; Isotype: RB)

Comments: This species is known only by their type collection.

Distribution: Registered by the type collection as occurring in Ouro Preto in Minas Gerais state (Brazil).

40. ***Paepalanthus farinaceus*** F.N. Costa, Andrino & Trovó, Phytotaxa 247 (2): 118–12.

TYPE: BRAZIL. Minas Gerais: Rio Vermelho, Serra do Ambrósio, Vargem do Anjo, próximo à Comunidade de Pedra Menina, 1248 m elev., 18°08'19.1"S, 43°01'06.8"W, 26 June 2012, *F.N. Costa, A.B. Sampaio, R. Ramos & S.N. Fonseca 1538* (Holotype DIAM!, isotypes B!, NY!, SPF!) (Fig. 5)

Comments: *Paepalanthus farinaceus* is recognized by its whitish green leaves, spathes and scapes, due to a dense sericeous vestiture of white trichomes, together with stramineous to cream-colored involucral bracts covered by the same kind of white trichomes.

Distribution: The species is microendemic, known from a single locality in Serra do Ambrósio, Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Rio Vermelho, Pedra Menina, Morro do Ambrósio, 15 July 1984, *A.M. Giulietti CFCR 4516, M.G. Wanderley, E. Varanda, A. Furlan & R. M. Harley* (SPF); Serra do Ambrósio, 1509 m elev., 18°06'24.1"S, 43°02'15.4"W, 23 October 2013, *R.R. Silva & S.N. Fonseca 109* (DIAM).

41. ***Paepalanthus fasciculifer*** Silveira, Floral. Mont.: 73, fig. XLII. 1928.

TYPE: BRAZIL, Minas Gerais: Serra do Cabral, Silveira 590 (**Lectotype**: R000181835b! **here designated**; Isolectotype: R!)

Nomenclatural notes: The lectotype that was chosen was the one that corresponded to the photograph in Silveira, 1928.

Comments: This species is microendemic, poorly known. It was recorded only by the type colletion until recently rediscovered by Costa et al (submitted).

Distribution: *Paepalanthus fasciculifer* is endemic to the Serra do Cabral, in Minas Gerais.

Additional specimens examined:— Brazil. Minas Gerais. Joaquim Felício, Serra do Cabral, *F. N. Costa et al. 1510* (DIAM).

42. ***Paepalanthus fastigiatus*** (Bong.) Körn., Fl. Bras. 3: 386. 1863. ≡ *Eriocaulon fastigiatum* Bong., Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math. 1: 626, 1831. ≡ Dupatya fastigiata (Bong.) Kuntze, Revis. Gen. Pl. 2: 745. 1891.

TYPE: BRAZIL. Minas Gerais: in petrosis S. St. Joze, *L. Riedel 288* (**Lectotype**: LE00001073! **here designate**d; Isolectotype: LE!)

Nomenclatural notes: Both materials in LE were annotated by Bongard; therefore, the one with more information about the plant was chosen as lectotype.

Comments: *Paepalanthus fastigiatus* is a remarkable species, with few herbarium records. The species is easily recognized by acute lanceolate leaves, hairy scapes and by the obovate brown involucral bracts, the external ones larger than the internal ones. However, the species appears to have clustered inflorescences at the tip of an inconspicuous main stem, which approximates the species of the other species of *Paepalanthus* subsect. *Actinocephaloides*, if it has trimerous flowers, or *Paepalanthus* sect. *Diphyomene*, in the case of having dimerous flowers. In any case, the species needs future studies.

Distribution: This species is reported from Serra St. José, between the cities of Tiradentes and São João del Rei, in Minas Gerais state (Brazil) and Serra da Gandarela, also in Minas Gerais state.

Additional specimens examined:— Brazil, Minas Gerais, Santa Bárbara. Serra da Gandarela, 8 jul 2012, Echtemacht, L., 2265 (HUFU).

43. ***Paepalanthus flavorutilis*** Ruhland, Pflanzenr. IV.30: 144, 1903.

TYPE: BRAZIL. Minas Gerais: S. do Cipó, 24 Apr 1892, C.A.W. Schwacke 8480 (Holotype: B!)

Comments: This species is very similar to *P. capito*. It can be distinguished by leaves with rounded apex, but needs to be closely analyzed.

Distribution: Occurs in the Espinhaço Range in Minas Gerais (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Diamantina, Estrada para Curralinho. Beira da estrada, próximo a um riacho, 21 April 2007, *M. Trovó & M.T.C. Watanabe 341* (SPF).

44. ***Paepalanthus freyreissi*** (Thunb.) Körn., Fl. Bras. 3: 370. 1863. ≡ *Eriocaulon freyreissii* Thunb., Pl. Bras.: 7. 1817. ≡ *Dupatya freyreissii* (Thunb.) Kuntze, Revis. Gen. Pl. 2: 745. 1891.

TYPE: BRAZIL. Minas Gerais: Brasilia, Villa Rica, *Freyreiss, G.W., 7* (Holotype: S!)

= *Paepalanthus paludosus* (Bong.) Kunth, Enum. Pl. 3: 502. 1841. ≡ *Eriocaulon paludosum* Bong., Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math. 1: 626, 1831.

TYPE: BRAZIL. Minas Gerais: In paludibus montis Itacolumi. 08.1824, L. Riedel 445 (Holotype: B!)

Comments: This species can be recognized among the species of the same area by its linear and rigid leaves, and brown involucral bracts.

Distribution: *Paepalanthus freyreissii* has a restricted distribution to the Espinhaço Range and Mantiqueira mountains, southeastern of the state of Minas Gerais (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Conceição do Ibitipoca, 12 September 1991, *S. M. S. Verardo 25362* (SPF); **Conceição do Mato Dentro**, Parque Estadual da Serra do Intendente, 05 June 2015, *S. N. Moreira 1746* (BHCB); Dans uma caverna presque observar Itacolomi, abril 1840, *P. Claussen 34* (BM); **Itabira**, Serra dos Alves, 6 July 2008, *L. Echternacht 1736* (BHCB, SPF); **Itacolumy**, 28 July 1890, *A. Glaziou 18585* (P); **Lima Duarte**, 16 July 2005, *M. F. Santos 46* (RB, SPF); **Lima Duarte,** Parque Estadual do Ibitipoca, 23 July 2009, *L. Echternacht 2072* (BHCB, SPF); **Marianna**, 1 January 1833, *Vauthier 67* (P); Minas, Haut de l´Itacolumy, 25 June 1884, *A. Glaziou 15545* (P); **Ouro Preto**, Ad Serra do Itacolomy,1896, *M. Gomes 67* (F, NY); **Ouro Preto**, Itacolomy, 1945, *F. de Lauro 47670* (NY); **Ouro Preto**, Serra do Itacolomi, 28 July 1896, *M. M. Gonçalves 67* (BHCB).

Fig. 5. *Paepalanthus farinaceus*. A: Habit. B: Leaves. C: Capitullum. Photos: F.N.Costa.

45. ***Paepalanthus glabrifolius*** Ruhland, Pflanzenr. IV.30: 139, 1903.

TYPE: BRAZIL. Rio de Janeiro: Campos de l'Itatiaia, entre les rochers, 20 Nov 1876, A.F.M. Glaziou 9001 (Holotype: B!; Isotypes: K!, LE!, P!)

= *Paepalanthus elongatulus* Ruhland, Pflanzenr. IV.30: 140, 1903. TYPE: BRAZIL. Rio de Janeiro: Haut de l'Itatiaia, cotè de Campo Bello, entroit humid, 23 Jan 1873, A.F.M. Glaziou 6740 (Holotype: B!; Isotypes: K!, P!). **syn. nov.**

= *Paepalanthus calvoides* Ruhland, Pflanzenr. IV.30: 146, 1903. TYPE: BRAZIL. Rio de Janeiro: Haut de l'Itatiaia, entre les rochers, 5 Jun 1871, A.F.M. Glaziou 5455 (Holotype: B!; Isotypes: K!, P!). **syn. nov.**

Nomenclatural notes: *Paepalanthus elongatulus* and *Paepalanthus calvoides* share the same characteristics of *P. glabrifolius* (such as scapes three times longer than leaves, spherical capitula and chestnuts to brown involucral bracts) as well as the same geographic distribution. For this reason, we propose the synonymization of *P. elongatulus* and *P. calvoides* with *Paepalanthus glabrifolius.*

Comments: *Paepalanthus glabrifolius* has solitary scapes inserted in the center of the rosette, usually forming clumps.

Distribution: *Paepalanthus glabrifolius* is restricted to the *campos de altitude* of the Mantiqueira mountains, in Rio de Janeiro and São Paulo states. (Brazil).

Additional specimens examined:— Brazil. Rio de Janeiro: Campos de J. Bueno Rangel, dans la grande roche du côté de Minas, 20 November 1876, *A. Glaziou 9001* (B, K, P); **Itatiaia**, 22 November 1965, *J. J. Sampaio s.n.* (RB); **Itatiaia**, 23 November 1945, *J. J. Sampaio s.n.* (RB); **Itatiaia**, Estrada para as Prateleiras, 25 May 2013, *C. M. Guerra Santos 34* (RB); **Itatiaia**, Parque Nacional de Itatiaia, parte alta do parque, próximo ao abrigo do Marcão à caminho do abrigo Rebouças, 15 November 2014, *S. N. S. Freitas 11* (RB); **Itatiaia**, Parte baixa do parque. Próximo a entrada, 24 May 2013, *C. M. Guerra Santos 27* (RB); **Itatiaia**, no date, *C. Porto 2095* (RB); no date, *A. Castellanos 25643* (LL, RB).

46. ***Paepalanthus glaucescens*** Körn., Fl. Bras. 3: 391, fig. L. 1863. ≡ *Dupatya glaucescens* (Körn.) Kuntze, Revis. Gen. Pl. 2: 745. 1891.

TYPE: BRAZIL. "Brasilia orientalis". *Sellow s.n.* (Holotype: B!; Isotype: LL! Fragment)

Comments: This species is very similar to *Paepalanthus tortilis*, which belongs to *Paepalanthus* ser. *Leptocephali*. However, the lack of additional specimens and information on precise locality prevents further conclusions.

Distribution: This species is known only by their type collection, which has no precise locality other than "Brazil".

47. ***Paepalanthus glaucophyllus*** Silveira, Floral. Mont.: 23, fig. VII. 1928.

TYPE: BRAZIL, Minas Gerais: Entre Itacambira e Juramento, "in campis siccis et saxosis", *Silveira 810* (**Lectotype** R000181843b! **here designated**!; Isolectotypes: R!)

Comments: This species belongs to the *Paepalanthus falcatus* complex and requires a future revision.

Distribution: This species is known only by their type collection, from the northern mountains of Minas Gerais state (Brazil), between the municipalities of Itcambira and Juramento.

48. ***Paepalanthus glaucopodus*** Silveira, Floral. Mont.: 99. 1928.

TYPE: BRAZIL, Minas Gerais: Milho Verde, Serra Geral, *Silveira 765* (**Lectotype:** R000181842! **here designated**; Isolectotype: R!)

Comments: This species is known only by their type collection and has similarities with other species of the same occurrence, such as *P. pubescens* and *P. sphaerulifer*, for example.

Distribution: Occurs in the municipality of Milho Verde, Diamantina Plateau, Espinhaço Range in Minas Gerais (Brazil).

49. ***Paepalanthus globosus*** Ruhland, Pflanzenr. IV.30: 143, 1903.

TYPE: BRAZIL. Minas Gerais: Serra de Capanema, près de Caraça, 20 Feb 1884, A.F.M. Glaziou 15537 (Holotype: B!; Isotypes: K!, P!)

Comments: This species belongs to the *Paepalanthus falcatus* complex and requires a future revision.

Distribution: *Paepalanthus globosus* is widely distributed in Brazil, where there are records for the savannas, *campos de altitude*, *campos rupestres* and restinga areas. This may be either result of the difficulty of applying the name or by the polymorphism of the species.

Additional specimens examined:— Brazil. Espírito Santo: Iúna, Parque Nacional do Caparaó, 18 February 2000, *V. C. Souza 23390* (RB, SPF); **Iuna**, Parque Nacional do Caparaó. Entre o arrozal eo rancho dos cabritos, 18 February 2000, *V. C. Souza 23406* (HUEFS, RB, SPF). **Minas Gerais: Alto Caparaó**, Parna do Caparaó, 5 July 2006, *M. Trovó 251* (SPF); **Alto Caparaó**, Parque Nacional do Caparaó, 6 March 2012, *D. Monteiro 601* (RB, SPF); **Alto Caparaó**, Parque Nacional do Caparaó, 9 January 1999, *L. S. Leoni 4095* (SPF); **Campos Altos**, PNCaparaó, 1 April 1989, *L. Krieger 914* (SPF); **Caparaó**, 4 July 2006, *L. S. Leoni 6531* (RB); **Cristalina**, Estrada Corinto - Conceição do

Mato Dentro, no date, *A. M. Giulietti 94280* (MBM); **Diamantina**, 3 April 1980, *A. M. Giulietti 30* (SPF).

50. ***Paepalanthus pullus*** Körn., Fl. Bras. 3: 366, 1863. ≡ Dupatya pulla (Körn.) Kuntze, Revis. gen. pl. 2. 746. 1891.

TYPE: BRAZIL. Minas Gerais, *Langsdorffi s.n.* (**Lectotype**: LE00001207! **here designated**; Isolectotype: K!, G, B!, LL! fragment!)

= *Paepalanthus gyrotrichus* Ruhland, Pflanzenr. IV.30: 132, 1903.

TYPE: BRAZIL. Minas Gerais: Perpetua près Diamantina, 11 Apr 1892, A.F.M. Glaziou 19986 (**Lectotype**: B! **here designated**, Isolectotypes: C, K, P). **syn. nov.**

= *Paepalanthus pullus* var. *flavida* Silveira, Floral. Mont.: 56. 1928.

TYPE: BRAZIL, Minas Gerais: Serra do Cipó, *J.Michaeli 722* (Holotype R!) **syn. nov.**

= *Paepalanthus pullus* var. *latifolia* Silveira, Floral. Mont.: 56. 1928.

TYPE: BRAZIL, Minas Gerais: Entre Serro e Diamantina, *Silveira 771* (Holotype R!) **syn. nov.**

= *Paepalanthus pullus* var. *longepilosa* Silveira, Floral. Mont.: 56. 1928.

TYPE: BRAZIL, Minas Gerais: Entre Serro e Diamantina, Serra Geral, *Silveira 770* (Holotype R!) **syn. nov.**

= *Paepalanthus pullus* var. *ramosa* Silveira, Floral. Mont.: 56. 1928.

TYPE: BRAZIL, Minas Gerais: Entre Serro e Diamantina, *Silveira 772* (Holotype R!) **syn. nov.**

= *Paepalanthus nigricans* Silveira, Floral. Mont.: 89, fig. LIV. 1928.

TYPE: BRAZIL, Minas Gerais: Baraunas, in campis sub rupibus, Silveira 698 (Holotype: R!) **syn. nov.**

Nomenclatural notes: The six taxa share the same morphological features, being part of the same range of morphological variation and it is quite difficult to distinguish them, besides that they have the same area of occurrence. For this reason, we propose here the synonymization of all this names with *Paepalanthus pullus*.

Comments: *Paepalanthus pullus* is tiny herb up to 10 cm tall, linear leaves in rosettes. Habit similar to many other species, such *P. pallidus*, *P. saxatilis*, and species of *P.* ser. *Leptocephali*.

Distribution: *Paepalanthus pullus* was known only by their type colletion, from the municipality of Baraúnas, Diamantina Plateau, Espinhaço Range in Minas Gerais (Brazil), but with the

synonimizations the area of occurrence increased, with many populations in the Diamantina Plateau as a whole.

Additional specimens examined:— Brazil. Minas Gerais: Camanducaia, Serra da Mantiqueira, 22 March 1991, *P. G. Windisch 6072* (SPF); **Conceição do Mato Dentro**, 14 August 2012, *E. Tameirão Neto 5085* (BHCB); **Conceição do Mato Dentro**, Cuba, no date, *G. Hatschbach 35306* (MBM); **Conceição do Mato Dentro**, Rio Santo Antônio, 27 October 1974, *G. Hatschbach 35402* (M, MBM, NY); **Diamantina**, 14 January 1998, *R. C. Forzza 623* (SPF); **Diamantina**, 19 July 1980, *N. L. Menezes CFCR 196* (SPF); **Diamantina**, 20 March 2016, *J. E. Q. Faria 5528* (RB); **Diamantina**, 28 February 1998, *R. C. Forzza 661* (SPF); **Diamantina**, 28 January 1976, *L. Krieger 14027* (MBM); **Diamantina**, 29 October 1981, *A. M. Giulietti CFCR 2207* (SPF); **Diamantina**, 30 October 1981, *A. M. Giulietti CFCR 2275* (SPF); **Diamantina**, 5 April 1983, *G. Martinelli 9183* (RB); **Diamantina**, 6 km de Diamantina. Curralinho, 31 August 1981, *N. L. Menezes CFCR 1886* (HUEFS, SPF); **Diamantina**, Estrada Diamantina-Extração, cerca de 8 km da cidade próximo da gruta de Extração, 20 November 1984, *R. M. Harley CFCR 6215* (B, BHCB, HUEFS, SPF); **Diamantina**, Estrada para Conselheiro Mata, Km 19, 05 April 2004, *M. J. G. Andrade 511* (HUEFS); **Diamantina**, Estrada para milho verde. Entrada para a Gruta do Salitre, 30 April 2001, *F. N. Costa 243* (HUEFS); **Diamantina**, Gruta do Salitre, 13 April 1974, *O. Robinson s.n.* (SPF); **Gouveia**, 9 April 1982, *N. Hensold 3833* (SPF); **Gouveia**, In vicinity of radio tower just W. of Fazenda Contagem. Outtcropping vertical quartz shelves, gravelly and sandy campo, 09 April 1982, *N. Hensold 647* (HUEFS, SPF); **Grão Mogol**, a sudoeste da cidade, mais ou menos 1km, no date, *A. M. Giulietti 3413* (MBM); **Itamarandiba**, 13 September 2006, *R. C. Mota 3091* (RB); **Itamarandiba**, Padre João Afonso, Serra Negra, 14 September 2006, *A. P. Fontana 2433* (RB); **Serro**, Just north of Milho Verde, 03 December 1981, *N. Hensold 327* (HUEFS, MBM, NY).

51. ***Paepalanthus harmsii*** Ruhland, Pflanzenr. IV.30: 216. 1903.

TYPE: BRAZIL. Minas Gerais: Serra de Ibitipoca, Jun 1896, *Magalhaes 1373* (Holotype: B!; Isotype: R!, photo F!)

Nomenclatural notes: This name was also excluded from *Paepalanthus* subg. *Xeractis* by Hensold (1988) and placed in *P.* sect. *Paepalanthus*. It was included in this treatment because it fits into Ruhland's concept of *P.* ser. *Variabiles*.

Comments: It is similar to *P. leiseringii,* but can be distinguished by the the robust habit, scapes longer (15 — 25 cm) and involucral bracts surpassing the height of the flowers in the capitula.

Distribution: *Paepalanthus harmsii* occurs in *campos de altitude* of the Mantiqueira mountains complex, in Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Lima Duarte, Parque Estadual do Ibitipoca, trilha entre a ramificação para o Pico do Pião e a trilha para o Lago dos Espelhos, 22 Jul 2009, *L. Echternacht 2069* (BHCB); **Lima Duarte**, Serra de Ibitipoca, 1 Nov 1973, *U.C. Câmara 152* (CESJ); **Olaria**, Serra Negra, 22 Aug 2009, *J.A. Oliveira 95* (CESJ); Rio Preto, Gruta do Funil, Jul 1879, *T. S. M. Grandi 313* (BHCB); **Rio Preto, Serra Negra,** Fazenda da Tiririca, entre Rio Preto e Olaria, *F.R.G. Salimena 1217* (CESJ).

52. ***Paepalanthus henriquei*** Silveira et Ruhland, Pflanzenr. IV.30: 129, 1903.

TYPE: BRAZIL. Minas Gerais: Serra de Ibitipoca, Jun. 1896, H. Magalhães 1372 (Holotype: B)

= *Paepalanthus orthoblepharus* Silveira, Floral. Mont.: 62, fig. XXXV. 1928.

TYPE: BRAZIL, Minas Gerais: Serra do Ibitipoca, *H. Magalhães s.n.* (559 in Herb. Silveira) (Holotype R!)

Comments: This species also belongs to the *Paepalanthus aequalis* complex and the group needs further revision.

Distribution: Occurs in *Serra do Ibitipoca*, in the southeast of Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Lima Duarte, 10 February 2001, *R. C. Forzza 1842* (RB, SPF); Lima Duarte, 21 April 2010, *M. G. Bovini 3146* (RB); **Lima Duarte**, Parque Estadual do Ibitipoca, 14 July 2005, *M. Trovó 179* (SPF); **Lima Duarte**, Parque Estadual do Ibitipoca, 18 September 2007, *C. Sarquis 3* (RB, SPF); **Lima Duarte**, Parque Estadual do Ibitipoca. Trilha Monjolinho - Lagoa Seca, 30 March 2004, *C. Morato 16* (RB); **São João Del Rei**, Serra do Cristal, 2 February 1984, *L. Krieger s.n.* (SPF); **Serra de Ibitipoca**, June 1896, *H. Magalhães 1372* (B, R); Serra de Ibitipoca, 1 November 1973, *U. C. Câmara 13275* (RB, SPF); Serra de Ibitipoca, 10 October 1970, PLK; U. *Confúcio 9434* (UB).

53. ***Paepalanthus itambeensis*** Silveira, Floral. Mont.: 46, fig. XXIV. 1928.

TYPE: BRAZIL, Minas Gerais: Itambé do Serro, in campis ad basin montem, Silveira 708 (**Lectotype**: R000181857! **here designated**; Isolectotype: R!)

Comments: *Paepalanthus itambeensis* robust habit, broad lanceolate leaves, long scapes exceeding leaf length, brown involucral bracts.

Distribution: This species is endemic of Santo Antônio do Itambé, in the central portion of the Espinhaço Range in Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Santo Antônio do Itambé, Caminho ao Pico Itambe, 9 September 1971, *G. Hatschbach 27512* (K, MBM, US); **Santo Antônio do Itambé**, Rod. BR-259, 5-10km de Serro, 27 November 1985, *G. Hatschbach 50238* (MBM, SPF); **Santo Antônio do Itambé**, Parque Estadual do Pico do Itambé, 23 April 2010, *F. N. Costa 1289* (DIAM); **Santo Antônio do Itambé**, Pico do Itambé, 14 July 2008, *L. Echternacht 1781* (SPF); **Serro**, 4 April 1982, *N. Hensold 3797* (SPF), *N. Hensold 599* (SPF).

54. ***Paepalanthus kleinii*** (Moldenke & L.B.Sm.) Trovó, *in* Trovó *et al.*, Phytotaxa 162 (4): 217–222. 2014

≡ *Paepalanthus leiseringii* var. *kleinii* Moldenke & Smith in Moldenke, Phytologia 25: 431. 1973.

TYPE: BRAZIL. Santa Catarina, Lages, "Bog by Rio Bandeirinhas, 23 km north of Lages, alt. 800–900 m", 04 December 1956, L.*B. Smith 8241* (Holotype US!, Isotypes B!, HBR!, LL!, NY!, R!).

Comments: This species is known only by their type collection.

Distribution: Occurs in the municipality of Lages, Santa Catarina state, in south of Brazil.

55. ***Paepalanthus klotzschianus*** Körn., Fl. Bras. 3: 389, fig. L. 1863. ≡*Dupatya klotzschiana* (Körn.) Kuntze, Revis. Gen. Pl. 2: 746. 1891.

TYPE: BRAZIL. "Brasilia orientalis", Sellow s.n. (Holotype BR; Isotype: BM!, NY! fragment) (Fig. 6)

Comments: *Paepalanthus klotzschianus* has an evident aerial stem, rigid leaves with spinescent apex, the sericeous indument of leaves and spathes tightly adpressed, reddish glabrous scapes, hemispherical to spherical capitula.

Distribution: It is distributed in the sand dunes on the coastal plain vegetation of Rio de Janeiro, Espírito Santo and Bahia states (Brazil).

Additional specimens examined:— Brazil. Bahia: Alcobaça, 14 August 1972, *T. S. Santos 2364* (RB); **Alcobaça**, 28 August 1993, *A. M. Miranda* (RB); **Belmonte**, 06 July 1966, *R. P. Belém 2481* (UB); **Belmonte**, Estrada BA-275 (Belmonte-Itapebi), Km 11-12, 7 October 2015, *L. S. B Calazans 584* (RB); **Camaçari**, BA-009 (Estrada do Côco), entre Arembepe e Monte Gordo, 14 July 1983, *H.*

P. Bautista 818 (ALCB, MBM, NY); **Caravelas**, 5 July 2007, *H. M. Dias 197* (RB); **Caravelas**, km 16 da rodovia Caravelas/Alcobaça (BA001), 06 October 2000, *L. A. Mattos-Silva 4253* (ALCB, HUEFS); **Caravelas**, Massangano-Macaco, 23 August 2011, *E. N. de Matos 365* (HUEFS); **Itacaré**, "Campo Cheiroso", 14 km north of Serra Grande off the road to Itacaré, 1992, *W. W. Thomas 9485* (NY); **Itacaré**, Campo cheiroso, 14 km ao norte de Serra Grande, na rodovia para Itacaré, 14 December 2014, *C. O. Andrino 322* (SPF); **Jacobina**, Piemonte da Diamantina, Serra do Tombador, 02 July 1996, *A. M. Giulietti 3321* (ALCB); **Morro do Chapéu**, Piemonte da Diamantina, Caminho para Ventura, na estrada, 07 September 2002, *M. L. Guedes 9860* (ALCB); **Mucuri**, 14 September 1978, *S. A. Mori 10484* (RB, NY); **Nova Viçosa**, 22 July 1979, *E. F. Guimarães 907* (RB), *E. F. Guimarães 950* (RB), *Vera L. Gomes 54* (RB); **Nova Viçosa, Nova** Viçosa, arredores, 1983, *G. Hatschbach 47026*(MBM, NY); **Piatã**, Arredores da cidade no caminho para a Capelinha, 14 February 1987, *R. M. Harley 24190* (HUEFS); **Porto Seguro**, 24 June 1962, *A. P. Duarte 6826* (RB); **Prado**, 12 August 1995, *G. Hatschbach 63022* (MBM, SPF); **Prado**, Extremo Sul, 14 December 1998, *M. L. Guedes 6271* (ALCB); **Prado**, Extremo Sul, 29 November 1997, *M. R. Fonseca 1102* (ALCB); **Espírito Santo: Conceição da Barra**, 21 August 2009, *M. M. Monteiro 174* (RB); **Conceição da Barra**, 24 August 1987, *G. Hatschbach 51438* (MBM, SPF); **Conceição da Barra**, Comunidade de Lajinha, Fazenda Rancho Tropical II, Restinga Arbustiva alta com moitas, 5 July 2007, *C. Farney 4771* (RB); **Conceição da Barra**, Itaúnas, no date, *G. Hatschbach 51438* (MBM); **Guarapari**, 07 August 1987, *M. L. Guedes 1332* (ALCB); **Guarapari**, 7 August 1987, *A. M. Giulietti 1046* (SPF); **Guarapari**, Parque Estadual Paulo Cesar Vinha, 5 March 2001, *P. Fiaschi 649* (SPF); **Itapemirim**, 22 July 1986, *O. J. Pereira 1428* (SPF); **Itaúnas**, 26 August 1994, *Menezes 1332* (SPF); **Linhares**, 17 September 1987, *G. Martinelli 12232* (RB); **Linhares**, Reserva Natural Vale, 15 September 1985, *D. A. Folli 725* (HUEFS, SPF); **Linhares**, Reserva Natural Vale, 20 July 1995, *C. van den Berg 162* (SPF); **Linhares**, Reserva Natural Vale, 7 July 2006, *M. Trovó 257* (SPF); **São Mateus**, 1 August 2007, *A. O. Giaretta 83* (RB); **Setiba**, Área de mineração de areia. Setibaville, 23 December 1996, *J. M. A. Braga 3742* (HUEFS, RB, SPF); **Vargem Alta**, 18 January 2008, *L. Kollmann 10303* (SPF); **Vila Velha**, 23 June 1987, *J. M. L. Gomes 88* (SPF).

Fig. 6. *Paepalanthus klotzschianus*. A: Habit. B: Rosette. C: the spinescent apex of the leaves. D: Spathes and scapes. E: Capitullum with concentric circles of pistillate and staminate flowers. Photos: Cleiton Pessoa.

56. ***Paepalanthus lanatus*** Silveira, Floral. Mont.: 42, fig. XXI. 1928.

TYPE: BRAZIL, Minas Gerais: Entre Itacambira e Juramento in campis arenosis siccisque, Silveira 804 (**Lectotype:** R000140533 **here designated**; Isolectotype: R!)

Comments: *Paepalanathus lanatus* has an elongated branched stem, with densely lanose-villose leaves, equally hairy scapes and glabrescent involucral bracts. It has a similar habit to other species of the genus, outside P. ser. Paepalanthus, such as *P. maculatus*, for example.

Distribution: It occurs in the northern mountain of Minas Gerais State (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Itacambira, 18 December 1994, *F. Rivadavia Lopes 331* (SPF); **Itacambira**, 18 November 1992, *R. Mello-Silva 632* (MBM, SPF); **Itacambira**, 30 September 1997, *M. L. Kawasaki 1041* (SPF); **Itacambira**, 8 January 1986, *J. R. Pirani CFSC 9068* (SPF); **Itacambira**, 9 January 1986, *C. Kameyama 9174* (SPF); **Jequitinhonha**, Serra Sapucaia, 03 September 1959, *M. Magalhães 15578* (UB).

57. ***Paepalanthus leiseringii*** Ruhland, Pflanzenr. IV.30: 216. 1903.

TYPE: BRAZIL. Minas Gerais. Serra de Ibitipoca, Apr 1898, *Magalhaes 2915* (Holotype: B!; Isotypes: NY!, R!)

= *Paepalanthus sphaeroides* Trovó, Echtern. & Sano, Blumea: 57: 105. Fig. 1, 2; Map 1. 2012. TYPE: BRAZIL. São Paulo, Piquete, "trilha para o Pico dos Marins, pouco após a Pedra do Careca", 16 Dec. 2006. *M.L.O. Trovó et al. 319* (Holotype: SPF!; Isotype B, NY, SP). **syn. nov.**

Nomenclatural notes: *Paepalanthus leiseringii* was known only by its type specimen. After careful morphological analysis, we conclude that *Paepalanthus leiseringii* and the recently described species *Paepalanthus sphaeroides* share the same distribution, habitat, and the same diagnostic characteristics, such as scapes grouped in a single plane on the axil of subsequent leaves and patent involucral bracts slightly surpassing the capitula. For this reason, we propose the synonymization of *Paepalanthus sphaeroides* with *Paepalanthus leiseringii*.

Comments: Besides these features, *Paepalanthus leiseringii* can be reconized by the short stem, leaves disposed in rossetes, and numerous free scapes equalling or slightly larger the leaf height. *Paepalanthus leiseringii* is a good example of how species that are described from just one collection can be a problem for the understanding and application of the name. This species remained as known only by the type collection until now and for more many years undeterminate in the herbarium collections. As new

collections are carried out (e.g. *Echternacht 1568*), it is possible to analyze the morphological variations of the species, such as the gradual range of the color of the involucral bracts in *P. leiseringii*, which appear to become clearer with the development of the plant.

Distribution: *Paepalanthus leiseringii* occurs in *campos de altitude* on the Mantiqueira mountains. There are collections from São Paulo state, in the municipalities of Piquete, and Minas Gerais state, in Alagoa and Serra de Ibitipoca.

Additional specimens examined:— Brazil. Minas Gerais, Alagoa, Parque Estadual do Pico do Papagaio, 10 Nov. 2007; *L. Echternacht 1568* (BHCB, SPF), **Alagoa**, Parque Estadual do Pico do Papagaio, 10 Nov. 2007, *L. Echternacht 1564* (BHCB). **São Paulo: Piquete**, Pico dos Marins - APA Serra da Mantiqueira, 3 September 2013, *L. N. Gonçalves 147* (RB).

58. ***Paepalanthus leucoblepharus*** Körn., Fl. Bras. 3: 388. 1863. = *Dupatya leucoblephara* Kuntze, Revis. gen. pl. 2. 745. 1891.

TYPE: BRAZIL. "Brasilia", *L. Riedel s.n.* (Holotype: LE00002833!)

Comments: The locality in which the type specimen was collected was not specified, so that there materials identified by that name from Bahia and in the South of Espinhaço Range in Minas Gerais, probably resulting from different interpretations of the species circumscription. It is morphologically similar to many other species of the genus and it was not yet been possible to thoroughly analyze these materials in comparison with the type specimen, and therefore the identity of this species remains uncertain.

59. ***Paepalanthus linearifolius*** Silveira, Floral. Mont.: 57. 1928.

TYPE: BRAZIL. Minas Gerais: Serra da Moeda, Silveira 806 (Holotype R!)

Comments: This species also belongs to the *Paepalanthus aequalis* complex. It is reported only from the type, but the group needs revision.

Distribution: It occurs in Serra da Moeda, Iron Quadrangle, in the city of Belo Horizonte, Minas Gerais state (Brazil).

60. ***Paepalanthus lingulatus*** (Bong.) Kunth, Enum. Pl. 3: 522, 1841. ≡ *Eriocaulon lingulatum* Bong., Mém. Acad. Imp. Sci. St.-Petersbourg, Ser. 6, Sci. Math. 1. 626. 1831 ≡ *Dupatya lingulata* (Bong.) Kuntze Revis. Gen. Pl. 2: 746. 1891.

TYPE: BRAZIL. Minas Gerais: in glareosis montis altis S. da Lapa, Nov 1824, *L. Riedel 1410* (Holotype: LE00001182!) (Fig. 7)

Comments: Species poorly known, with few records. It has a short stem, lanceolate leaves with a ciliated margin, leaves arranged in rosettes and scapes of the same size or slightly larger than the leaves.

Distribution: Occurs in North of the state of Minas Gerais (Brazil).

Additional specimens examined:— **Brazil. Minas Gerais: Juramento**, 2018, *L. H. M. Fonseca s.n.* (SPF).

61. ***Paepalanthus luetzelburgii*** Herzog, Repert. Spec. Nov. Regni Veg. 20: 84. 1924.

TYPE: BRAZIL. Bahia: Rio de Contas, Serra Três Irmãos, 1000 m, Aug 1913, *Luetzelburg 468* (Holotype: M 0137123!, Isotype: M!)

Comments: This species has up to 20 cm tall, shigtly elongate stem, lanceolate leaves, hemispherical capitulum and brown to dark brown involucral bracts.

Distribution: *Paepalanthus luetzelburgii* is endemic to the state of Bahia, occurs in Chapada Diamantina, in Espinhaço Range (Brazil).

Additional specimens examined:— **Brazil. Bahia: Abaíra**, Salão da Barra - Campos Gerais do Salão, 1994, *W. Ganev 3557* (NY); **Abaíra,** Salão, Campos Gerais do Salão, 1994, *W. Ganev 3196* (NY); **Jacobina**, 18 November 1986, *L. P. Queiroz 1194* (HUEFS); **Jacobina**, Serra da Jacobina, 18 November 1986, *L. P. Queiroz 1194* (SPF); **Jacobina**, Serra da Jacobina, no date, *L. P. Queiroz 1194* (MBM); **Morro do Chapéu**, Morrão, no date, *G. Hatschbach 42391* (MBM); **Morro do Chapéu**, Morro do Chapéu, arredores, no date, *G. Hatschbach 49468* (MBM); **Mucugê,** Morro do Pina, 20 July 1981, *A. M. Giulietti CFCR 1528* (CEN, HUEFS, SPF); **Mucugê**, Na trilha dos Rios Piabinha e Tiburtino, 18 August 2007, *R. M. Harley 55626* (HUEFS).

Fig. 7. *Paepalanthus lingulatus.* A: Habit and habitat. B;C: Upper and side view of individuals. Photos: Guilherme Antar.

62. ***Paepalanthus macaheensis*** Körn., Vidensk. Meddel. Naturhist. Foren. Kjøbenhavn: 311. 1871.

TYPE: BRAZIL. Rio de Janeiro. "Alto Macahé", 12 March 1870, Glaziou 4284 (first-step lectotype designated by Moldenke 1975: 104; second-step lectotype designated by Trovó & Sano 2015: 250 Lectotype C; Isolectotypes B!, P! [3 sheets]).

= *Paepalanthus euryphyllus* Ruhland, Pflanzenr. IV.30: 130, 1903.

TYPE: BRAZIL. Minas Gerais. "In humidis, Serra de Ibitipoca", July 1896, *H. de Magalhães 1654* (Holotype B! [2 sheets]; Isotype LL! fragment)

= *Paepalanthus bradei* Moldenke, Phytologia 7: 119. 1960.

TYPE: BRAZIL. Rio de Janeiro, Santa Maria Madalena, "Aguas Paradas", 5 February 1935, J. *Santos Lima & A.C. Brade 14198* (Holotype B!, Isotypes LL! fragment, RB!).

Comments: *Paepalanthus macaheensis* is robust species, with a conspicuous elongate stem, with glabrous leaves along and yellowish capitula getting progressively darker.

Distribution: This species is distributed in the Atlantic Forest Biome along the coastal mountains of Rio de Janeiro and Espírito Santo and the Serra da Mantiqueira, in the states of Espírito Santo and Minas Gerais.

Additional specimens examined:— Brazil. Espírito Santo: Alfredo Chaves, 5 May 1982, *G. Martinelli 8027* (RB); **Alfredo Chaves**, 8 May 1985, *G. Martinelli 10892* (RB); **Castelo**, Localidade de Bateias, 13 February 2008, *R. C. Forzza 4991* (RB); Domingos Martins, 12 September 1975, *G. Martinelli 779* (RB). **Minas Gerais: Lima Duarte**, Parque Estadual do Ibitipoca, 20 January 2005, *R. C. Forzza 3957* (RB, SPF); **Lima Duarte**, Parque Estadual do Ibitipoca, 22 July 2009, *L. Echternacht 2070* (BHCB, SPF); **São João del Rei**, Agua Geral- Serra do Lenheiro, no date, *H. L. Barreto 4655* (US); **São Thomé das Letras**, S. Tomé das Letras, arredores, 1975, *G. Hatschbach 36547* (MBM, NY); **Rio de Janeiro: Rio de Janeiro**, Haut des Orgues. Rio de Janeiro, 12 December 1869, *A. Glaziou 4282* (P); **Rio de Janeiro**: 5 April 1935, *Brade 14198* (B). RJ: 5 March 1935, *Santos Lima 14198* (NY); **Santa Maria Madalena**, 17 December 1986, *G. Martinelli 12007* (RB).

63. ***Paepalanthus magalhaesii*** Silveira, Fl. Serr. Min.: 43. 1908.

TYPE: BRAZIL. Minas Gerais: Serra do Capanema, 1893, *Magalhaes Gomes 823 (413 in herb. Silveira)*. (Lectotype: R000191590! here designated; Isolectotype: B!, R000191590a!). ≡ *Paepalanthus gomesii* Silveira, Floral. Mont.: 67. 1928. **nom. illeg. superfl.**

Nomenclatural notes: In Silveira (1908), the material *Magalhaes Gomes 823* is cited as type of *Paepalanthus magalhaesii*. After that, in Silveira (1928) the same material is cited as type of *Paepalanthus gomesii*. However, it is clear from Silveira's (1928) protologue, that he intends to change the name of *P. magalhaesii* to *P. gomesii*. Therefore, according to ICN, the correct name is *Paepalanthus magalhaesii* and *Paepalanthus gomesii* is a superfluous illegitimate name.

Comments: This species belongs to the *Paepalanthus aequalis* complex. It is reported only from the type, but the group needs revision.

Distribution: Occurs in Serra da Capanema, Espinhaço Range in Minas Gerais state (Brazil).

64. ***Paepalanthus melanthus*** Silveira, Floral. Mont.: 72, fig. XLII. 1928.

TYPE: BRAZIL, Minas Gerais: Entre Serro e Datas, Serra Geral, Silveira 690 (**Lectotype:** R000181865! **here designated**; Isolectotypes: R!)

Comments: *Paepalanthus melanthus* is here considered part of the *Paepalanthus falcatus* complex, which includes about twenty names and needs revision.

Distribution: Occurs in Diamantina Plateau, Espinhaço Range in Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Couto de Magalhães de Minas, Chapada do Couto, 17 July 1984, *A. M. Giulietti 4688* (SPF); **Serro**, 10 April 1982, *N. Hensold 3848* (SPF); **Serro**, 22 February 1982, *N. Hensold 3745* (SPF); **Serro**, Alto do Pico Itambé, 05 May 1942, *G. M. Magalhães 2093* (BHCB, UB).

65. ***Paepalanthus mendoncianus*** Ruhland, Pflanzenr. IV.30: 129, 1903.

TYPE: BRAZIL. Minas Gerais: Minas, 1884, *R. Mendonça 320* (Holotype: B!)

Comments: This species also belongs to the *Paepalanthus aequalis* complex. It is reported only from the type, but the group needs revision. Among the species of this species complex, *Paepalanthus mendoncianus* can be distinguished by the beige to golden involucral bracts.

Distribution: It occurs in the vicinity of Belo Horizonte, in the Iron Quadrangle, in Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Mariana, Acesso às minas de Capanema e Timbopeba - VALE, M. S. Mendes s.n. (BHCB).

66. ***Paepalanthus michaelii*** Silveira, Floral. Mont.: 39, fig. XIX. 1928.

TYPE: BRAZIL, Minas Gerais: Congonhas do Campo, campis ferruginosi, *Silveira 605* (**Lectotype**: R000181864! **here designated**; Isolectotypes: R!)

Comments: This species also belongs to the *Paepalanthus aequalis* complex. It is reported only from the type, but the group needs revision.

Distribution: Occurs in ferruginous rocky outcrops in Congonhas do Campo, Minas Gerais state (Brazil).

67. ***Paepalanthus miser*** Ruhland, Pflanzenr. IV.30: 133, 1903.

TYPE: BRAZIL. Minas Gerais: Serra de Ibitipoca, Jul 1896, H. Magalhães 1370 (Holotype: B!)

Comments: *Paepalanthus miser* are very delicate herbs, with extremely reduced stem, and have similar habit to other species of the genus, such as *Paepalanthus caespititius, Paepalanthus scirpeus* and species from *P.* [subsect. *Paepalanthus*] ser. *Leptocephali*, which need further studies on their species boundaries.

Distribution: This species is endemic to *Serra do Ibitipoca*, in the southeast of Minas Gerais state (Brazil).

Additional specimens examined:— Brazil: Minas Gerais: Serra de Ibitipoca,1896, *H. de Magalhaes 1374* (NY); **Serra de Ibitipoca**,1896, *H. Magalhães 1370* (B); **Conceição do Ibitipoca**, 12 September 1991, *S. M. S. Verardo 25361* (SPF); **Gouveia**, ca. 17km SW of **Gouveia**; Km 258 on MG 259, 07 February 1972, *W. R. Anderson 35650* (NY, NY, UB); Lima Duarte, 12 September 1991, *S. M. S. Verardo s.n.* (RB); **Lima Duarte**, Parque Estadual do Ibitipoca, 18 September 2007, *C. Sarquis 2* (RB, SPF); **Lima Duarte**, Parque Estadual do Ibitipoca, 20 September 2006, *R. C. Forzza 4258* (RB, SPF); **Lima Duarte**, Parque Estadual do Ibitipoca, 22 July 2009, *L. Echternacht 2064* (BHCB, SPF); **Lima Duarte**, Parque Estadual do Ibitipoca, entre a Mata Grande e a Ponte de Pedra, 30 March 2004, *R. C. Forzza 3281* (RB); **Lima Duarte**, Parque Estadual do Ibitipoca, Gruta dos Três Arcos, 26 July 2004, *R. C. Forzza 3539* (RB); **Lima Duarte**, Parque Estadual do Ibitipoca, mata da Gruta dos Tres Arcos, 11 August 2005, *R. C. Forzza 4149* (RB); **Lima Duarte**, Parque Estadual do Ibitipoca, Monjolinho, 19 September 2006, *R. C. Forzza 4253* (RB); **Lima Duarte**, Parque Estadual do

Ibitipoca. Gruta do Monjolinho, June 2004, *E. V. S. Medeiros 302* (RB); **Lima Duarte**, Parque Estadual do Ibitpoca. Pico do Pião, 27 September 1970, *P. I. S. Braga 1871* (RB); **Serra de Ibitipoca**, June 1896, *H. Magalhães s.n.* (R); **Serra de Ibitipoca**, May 1970, *U. Confúcio 9155* (SPF); **Serra de Ibitipoca**, 28 September 1970, *L. Krieger 9300* (RB, SPF).

68. ***Paepalanthus montanus*** Silveira, Floral. Mont.: 76, fig. XLIV. 1928.

TYPE: BRAZIL, Minas Gerais: Chapada do Couto, *Silveira 700* (**Lectotype**: R000181866! **here designated**; Isolectotype: R!)

Comments: This is a micro-endemic species that was known only from the type collection until recently rediscovered by Costa *et al.* (submitted).

Distribution: *Paepalanthus montanus* is restricted to Chapada do Couto locality, in Rio Preto State Park, Espinhaço Range in Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Diamantina, Caminho para Chapada do Couto pela ponte-do-acaba-mundo, 14 December 2011, *F. N. Costa 1465* (DIAM).

69. ***Paepalanthus multicapitatus*** A.M.Giulietti & E. Miranda, Kew Bull. 64: 532. 2009.

TYPE: BRAZIL, Bahia, Município Lençóis, Rio Mucugezinho, 27 Sept. 1994, Giulietti, Stam, Guedes & Bautista PCD 874 (Holotypus ALCB!; Isotype CEPEC!, K!).

Comments: This species resembles *P. barbulatus* due to its numerous scapes, but is easily distinguished by the blackish and glabrous involucral bracts of *P. multicapitatus*, contrasting with the chestnut and hairy bracts of *P. barbulatus*.

Distribution: *Paepalanthus multicapitatus* is endemic to the rocks along the margin of the Rio Mucugezinho, in the municipality of Lençóis, Chapada Diamantina in Espinhaço Range, state of Bahia, Brazil.

Additional specimens examined:— Brazil. Bahia: Lençóis, Chapada Diamantina, Serra da Chapadinha, Rio Mucugezinho, 27 September 1994, *A. M. Giulietti 874* (ALCB).

70. ***Paepalanthus nanus*** Silveira, Floral. Mont.: 52, fig. XXVIII. 1928.

TYPE: BRAZIL, Minas Gerais: Chapada do Couto, Silveira 699 (Holotype: R!)

Comments: This species is known only by the type collection.

Distribution: *Paepalanthus nanus* occurs in Chapada do Couto locality, in Rio Preto State Park, Diamantina Plateau, Espinhaço Range in Minas Gerais.

71. ***Paepalanthus neglectus*** Körn., Fl. Bras. 3: 368, 1863. ≡ *Dupatya neglecta* (Körn.) Kuntze, Revis. gen. pl. 2. 746. 1891.

TYPE: BRAZIL. Bahia. *Riedel s.n.*; Minas Gerais. *Langsdorff s.n.* (**Sintypes**: LE! P!, G!, B!)

Nomenclatural notes: Looking at the two syntypes, they look like they are different collections. Also, would be possible it was the same collection under two different collector names, very possibly the same species, but not necessarily. So, we chose not to designate a lectotype without being able to closely compare Körnicke's (1863) description with the actual specimens. It is possible, for example that the flowers were in good shape on only one of the specimens and the author would have used that specimen to describe the flowers. It is important to know which characters Körnicke considered important for the definition of the species and make sure the lectotype best represents that.

Distribution: This species occurs in *campos rupestres* of the Espinhaço Range in Minas Gerais state (Brazil).

Additional specimens examined:— **Brazil. Bahia: Alcobaça**, 5km a W da sede do município, no date, *G. P. Lewis 932* (MBM); **Belmonte**, Extremo Sul, Próximo à Cidade, 15 August 2009, *M. L. Guedes 16950* (ALCB); **Cairu**, Baixo Sul, Garapuá, 12 August 2006, *M. G. Tosto 66* (ALCB); **Conde**, Litoral Norte, 08 September 2004, *M. L. Guedes 11262* (ALCB); **Pico das Almas**, 19 February 1987, *R. M. Harley 24412* (SPF); **Rio de Contas**, 10 June 2004, *B. R. N. Araújo 85* (HUEFS); **Rio de Contas**, Arapiranga, na beira da trilha para a Serra do Porco Gordo, 18 June 2000, *R. M. Harley 54003* (HUEFS); **Rio de Contas**, Campo do Queiroz, 18 January 2003, *A. K. A. Santos 32* (HUEFS); Rio de Contas, Campo do Queiroz, 09 June 2004, *B. R. N. Araújo 64* (HUEFS); **Rio de Contas**, Na subida para o Campo do Queiroz, 08 January 2000, *L. P. Félix 9543* (HUEFS); **Rio de Contas**, Pico das Almas, 16 December 2004, *B. R. N. Araújo 121* (HUEFS); **Rio de Contas**, Pico das Almas. Campo de Queiroz, 14 April 2001, *R. M. Harley 54228* (HUEFS); **Rio de Contas**, Solo pedregoso com muitas gramineas. Próxima a matacões, 10 June 2004, *B. R. N. Araújo 87* (HUEFS); **Salvador**, Região Metropolitana Salvador, Dunas de Itapuã, 12 May 1979, *L. R. Noblick 1348* (ALCB); **Salvador**, Região Metropolitana Salvador, Dunas do Flamengo, APA das Dunas e Lagoas do Abaeté. Áreas abertas, 05 July 2008, *F. O. da Silva 82* (ALCB); **Serra das Almas**, 18 March 1977, *R. M. Harley 19643* (SPF).

72. ***Paepalanthus nigricaulis*** Silveira, Floral. Mont.: 43, fig. LIII. 1928.

TYPE: BRAZIL, Minas Gerais: Entre Serro e Datas, Baraúnas, Serra Geral, Silveira 764 (**Lectotype**: R000181831! **here designated**; Isolectotype: R!)

Comments: *Paepalanthus bombacinus* has a robust habit, with more than 20 cm tall, short aerial stem, leaves in rosettes and numerous scapes. Appears to be closely related to *Paepalanthus regalis*, *Paepalanthus regelianus*, *Paepalanthus serrinhensis* and other species of this group mentioned at the beginning of this treatment. It can be recognized by its golden involucral bracts.

Distribution: This species occurs in *campos rupestres* of the Espinhaço Range in Minas Gerais state (Brazil).

Additional specimens examined:— **Brazil. Minas Gerais: Andrelândia**, Serra de St. Antonio, 1936, *H. L. de M. Barreto 5301* (NY); **Conselheiro Mata**, 10 January 1987, *T. S. M. Grandi 2329* (SPF); **Diamantina**, 12 January 1998, *J. R. Pirani 3940* (SPF); **Diamantina**, 20 August 1990, *R. Mello-Silva 362* (SPF); **Diamantina**, 24 March 1986, *R. Mello-Silva CFCR 9771* (SPF); **Diamantina**, 25 February 1987, *T. Stützel 32* (SPF); **Diamantina**, 3 April 1980, *A. M. Giulietti CFCR 42* (SPF); **Diamantina**, 30 August 1981, *A. M. Giulietti 1822* (SPF); June 1925, *A. Silveira 764* (R).

73. ***Paepalanthus nigriflorus*** Silveira, Floral. Mont.: 25, fig. X. 1928.

TYPE: BRAZIL, Minas Gerais: Entre Itacambira e Juramento, in campis siccis arenosisque, Silveira 808 (Holotype R!)

Comments: This species also belongs to the *Paepalanthus aequalis* complex. It is reported only from the type, but the group needs revision.

Distribution: *Paepalanthus nigriflorus* occurs in the northern mountains of the Minas Gerais state, between the municipalities of Itacambira and Juramento.

74. ***Paepalanthus oblongifolius*** A.M.Giulietti & E. Miranda, Kew Bull. 64: 530. 2009.

TYPE: BRAZIL, Bahia, Lençóis, Serra da Chapadinha, 24 Nov. 1994, *Melo, França, Oliveira, Sena, Souza & Ganev* PCD 1323 (Holotype ALCB!; Isotype CEPEC!, K!) (Fig. 8)

Comments: *Paepalanthus oblongifolius* is a robust species, usually reaching over 60 cm tall, can be recognized by its oblong-lanceolate coriaceous leaves, apex obtuse to rounded mucronate, and chestnut scapes, sparsely pubescent.

Distribution: It was recently described as endemic to Serra da Chapadinha, in the municipality of Lençois, Bahia (Giullieti & Miranda, 2009), but was found in this study also in the municipality of mucugê, Chapada Diamantina, in Bahia state (Brazil).

Additional specimens examined:— Brazil. Bahia: *Mucugê*, Chapada Diamantina, 31 January 2015, *C. O. Andrino* 337 (SPF).

75. ***Paepalanthus oerstedianus*** Körn., Fl. Bras. 3: 374, 1863.

TYPE: BRAZIL. Minas Gerais, in humidis Serra de Cubatão, Oct. 1833, *L. Riedel 1777* (Lectotype B!, designated by Trovó & Sano 2010; Isolectotypes G, K!, L, M!, P!, UPS).

Comments: This species have slightly elongated stems, glabrous leaves, non-white spherical mature capitula.

Distribution: *Paepalanthus oerstedianus* occurs along trailsides in shaded elevated areas of the Serra do Mar in São Paulo state (Brazil)

Additional specimens examined:— Brazil. São Paulo: Biritiba-Mirim, Estação Biológica de Boracéia, 29 May 1986, *A. Custodio Filho 2660* (SPF); **Biritiba-Mirim**, Estação Biológica de Boracéia, 9 December 1983, *A. Custodio Filho 2068* (SPF); **Boracéia**, Reserva Biológica do Museu de Zoologia, 31 October 1987, *R. Simão-Bianchini 5* (SPF); **Itanhaém**, Parque Estadual da Serra do Mar, 15 November 1997, R. J. F. Garcia 1363 (SPF); **Itanhaém**, Parque Estadual da Serra do Mar, Núcleo Curucutu,2006, *M. Trovó 312* (NY); **Salesópolis**, 12 October 2013, *S. A. P. Godoy 4119* (RB); **Salesópolis**, 30 November 1951, *M. Kuhlmann 2773* (SPF); **Salesópolis**, Estação Biológica de Boracéia, 4 September 1994, *C. Y. Kiyama 39* (SPF); **Salesópolis**, no date, *A. Custodio Filho s.n.* (K); **Sao Paulo**, Alto da Serra, 1948, *A. L. Moldenke 19635* (NY); **São Paulo**, Parque Estadual da Serra do Mar, 18 December 1996, *R. J. F. Garcia 939* (SPF); **São Paulo**, Parque Estadual da Serra do Mar, 18 January 1996, *G. M. P. Ferreira 20* (SPF); **Serra de Cubatão**, 1 February 1839, *Guillemin 519* (P); **Serra de Cubatão**, 1 February 1840, *Guillemin 519* (P).

Fig. 8. *Paepalanthus oblongifolius*. A: Habit; B: Rosette detail. C: Side view of the capitulum. D: Bottom view.

76. ***Paepalanthus orthogonalis*** Silveira, Floral. Mont.: 85, fig. LI. 1928.

TYPE: BRAZIL. Minas Gerais: Baraúna, in campis arenosis, june 1925, Silveira 765 (Holotype R000181872!)

Comments: This species has a short stem, short linear leaves, scapes five times longer than leaves, three to five scapes per individual, hemispherical sections and dark brown involucral bracts.

Distribution: *Paepalanthus orthogonalis* occurs in Diamantina Plateau, Espinhaço Range in Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Datas, 18 August 1990, *R. Mello-Silva 309* (SPF); **Diamantina**, 18 August 1990, *R. Mello-Silva 330* (SPF); **Diamantina**, 3 April 1980, *A. M. Giulietti 35* (SPF), *A. M. Giulietti 46* (SPF), *A. M. Giulietti 947* (SPF*), A. M. Giulietti 958* (SPF); **Santana de Pirapama**, 26 July 2008*, L. Echternacht 1876* (SPF).

77. ***Paepalanthus ovatus*** Körn., Fl. Bras. 3: 367, 1863. ≡ *Dupatya ovata* (Körn.) Kuntze, Revis. gen. pl. 2. 746. 1891.

TYPE: BRAZIL. Rio de Janeiro, crescit in montibus Serra dos Órgãos, jul 1842, *Gardner 5901* (Holotype: P!, Isotype B!, G!, US!, P!, K!, NY!)

Nomenclatural notes: Gardner's collections at B only arrived there after Körnicke's time, and are not annotated by him. Körnicke saw Gardner's collections at P, HAL, and W (1863, Fl. Bras. Footnote, p. 303), but none of the type specimens on JSTOR were annotated by him. It's possible he only saw the specimen at W, which is now destroyed. At any rate, a lectotypification is needed; therefore, we choose the specimen deposited at P, which the author analyzed and illustrates the description of the species.

Comments: *Paepalanthus ovatus* has membranaceous leaves restricted to the rosette with short trichomes. It has a sympatric occurrence with *P. caparoensis*, a very similar species and according Freitas &Trovó (2017) may be natural hybrids. Anyway, *P. ovatus* has shorter scapes than *P. caparoensis* and a deeper morphological analysis is necessary.

Distribution: *Paepalanthus ovatus* occurs in the *campos de altitude* of the *Serra do Mar*, in Rio de Janeiro state and in Mantiqueira complex, in Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: São João del Rei, no date, *A. Glaziou 17836* (K). **São Tomé das Letras**, 28 February 1975, *G. Hatschbach 36547* (MBM). **Rio de Janeiro**: Haut des Orgues,1809, *A. Glaziou 4282* (NY); Haut Orgues. Rio de Janeiro, 3 April 1870, *A. Glaziou 4281* (P); **Macaé,** Pico do Frade, 16 April 1985, *G. Martinelli 10703* (SPF); **Nova Friburgo**, 12

March 1870, *A. Glaziou 4284* (P); **Nova Friburgo**, 20 June 1987, *L. C. S. Giordano 301* (RB); **Nova Friburgo**, 26 April 2009, *C. N. Fraga 2559* (SPF); **Nova Friburgo**, Pico da Caledônia, 15 January 1991, *J. L. Clark 814* (SPF); **Nova Friburgo**, no date, *R. Franzen 34* (MBM); **Petrópolis**, APA Petrópolis, 12 February 2011, *R. Borges 1174* (SPF); **Petrópolis**, Morro do Cuca, 15 May 1986, *G. Martinelli 11580* (SPF); **Rio de Janeiro**, Serra dos Órgãos, 7 June 1916, *P. von Luetzelburg 6606* (M); Serra dos Órgãos, no date, *P. von Luetzelburg 6584* (NY); **Teresopolis**, 22 April 1966, *George Eiten 7150* (LL, UB); **Teresópolis**, At Baleia Rock, Parque Nacional da Serra dos Órgãos, Terezopolis, 1948, *A. L. Moldenke 19613* (NY); **Teresópolis**, Parque Estadual dos Três Picos, 17 January 2015, *C. Baez 190* (RB); **Teresópolis**, Parque Estadual dos Três Picos, 3 February 2015, *C. Baez 222* (RB); **Teresópolis**, Parque Estadual dos Três Picos, 4 April 2015, *C. Baez 259* (RB); **Teresópolis**, Parque Nacional da Serra dos Órgãos, 12 March 2001, *C. B. Costa 506* (SPF).

78. ***Paepalanthus pallidus*** Silveira, Fl. Serr. Min.: 44, fig. XXXIII.II. 1908.

TYPE: BRAZIL. Minas Gerais: Ouro Preto, in aridis fissuris saxi ferruginosi, December 1906, *J. C. da Costa Sena s.n. (458 in Herb. Silveira)* (Holotype R!)

Comments: *Paepalanthus pallidus* is tiny herb up to 10 cm tall, linear leaves in rosettes. This species is quite similar o *Paepalanthus pullus*, needs further revision.

Distribution: It is reported only by the type specimen, from municipaly of Ouro Preto, Minas Gerais state (Brazil). The material *W.R. Anderson 35819* (NY, K, UB) determined as *P. pallidus* do not correspond to the species.

79. ***Paepalanthus parallelinervius*** Silveira, Floral. Mont.: 65, fig. XXXVII. 1928.

TYPE: BRAZIL, Minas Gerais: Chapada do Couto, Silveira 702 (**Lectotype**: R000181891a! **here designated**; Isolectotype: R!)

Comments: This species is known only by the type collection.

Distribution: *Paepalanthus parallelinervius* occurs in Chapada do Couto locality, in Rio Preto State Park, Diamantina Plateau, Espinhaço Range in Minas Gerais.

80. ***Paepalanthus parvifolius*** Silveira, Floral. Mont.: 91, fig. LV. 1928.

TYPE: BRAZIL, Minas Gerais: Serra do Cipó, in campis arenosis, Pedro Luiz Oliveira 640 (Holotype: R!)

Additional specimens examined:— **Brazil. Minas Gerais: Diamantina**, 12 January 1998, *J. R. Pirani 3936* (SPF); **Diamantina**, 25 February 1987, *D. C. Zappi 10406* (SPF), *T. Stützel 56* (SPF); **Diamantina**, 3 April 1980, *A. M. Giulietti 28* (SPF), A. *M. Giulietti 949* (SPF).

81. ***Paepalanthus paulinus*** Ruhland, Pflanzenr. IV.30: 215. 1903.

TYPE: BRAZIL. Minas Gerais: Serra do Cipó, Jun 1901, *Sena (herb. Schwacke) 14550* (Holotype: B; Isotype: RB! photo F!)

= *Paepalanthus asper* Silveira, Fl. Ser. Min.: 64. 1908. TYPE: BRAZIL. Minas Gerais: Serra do Cipó, Apr 1905, *Silveira 350* (**Lectotype**: R000139224a! **here designated**; Isolectotype: R!).

Nomenclatural notes: This name was also excluded from *Paepalanthus* subg. *Xeractis* by Hensold (1988) and placed in *P.* sect. *Paepalanthus*. It was included in this treatment because it fits into Ruhland's concept of *P.* ser. *Variabiles*.

Comments: It is similar to *P. riedelianus*, *P. serpens*, but can be distinguished by the involucral bracts exceeding the height of the flowers in the capitula.

Distribution: It is distributed in the Serra do Cipó, Espinhaço Range in Minas Gerais (Brazil).

Additional specimens examined:— **Brazil. Minas Gerais: Barão de Cocais**, 4 May 1982, *N. Hensold 788* (K); **Santana do Riacho**, no date, *A. M. Giulietti 5704* (K). **Barão de Cocais**, 4 May 1982, *N. Hensold 788* (RB); **Barão de Cocais**, Serra do Garimpo, 10 km by road NW of Barão de Cocais, 1982, *N. Hensold 788* (NY); **Barão de Cocais**, Serra do Garimpo, 4 May 1982, *N. Hensold 3948* (SPF); **Barão de Cocais**, Serra do Garimpo, no date, N. Hensold 788 (MBM); Itabira, Serra dos Alves, 30 March 2017, *P. B. Meyer 3002* (BHCB); **Itabira**, Serra dos Alves, 5 July 2008, *L. Echternacht 1727* (SPF); **Itambé do Mato Dentro,** Serra do Cipó, 11 May 1982, *N. Hensold 4237* (SPF); **Itambé do Mato Dentro**, Serra do Cipó, Serra das Bandeirinhas, no date, *N. Hensold 824* (MBM); **Jaboticatubas**, Parque Nacional da Serra do Cipó, 15 June 2000, *F. N. Costa 164* (SPF); **Jaboticatubas**, Serra do Cipó, 5 September 1976, *W. Monteiro 4* (HUEFS, SPF); **Santana de Pirapama**, 27 February 2009, *D. C. Zappi 1654* (RB); **Santana do Riacho**, 17 April 1981, *N. M. Castro s.n.* (RB); **Santana do Riacho**, 25 April 1978, *H. C. de Lima 383* (RB); **Santana do Riacho**, APA Morro da Pedreira, 14 October 2013, *M. Verdi 6445* (SPF); **Santana do Riacho**, km 110 ao longo da rodovia Belo Horizonte - Conceição do Mato Dentro, 17 April 1981, *N. M. Castro 7292* (W); **Santana do Riacho**, Margem da estrada Belo Horizonte-Conceição do Mato Dentro km 114, 29 April 1973, *A. M. Giulietti 4070* (M); **Santana do Riacho**, Parque Nacional da Serra do Cipó, 28 July 1991, *A. M. Giulietti 12607* (SPF); **Santana do Riacho**, Serra do Cipó, 7 June 1970, *A. B. Joly*

284 (SPF); **Santana do Riacho**, Serra do Cipó, 8 July 1973, *A. M. Giulietti 4210* (SPF); **Santana do Riacho**, Serra do Cipó, 8 September 1974, *J. Semir 5198* (SPF); **Santana do Riacho**, Serra do Cipó, Rodovia Belo Horizonte - Conceição do Mato Dentro, antigo Km 114, 1993, *P. T. Sano CFSC 13107* (NY); **Santana do Riacho**, Serra do Cipó. Estrada Lagoa Santa - Conceição do Mato Dentro (MG 010), 5,5-6 após a ponte sobre o rio Vacaria, 22 April 2002, *R. Mello-Silva 2924* (HUEFS, SPF).

82. ***Paepalanthus plantagineus*** (Bong.) Körn., Fl. Bras. 3: 369, 1863.

≡ *Eriocaulon plantagineum* Bong., Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math. 1: 630, 1831. ≡ *Dupatya plantaginea* (Bong.) Kuntze, Revis. gen. pl. 2. 746. 1891.

TYPE: BRAZIL. "Brasilia", L. Riedel 439 (Holotype: B!)

= *Paepalanthus plantagineus* fo. *luxurians* Beauv., Bull. Herb. Boissier, sér. 2, 8: 287. 1908.

TYPE: BRAZIL. Sur les roches, serra do Frezao, L, Damazio 1844 (Holotype: BR)

Comments: *Paepalanthus plantagineus* inhabits shaded regions, has slightly elongated stem, linear to lanceolate leaves, hemispherical capitula and dark brown involucral bracts.

Distribution: It occurs in the South of the Espinhaço Range in Minas Gerais (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Ouro Preto, Itacolomi, 1950, *A. Macedo 2792* (NY); **Ouro Preto**, Serra das Camarinhas, 10 March 1982, *N. Hensold 3786* (SPF); **Ouro Preto**, Serra das Camarinhas, about 2 km N of Ouro Preto, 1982, *N. Hensold 546* (NY); **Ouro Preto**, Serra do Itacolomi, 28 July 1896, *M. M. Gonçalves 3029* (BHCB, NY); **Ouro Preto**, Taquaral, 24 April 1892, *M. M. Gonçalves 2992* (BHCB); **Ouro Preto**, no date, *M. M. Gonçalves 946* (BHCB); Pico do Itacolomi, 24 May 1975, *J. Badini s.n.* (SPF); **Rio Preto**, 10 November 2005, *K. Antunes 204* (SPF); **Rio Preto**, Serra Negra, 16 February 2007, *F. R. G. Salimena 2426* (SPF); **São Thomé das Letras**, Serra de São Thomé, 30 October 1989, *I. Cordeiro 5701* (SPF); Serra de Ibitipoca, 24 September 1976, *L. Krieger 14312* (SPF); Serra do Cipó, 17 September 1950, *A. P. Duarte 3240* (SPF); Serra do Frasão, 1904, *C. A. W. Schwacke s.n.* (BHCB); **Tiradentes**, 1 April 2011, *M. Sobral 14152* (RB); **Tiradentes**, Serra de São José, 24 December 1987, *R. Alves 158* (SPF).

83. ***Paepalanthus praemorsus*** Ruhland, Pfanzenr. IV.30: 172. 1903.

TYPE: BRAZIL. Minas Gerais, Tombador, bei Diamantina, 4 April 1892, Glaziou 19966 (Holotype: B_10_0157352!, Isotypes: LE!; P!, K!, LL! fragment)

Comments: *Paepalanthus praaemorsus* is here considered part of the *Paepalanthus falcatus* complex, which includes about twenty names and needs revision.

Distribution: Occurs in Diamantina Plateau, Espinhaço Range in Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Diamantina, Galheiros. Campo atrás da comunidade, 29 November 2014, *C. O. Andrino 319* (SPF); **Diamantina**: Tombador près de **Diamantina**, 8 April 1892, *A. Glaziou 19960* (K, P), *A. Glaziou 19966* (K); **Santana do Riacho**, Serra da Lapinha, 27 March 1991, *J. R. Pirani 12185* (SPF), *J. R. Pirani 12227* (SPF); **Serro**, 2.5 km N of Milho Verde, where road cuts through large rock outcrop, 1982, *N. Hensold 505* (NY), *N. Hensold 663* (NY); **Serro**, Alto do Pico do Itambé, 1942, *G. M. Magalhaes 2093* (NY); **Serro**, Serra da Pedra Redonda, 4 km. west of Sêrro, 1945, *L. O. Williams 6926* (NY).

84. ***Paepalanthus pubescens*** Körn., Fl. Bras. 3: 384. 1863. ≡ *Dupatya pubescens* (Körn.) Kuntze, Revis. gen. pl. 2. 745. 1891.

TYPE: BRAZIL. Minas Gerais: No precise locality, *Martius 896* (**Lectotype**: B! **here designated**; Isolectotypes: G! photo, P!, B!)

Nomenclatural notes: Only the duplicates at B and HAL are annotated by Körnicke, so we chose the specimen deposited at B as the lectotype.

Comments: This species belongs to the *Paepalanthus falcatus* complex and the group needs revision.

Distribution: Occurs in the Espinhaço Range in Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Barão de Cocais, Serra do Garimpo, no date, *N. Hensold 779* (MBM); **Conceição do Mato Dentro**, 9km NW of Congonhas do Norte on road to Gouveia, 20 April 1982, *N. Hensold 707* (F, MBM); **Diamantina**, Fazenda Buriri, 21 June 2008, *L. Echternacht 1712* (SPF); **Diamantina**, no date, *G. Gardner 5271* (K); **Diamantina**, Serra de **Diamantina**, August 1960, *M. Magalhães 18364* (UB); **Diamantina**, Serra de San Antonio. Summit of Serra, 27 December 1929 To 30 December 1929, *M. A. Chase 10356* (US); **Felício dos Santos**, Cachoeira do sumidouro, 15 November 2006, *P. L. Viana 2858* (BHCB); **Itabirito**, Pico do Itabirito, 18 May 1994, *W. A. Teixeira s.n.* (SPF); **Itambé do Mato Dentro**, 11 May 1982, *N. Hensold 796* (MBM, RB); **Itambé do Mato Dentro**, Serra do Cipó, 11 May 1982, *N. Hensold 4208* (SPF); **Ouro Preto**, 18 August 1937, *Mello Barretto 9177* (F); **Ouro Preto**, Alto do Caboclo, 1937, *H. L. Barreto 9177* (BHCB); **Ouro Preto**; in campis ad Serra do Itatiaya,1895, *M. Gomes 2724* (NY); **São Gonçalo do Rio Preto**, Parque Estadual do Rio Preto, Subida para o pico Dois Irmãos, 10 May 2004, *P. L. Viana 1792* (BHCB); **São Roque de Minas**, Parque Nacional da Serra da Canastra, 16 May 2007, *M. Trovó 394* (SPF); Serra de Capanema, no date, *M. M. Gonçalves 756* (BHCB).

85. ***Paepalanthus pulchellus*** Herzog, Repert. Spec. Nov. Regni Veg.: 20: 85. 1924.

TYPE: BRAZIL. Bahia: Rio de Contas, Serra das Almas, *Luetzelburg 15507* (**Lectotype**: M 0171923! **here designated**; Isolectotypes: LL!, JE) (Fig. 9)

Comments: *Paepalanthus pulchellus* is easily recognized among the species with the same area of occurrence due to small size, short stem, glabrescent leaves in rosettes, hemispherical capitula and brown involucral bracts.

Distribution: This species is endemic to the state of Bahia, occurs in Chapada Diamantina, in Espinhaço Range (Brazil).

Additional specimens examined:— Brazil. Bahia: Abaíra, 08 June 1994, *W. Ganev 3337* (HUEFS); **Abaíra**, 21 July 1993, *W. Ganev 1913* (HUEFS); **Abaíra**, Campo da Mutuca, 23 March 1992, *B. Stannard 52802* (HUEFS, SPF); **Abaíra**, Catolés Caminho Boa Vista para Bicota, 09 July 1995, *F. França 1277* (ALCB, HUEFS, SPF); **Abaíra**, no date, *W. Ganev 1293* (K, SPF); **Água Quente**, Trilha Caiambola-Catolés, próximo à descida do Guarda-mor, 03 July 1998, *F. H. F. Nascimento 22* (HUEFS); **Barra da Estiva**, 23 November 1992, *M. M. Arbo 5721* (SPF, HUEFS); **Barra da Estiva**, Morro do Ouro, 19 November 1988, *R. M. Harley CFCR 26957* (HUEFS, NY, SPF); **Bethânia**, Estrada para Canavieiras, 3.9 km, 9 July 2006, *M. Trovó 261* (NY, SPF); **Caeté-Açú**, 30 June 1983, *L. P. Queiroz 669* (HUEFS); **Cairu**, Baixo Sul, Garapuá, 12 August 2006, *M. G. Tosto 6* (ALCB); **Canavieiras**, Litoral Sul, October 1952, *G. C. P. Pinto 52-266* (ALCB); **Canavieiras**, Margem da Rodovia Camacan-Canavieiras, 32 km W de Canavieiras, 8 September 1965, *R. P. Belem 1686* (K, NY, UB); **Canavieiras**, Rodovia Canavieiras - Santa Luzia, km 20-30, no date, *G. Hatschbach 68639* (MBM); **Ibicoara**, 29 January 2014, *J. C. Lopes 416* (SPF); **Ibicoara**, Serra do Sincorá, 21 July 1998, *L. P. Félix 8775* (HUEFS); **Itaeté**, Chapadinha, 22 February 2004, *R. Funch 170* (HUEFS); **Ituberá**, Litoral Sul, Mata da Sede, 15 September 2006, *M. L. Guedes 12656* (ALCB); **Jacobina**, Piemonte da Diamantina, Serra da Maricota, perto da Serra do Vento, 03 July 1996, *R. M. Harley 3350* (ALCB); **Lençóis**, Chapada Diamantina, 18 August 1996, *A. A. Conceição 33* (SPF); **Lençóis**, Morro do Pai Inácio, 18 December 1984, *A. M. Giulietti CFCR 7113* (NY, SPF); **Lençóis**, Morro do Pai Inácio, 18 July 1985, *R. Kral 72793* (SPF); **Lençóis**, Município de Caeté-Açú: Cacheira Glass, 1983, *L. P. de Queiroz 669* (NY); **Lençóis**, Serra dos **Lençóis**, 22 May 1980, *R. M. Harley 22395* (MBM, SPF); **Lençóis**, Serra Larga, 19 December 1984, *B. Stannard CFCR 7181* (NY, SPF); **Lençóis**, Serras dos Lençóis. Serra do Brejão ca. 14 km NW of Lençóis, 1980, *R. M. Harley 22395* (NY); **Maraú**, Litoral Sul, Fazenda Taipus de Fora, 24 May 2009, *M. L. Guedes 15130* (ALCB); **Miguel Calmon**, Parque de Sete Passagens/ Trilha do Dandá: Próximo a sede, 24 November 2005, *J. G.*

Freitas 53 (HUEFS); **Miguel Calmon**, Piemonte da Diamantina, Sete Passagens. Sede, 04 August 2006, *M. L. Guedes 12137* (ALCB); **Miguel Calmon**, Serra das Sete Passagens, Parque Estadual das Sete Passagens, próximo à sede do parque, 04 April 2001, *T. Ribeiro 115* (HUEFS); Morro do Ouro, 19 July 1981, *A. M. Giulietti 1257* (SPF); **Mucugê**, Parque Nacional da Chapada Diamantina, 5 July 2009, *L. Echternacht 2056* (BHCB, SPF); **Mucugê**, Rio Piaba, 22 February 2004, *R. Funch 217* (HUEFS); **Mucugê**, Serra de São Pedro, 1984, *A. M. Giulietti CFCR 7062* (HUEFS, SPF, NY); **Mucugê**, Trilha no Vale de Medonho, beira de um riacho, em solo arenoso, 19 September 2010, *R. M. Harley 56137* (HUEFS); **Palmeiras**, 11 October 1987, *L. P. Queiroz 1919* (HUEFS, MBM, SPF); **Palmeiras**, 29 June 1983, *L. P. Queiroz 647* (HUEFS); **Palmeiras**, 12 June 1981, *S. A. Mori 14348* (NY, NY); **Palmeiras**, Morro do Pai Inácio, 25 October 1994, *A. M. Carvalho 987* (SPF); **Palmeiras**, Morro do Pai Inácio, 30 August 1994, *A. Poveda 583* (ALCB, SPF); **Palmeiras**, Vale do Capão Cachoeira da Fumaça, 01 October 2012, *A. S. Oliveira Jr 71* (HUEFS); **Pindobaçu**, Subida da Serra da Fumaça. pelo povoado de Lutanda ca. de 2 Km da Chácara Campelo, 08 October 2011, *C. R. S. Oliveira 23* (HUEFS); **Rio de Contas**, Campo do Zé Maria, 28 July 1999, *A. M. Giulietti 1527* (HUEFS); **Rio de Contas**, Kaiambola. Serra da Mesa, 19 April 2003, *A. M. Giulietti 2423* (HUEFS); **Rio de Contas**, Lavra Velha, no date, *F. H. F. Nascimento 1205* (HUEFS); **Senhor do Bonfim**, Alto da Serra de Santana, 29 July 2005, *T. S. Nunes 1198A* (HUEFS).

86. ***Paepalanthus regalis*** Mart. ex. Körn., Fl. Bras. 3: 393 (1863). ≡ *Dupatya regalis* (Mart. ex Körn.) Kuntze. Revis. gen. pl. 2. 746. 1891

TYPE: BRAZIL. Minas Gerais: In stratis saxis Itacolumitidis prope Tejuco et in Serra de S. Antonio. Prov. Minarum, May 1818, Martius s.n. (Holotype: M 0165227!; Isotypes: M!) (Fig. 10)

= *Paepalanthus regalis* Mart. var. *recurvus* Silveira, Floral. Mont.: 55, fig. XXXI, XXXII. 1928.

TYPE: BRAZIL, Minas Gerais: Proximo a Grão-Mogol, Entre Itacambira e Juramento, Chapadão, *Silveira 578* (**Lectotype**: R000181889a! **here designated**; Isolectotype: R!) **syn. nov.**

Fig. 9. *Paepalanthus pulchellus.* A: Habit. B. Rosette detail. C;D;E. Capitula.

Nomenclatural notes: *Paepalanthus regalis* Mart. var. *recurvus* was described as a variety based on the same characteristics of the type variety. *Paepalanthus regalis* has a relatively wide distribution and a gradient of morphological variation along the Espinhaço. Therefore, we propose the synonymization of *Paepalanthus regalis* Mart. var. *recurvus* with *Paepalanthus regalis*.

Comments: *Paepalanthus* regalis is a robust species, usually reaching over 30 cm tall, which can be recognized by capitula cream to ochre, usually recurved, and dark brown glabrescent involucral bracts.

Distribution: It is distributed from the Diamantina Plateau, in the Espinhaço Range in Minas Gerais state, to the Chapada Diamantina in Bahia state (Brazil).

Additional specimens examined:— **Brazil. Bahia: Abaíra**, Pico do Barbado, 15 August 1998, *A. M. Giulietti 1443* (HUEFS, MBM); **Barra da Estiva**, 23 November 1992, *M. M. Arbo 5759* (BHCB, F, SPF); **Barra da Estiva**, Camulengo povoado em baixo dos "inselbergs" ao S da Cadeia do Sincorá". Estrada B.da Estiva/Triunfo do Sincorá. Entr. L, 17, 23 May 1991, *E. B. Santos 293* (HUEFS, SPF); **Mucugê,** Chapada Diamantina, caminho para Igatu, 27 July 2013, *M. L. Guedes 20895* (ALCB); **Ibicoara**, Chapada Diamantina, 14 August 2011, *H. A. Ogasawara 151* (ALCB); **Jacaraci**, 16 July 1999, *F. Rivadavia Lopes 1147* (SPF); **Lençóis**, 12 July 2006, *M. Trovó 270* (SPF); **Lençóis**, Morro do Pai Inácio, 12 July 2006, *M. Trovó 266* (SPF); **Lençóis**, Serra da Chapadinha, 24 November 1994, E. Melo 1323 (SPF); **Lençóis**, Serra dos Lençóis, 22 May 1980, *R. M. Harley 22349* (SPF); **Macarani**, 17 August 2001, *A. M. Carvalho 7014* (RB); **Morro do Chapéu**, Telebahia Tower, ca 6 km S of Morro do Chapeu, 16 June 1981, *S. A. Mori 14447* (NY); **Morro do Ouro**, 19 July 1981, *A. M. Giulietti 1283* (SPF); **Mucugê**, September 1973, *G. C. P. Pinto 100* (HUEFS); **Mucugê**, 10 October 1987, *L. P. Queiroz 1872* (HUEFS, SPF); **Mucugê**, 12 October 1987, *L. P. Queiroz 1992* (HUEFS, SPF); **Mucugê**, 1km N de **Mucugê**, no date, *L. P. Queiroz 1872* (MBM); Mucuge, 9 May 1976, *T. S. Santos 3113* (CEPEC, NY); **Mucugê**, a 1 km ao N, no date, *M. L. Guedes 1461* (MBM); **Mucugê**, Morro do Pina, 20 July 1981, *A. M. Giulietti 1503* (SPF); **Mucugê**, SW de **Mucugê**, 04 September 2003, *R. M. Harley 54640* (HUEFS); Palmeira, 29 June 1983, *L. P. Queiroz 634A* (HUEFS); **Palmeiras**, Base do Morro do Pai Inácio, Parque Natural Municipal do Morro do Pai Inácio, 25 August 2014, *F. Hurbarth 662* (ALCB, HUEFS); **Palmeiras**, Chapada Diamantina, Morro do Pai Inácio, 12 October 1987, *M. L. Guedes 1566* (ALCB); **Palmeiras**, Chapada Diamantina, Trilha para Cachoeira do Pai-Inácio, 18 September 2011, *C. R. A. Silva 2* (ALCB); **Palmeiras**, Morro do Pai Inácio, 29 August 1994, *M. L. Guedes 501* (SPF); **Piatã**, 15 February 1987, *R. M. Harley 24255* (SPF); Piatã, 18 August 1992, *W. Ganev 905* (HUEFS, K); **Rio de Contas**, Campo do Zé Maria, 28 July 1999, *A. M. Giulietti 1529* (HUEFS); **Tres Morros**, 1913, *P. von Luetzelburg 311* (NYGB). **Minas**

Gerais: Caeté, Serra da Piedade, 06 December 1985, *T. S. M. Grandi 2168* (BHCB); **Diamantina**, 26 July 1986, *A. M. Giulietti CFCR 9991* (SPF); **Diamantina**, 26 July 2002, *F. N. Costa 672* (RB); **Diamantina**, Conselheiro Mata, 12 August 1972, *G. Hatschbach 30232* (MBM, NY, US); **Diamantina**, PARNA Sempre-Vivas, 19 June 2008, *L. Echternacht 1696* (SPF); **Grão Mogol**, 12 July 1990, *G. Hatschbach 54205* (F, MBM); **Grão Mogol**, 15 June 1990, *J. R. Pirani 13103* (SPF); **Grão Mogol**, 16 October 1988, *R. M. Harley 25101* (SPF); **Grão Mogol**, 22 July 1985, *G. Martinelli 11254* (RB); **Grão Mogol**, Fazenda Tamanduá, 10 September 2005, *E. Tameirão Neto 4053* (BHCB, SPF); **Grão Mogol**, Vale do Ribeirão das Mortes, 24 July 1986, *A. M. Giulietti CFCR 9946* (NY, SPF).

Fig. 10. *Paepalanthus regalis.* A: Habitat. B: Involucral bracts. C. Upper view of the capitulum. C: Side view of the capitulum.

87. ***Paepalanthus regelianus*** Körn., Fl. Bras. 3: 386, fig. XLIX. 1863. ≡ *Dupatya regeliana* (Körn.) Kuntze, Revis. gen. pl. 2. 746. 1891.

TYPE: BRAZIL, Minas Gerais: in prov. Minarum, *Langsdorff, s.n.* (**Lectotype** LE00001211! **here designated**; Isolectotype: LE!) (Fig. 11)

= *Paepalanthus coronarius* Silveira, Floral. Mont.: *63.*, fig. XXXVI.1928.

TYPE: BRAZIL, Minas Gerais: Baraúnas, Serra Geral, Jun 1925, *Silveira 758* (Lectotype: R000181826! here designated; Isolectotype: R!) **syn. nov.**

= *Paepalanthus coronarius* var. *ciliatus* Silveira, Floral. Mont.: 63. 1928.

TYPE: BRAZIL, Minas Gerais: Curralinho, Serra Geral, Jun 1925,*Silveira 506* (Lectotype: R000181827! here designated; Isolectotype: R!) **syn. nov.**

Nomenclatural notes: *Paepalanthus regelianus*, *Paepalanthus coronarius*, and *Paepalanthus coronarius* var. *ciliatus* share the same morphological features, as well as the same locality of occurrence. The differences observed in the type specimen of the two species seem to be due only to the stage of development of the plant. Hence, we propose the merging of these names in *Paepalanthus regelianus.*

Comments: *Paepalanthus regelianus* can be recognized by the robust habit, leaves broadly lanceolate, hairy on the abaxial face and glabrescent on the adaxial face. It also has pubescent scapes brown to dark brown.

Distribution: The species was known only by few collections of a single locality, in Milho Verde (Minas Gerais state), and was recently recorded in Biribiri state Park, in Minas Gerais (Andrino et al, 2015) in a population with few individuals.

Additional specimens examined:— Brazil. Minas Gerais: Diamantina, Parque Estadual do Biribiri, 16 May 2011, *C. O. Andrino 154* (DIAM, SPF); **Serro**, 25 April 2007, *M. Trovó 377* (SPF); **Serro**, 8 April 2010, *C. O. Andrino 34* (DIAM).

88. ***Paepalanthus riedelianus*** (Bong.) Körn., Fl. Bras. 3: 383, 1863. ≡ *Eriocaulon riedelianum* Bong., Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math. 1: 630, 1831. ≡ *Dupatya riedeliana* (Bong.) Kuntze, Revis. gen. pl. 2. 746. 1891.

TYPE: BRAZIL. Bahia: In arenosis humidis, Marahu pr. Bahia, *L. Riedel s.n.* (Holotype: LE00002856!) (Fig. 12)

= *Paepalanthus vauthierianus* (Guill.) Kunth, Enum. Pl. 3: 500, 1841. ≡ *Eriocaulon vauthierianum* Guill., in Deless., Ic. Sel. 3: 57. fig. 95, 1837. TYPE: BRAZIL. Minas Gerais: Humidis ad Serra do Frio, May, *A.C. Vauthier 69* in Herb. Richard (Holotype: P!)

= *Paepalanthus eriophaeus* Ruhland, Pflanzenr. IV.30: 130, 1903. TYPE: BRAZIL. Minas Gerais: Diamantina, dans le camp sec, 4 Apr 1892, *A.F.M. Glaziou 19963* (Holotype: B!; Isotypes: P!) **syn. nov.**

= *Paepalanthus platycaulis* Silveira, Floral. Mont.: 27, fig. XI. 1928. TYPE: BRAZIL, Minas Gerais: Itacambira, Silveira 807 (**Lectotype**: R000181880a! **here designated**; Isolectotype: R!) **syn. nov.**

= *Paepalanthus neopulvinatus* (Silveira) Moldenke, Phytologia, 3(2): 373. 1947. TYPE: BRAZIL, Minas Gerais: Diamantina, *Silveira 501* (**Lectotype**: R000181892a! **here designated**; Isolectotype: R!) ≡ *Paepalanthus pulvinatus* Silveira, Floral. Mont.: 37. 1928, *non* N. E. Br. 1901. **syn. nov.**

Nomenclatural notes: Körnicke (1863) cited in the protologue of *Paepalanthus riedelianus*, two specimens, one from Bahia, which corresponds to the type of *P. riedelianus,* and another from Minas Gerais, which corresponds to the type of its synonym, *P. vauthierianus.* There is nothing similar to this species in Bahia, especially in the restinga area, since Maraú is composed of this phytophysiognomy. In addition, *Paepalanthus riedelianus* was known only by the type material. All these facts increase the suspicion that may there has been some tag exchange or something like that. Also, the synonym cited by Körnicke (1863) for *P. riedelianus*, *P. vauthierianus* is certainly the same species as *Paepalanthus eriophaeus*. Moreover, Silveira (1928) described two species with the same morphological characteristics and geographic distribution, *Paepalanthus platycaulis* and *Paepalanthus neopulvinatus* (=*Paepalanthus pulvinatus* Silveira) all together representing a continuity of size variations, but with the same diagnostic characteristics. Therefore, we propose that all such names be merged in *Paepalanthus riedelianus.*

Comments: *Paepalanthus riedelianus* can be recognized by the medium size (15-23 cm tall), short aerial stem, leaves with ciliated margin and scapes never exceeding more than 3 cm the height of leaves. It is morphologically similar to *P. blepharophorus*, from which it is distinguished by the chestnuts involucral bracts and broader leaves.

Distribution: This species is endemic to the Espinhaço Range in Minas Gerais state, with greater abundance in the Serra do Cipó and in the Diamantina Plateau.

Additional specimens examined:— Brazil. Minas Gerais: Congonhas do Norte, 17 June 2010, *C. O. Andrino 62* (DIAM, SPF), *C. O. Andrino 63* (DIAM); **Congonhas do Norte**, 18 June 2010, *C. J. Costa 22* (DIAM); **Congonhas do Norte**, 21-24 April 1982, *N. Hensold 722* (B); **Congonhas do Norte**, Serra do Capão Grande, 24 April 2004, *A. B. Amaral 24* (DIAM); **Diamantina**, 13 April 2011, *R. Mello-Silva 3408* (B, RB, SPF); **Diamantina**, 14 June 1996, *R. Mello-Silva 1142* (RB, SPF); **Diamantina**, 17 April 1987, *V. L. Scatena CFCR 10584* (SPF); **Diamantina**, 18 August 1990, *R. Mello-Silva 312* (SPF); **Diamantina**, 21 April 2007, *M. Trovó 348* (SPF); **Diamantina**, 23 September 2016, *J. E. Q. Faria 6584* (SPF); **Diamantina**, 25 February 1987, *T. Stützel 19* (SPF); **Diamantina**, Parque Estadual do Biribiri, 16 May 2011, *C. O. Andrino 162* (DIAM); **Diamantina**, Sierra dos Cristaes, 4 April 1892, *A. Glaziou 19964* (P); **Diamantina**, no date, *V. L. Scatena s.n.* (BHCB); Gouveia, 22 May 1989, *G. Hatschbach 53064* (MBM); Gouveia, 9 April 1982, *N. Hensold 640* (B, SPF); **Itacambira**, Alto da Serra, 04 April 2004, *M. J. G. Andrade 504* (HUEFS); **Santana de Pirapama**, Serra do Cipó, Capela de São José, Subida da Senhorinha, segundo platô, 11 November 2009, *D. C. Zappi 2316* (HUEFS, RB); **Santana do Riacho**, RPPN Brumas do Espinhaço e Ermo do Gerais, Na trilha para o mirante da Cachoeira Bicame, 29 January 2013, *L. Echternacht 2286* (BHCB); **São Gonçalo do Rio Preto**, Parque Estadual do Rio Preto, 3 September 2007, *N. F. Mota 903* (BHCB), *N. F. O. Mota 903* (SPF).

89. ***Paepalanthus rigidifolius*** Silveira, Floral. Mont.: 66, fig. XXXVIII. 1928.

TYPE: BRAZIL, Minas Gerais: Chapada do Couto, *Silveira 701* (Hototype R!)

Comments: This species also belongs to the *Paepalanthus aequalis* complex. It is reported only from the type, but the group needs revision. *Paepalanthus rigidifolius* is another species of the Chapada do Couto locality, Minas Gerais, known only by the type specimen.

Distribution: Occurs in Chapada do Couto locality, in Rio Preto State Park, Diamantina Plateau, Espinhaço Range in Minas Gerais.

90. ***Paepalanthus rufescens*** Silveira, Floral. Mont.: 104, fig. LVII. 1928.

TYPE: BRAZIL, Minas Gerais: Entre Pouso Alto e Serro, *Silveira 512* (Hototype R!)

Comments: This species is known only by their type specimen.

Distribution: Occurs in the Diamantina Plateau, between the municipalities of Pouso Alto e Serro, in the Espinhaço Range in Minas Gerais state (Brazil).

Fig. 11. *Paepalanthus regelianus*. A; C: Habit. B: Scapes. C: Capitulum.

91. ***Paepalanthus rufoalbus*** Silveira, Floral. Mont.: 94, fig. LX. 1928.

TYPE: BRAZIL, Minas Gerais: Diamantina, *Silveira 695* (Holotype: R!)

Comments: *Paepalanthus rufoalbus* can be recognized by growth in clumps, an elongated branched stem, covered by sheaths of old leaves and with lanceolate leaves restricted to the apex of the stem.

Distribution: This species is restricted to the Diamantina Plateau, more precisely to the municipality of Diamantina, Minas Gerais state (Brazil).

Additional specimens examined:— **Brazil. Minas Gerais: Diamantina**, Campus JK da UFVJM, 29 September 2011, *I. M. Franco 759* (DIAM); **Diamantina**, Parque Estadual do Biribiri, 19 May 2011, *C. O. Andrino 168* (DIAM, SPF); **Pico do Itambé**, 5 April 1982, *N. Hensold CFCR 7801* (SPF).

92. ***Paepalanthus saxatilis*** (Bong.) Körn., Fl. Bras. 3(1): 365, 1863. ≡ *Eriocaulon saxatile* Bong., Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math. 1: 625, 1831. ≡ *Dupatya saxatilis* (Bong.) Kuntze, Revis. gen. pl. 2. 746. 1891.

TYPE: BRAZIL. Minas Gerais: In saxosis umbrosis Serra de St. Jozé Jun 1824 L. *Riedel 293* (Holotype: LE; Isotypes: B!, BR, G, K!, L, M!, OXF, S, UPS).

Comments: *Paepalanthus saxatilis* is tiny herb up to 10 cm tall, linear leaves in rosettes. Habit similar to many other species, such *P. pallidus*, *P. pullus* and species placed in *P.* ser. *Leptocephali*.

Distribution: It occurs in the South of the Espinhaço Range in Minas Gerais (Brazil).

Additional specimens examined:— **Brazil. Minas Gerais: São João Del Rei**, Serra de São João Del Rei, no date, *A. Silveira s.n.* (BHCB); **Serra de São José**, 20 May 1988, *R. Alves 344* (SPF); Serra de Tiradentes, 1936, *H. L. de M. Barreto 17507* (NY); **Tiradentes**, Serra de Tiradentes, 10 July 1936, *M. Barreto 4783* (BHCB, MBM, NY, SPF).

93. ***Paepalanthus schuechianus*** Körn., Fl. Bras. 3(1): 369, 1863. ≡ *Dupatya schuechiana* (Körn.) Kuntze, Revis. gen. pl. 2. 746. 1891.

TYPE: BRAZIL. "Brasilia Orientalis", no date, Schüch s.n. (Holotype: W destroyed, F! photo negative number: 29994)

Comments: *Paepalanthus neglectus* and *Paepalanthus schuechianus* are very similar in size, habit, leaves linear to lanceolate, brown involucral bracts. As it was not found in the field, the conclusions based on the type specimens appear precipitous, and further studies of these species are necessary.

Distribution: It reported to municipality of Lençois, Chapada Diamantina, in Espinhaço Range, although the type specimen has no precise locality.

Additional specimens examined:— Brazil. Bahia: Lençóis, Chapada Diamantina, Serra da Chapadinha, 08 July 1996, *A. M. Giulietti 3503* (ALCB, SPF).

94. ***Paepalanthus scirpeus*** Mart. ex Körn., Fl. Bras. 3: 364. 1863.

TYPE: BRAZIL. Minas Gerais: Serra de Mendanha et prope Itambé do Serro Frio. Minas, May 1818, *Martius s.n.* (Holotype: M!; Isotypes: B!, MEL, LL fragment) (Fig. 13)

Comments: *Paepalanthus scirpeus* are very delicate herbs, with extremely reduced stem, being visible only the scapes, since the leaves are deciduous and little numerous. Individuals of *P. scirpeus* have similar habit to other species of the genus, such as *Paepalanthus caespititius* and species from *P.* [subsect. *Paepalanthus*] ser. *Leptocephali*, which need further studies on their species boundaries.

Distribution: This species is distributed on the Espinhaço Range in Minas Gerais.

Additional specimens examined:— Brazil. Minas Gerais: Barão de Cocais, Serra do Garimpo, 10 km by road NW of Barão de Cocais, 04 May 1982, *N. Hensold 767* (HUEFS, NY); **Caeté**, Serra da Piedade, 1938, *H. L. de M. Barreto 26496* (NY); **Caeté**, no date, *H. L. Barreto 8802* (BHCB); **Catas Altas**, Chapada de Canga, 16 March 2016, *R. C. Mota 3703* (BHCB); **Conceição do Mato Dentro**, Tabuleiro, alto da Cachoeira, 19 February 2004, *C. van den Berg 1344* (HUEFS); **Congonhas do Norte**, 18 June 2010, *C. J. Costa 23* (DIAM); **Congonhas do Norte**, 3 February 2009, *J. R. Pirani 5732* (RB); **Couto de Magalhães de Minas**, 21 June 2002, *F. N. Costa 614* (SPF); **Datas**, 25 May 1978, *M. B. Ferreira 7255* (SPF); **Diamantina**, 12 July 1996, *L. R. Parra 52* (SPF); **Diamantina**, Serra do Espinhaço, 11 April 1982, *N. Hensold 3867* (SPF); Eastern slopes of Pico do Itambé, 12 February 1972, *W. R. Anderson 35885* (NY, NY, UB); **Gouveia**, 12 km from BR-259 between **Gouveia** and Curvelo, along road to Morro do Camilinho, 09 April 1982, *N. Hensold 653* (HUEFS, NY); **Mariana**, Mina de Fábrica Nova, região da mina, 07 March 2008, *S. G. Rezende 2476* (BHCB); no date, *A. Glaziou 19985* (K); **Santo Antonio do Itambé**, Pico do Itambé, Caverna, 04 April 2004, *N. Hensold 3800* (HUEFS); **Presidente Kubitschek**, 2 March 1987, *G. Hatschbach 51218* (MBM); **Santana do Riacho**, Serra do Cipó, 27 July 1999, *F. N. Costa 48* (SPF); **Santana do Riacho**, Serra do Cipó, 5 July 1978, *A. M. Giulietti 5508* (SPF); **Santana do Riacho**, Serra do Cipó: antigo km 139 da Rodovia BH-Conceição do Mato Dentro, um pouco antes da bifurcação, lado direito da estrada, 27 July 1999, *F. N. Costa 48* (HUEFS); **Santo Antônio do Itambé**, Pico do Itambé, 4 April 1982, *L. Rossi CFCR 3006* (HUEFS, SPF); **São Gonçalo do Rio Preto**, Parque Estadual do Rio Preto, 11

October 2008, *T. E. Almeida 1479* (BHCB, SPF); **Serro**, Pico do Itambé, 5 May 1942, *Mendes Magalhães 2129* (SPF); **Serro,** no date, *G. M. Magalhães 2129* (BHCB).

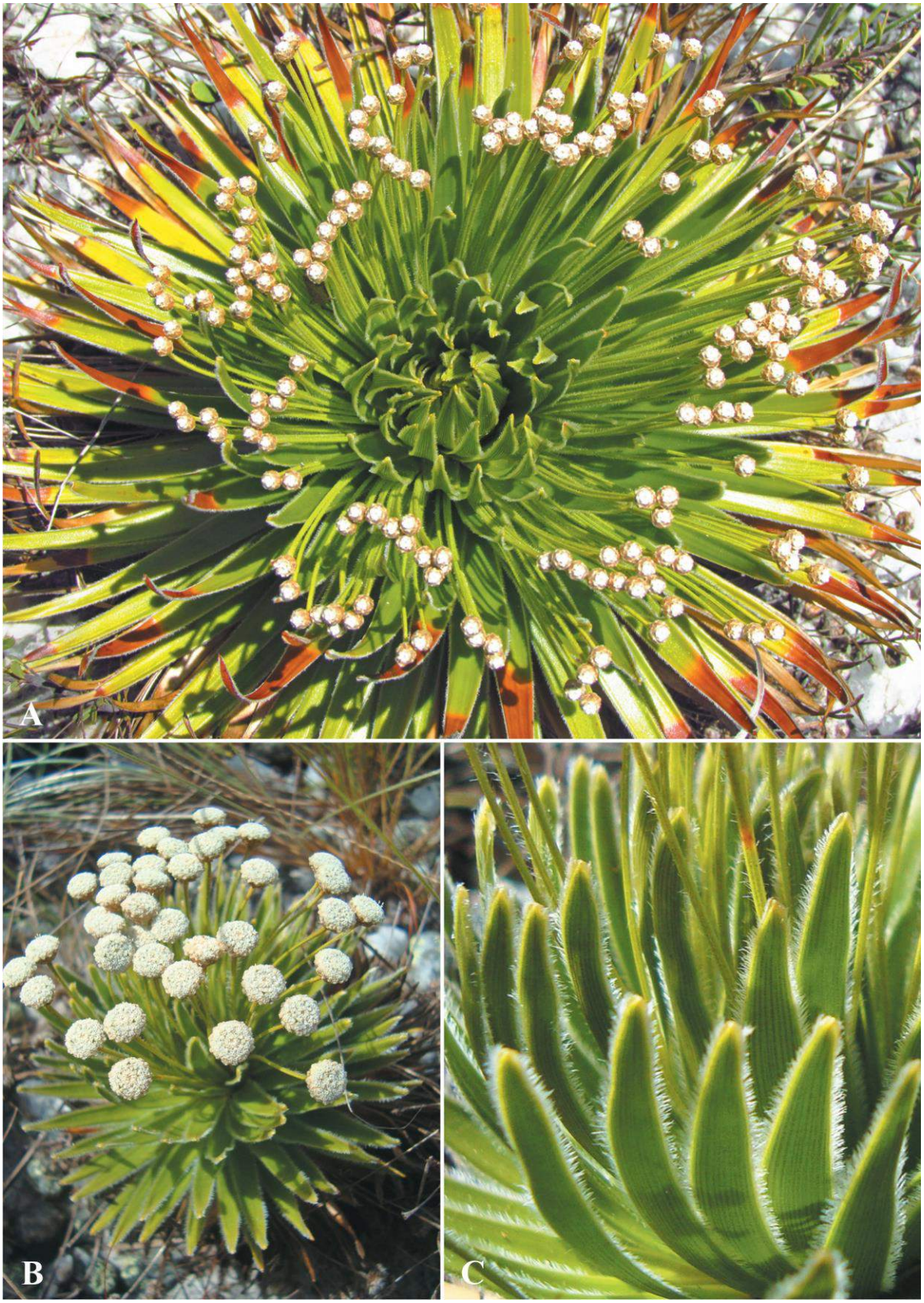


Fig. 12. *Paepalanthus riedelianus.* A;B: Habit. C: Margin of the leaves.

Fig. 13. *Paepalanthus scirpeus.* A: Habitat and habit. B: Capitula.

95. ***Paepalanthus serpens*** Echter. & Trovó, PhytoKeys 48: 43-49, 2015.

TYPE: BRAZIL. Minas Gerais, Santana do Pirapama, Reserva Particular do Patrimônio Natural (RPPN) Toucan Cipó, Trilha da Captação, 27 Jul 2013, *L. Echternacht, T. V. Bastos, M. Stallegger, C. A. Ferreira Júnior 2316* (Holotype HUFU! photo; Isotypes BHCB!, NY!, P!, R!, SPF!)

Comments*: Paepalanthus serpens* was recently described and differs from the other species of the genus by its elongated, lignescent stem, thickened by the marcescent sheaths of the linear leaves, which are disposed in rosette at the stem apex, scapes usually as long as the leaves and capitula with straw-coloured involucral bracts.

Distribution: *Paepalanthus serpens* is known from one population at the western of the Serra do Cipó, southern Espinhaço Range, in Minas Gerais state (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Santana do Pirapama, Trilha da Captação, 8 Sep 2011, *C. A. Ferreira Júnior s.n.* (BHZB 8198); same locality, 854 m, 19 Mar 2011, *W. Milliken et al. 4296* (SPF, K).

96. ***Paepalanthus serrinhensis*** Silveira, Floral. Mont.: 44, fig. XXIII. 1928.

TYPE: BRAZIL, Minas Gerais, in umbrosis secus margines capoeiras prope Serrinha, inter Grao Mogol et Itacambira, Jul. 1926, *Silveira 802* (Holotype: R!)

= *Paepalanthus stenolepis* Silveira, Floral. Mont.: 43, fig. XXII. 1928. TYPE: BRAZIL, Minas Gerais: entre Grão-Mogol e Itacambira, Serrinha, *Silveira 801* (**Lectotype** R000181912! **here designated**; Isolectotype: R!) **syn. nov.**

Comments: *Paepalanthus serrinhenis* was known only by the type collection, but was found in this work at a mountain called *Pico do Padre Ângelo* and *Pico da Aliança*, a complex of rock outcrop disjunct to Espinhaço Range with many records of new occurrences and new species (Gonella *et al.*, 2015). It is similar to *Paepalanthus spathulatus* and other robust species mentioned at the beginning of this treatment, but *P. serrinhensis* is more robust species and does not have the involucral bracts exceeding the height of the capitula as *P. spathulatus*.

Distribution: This species occurs in the North and Northeast mountains of the Minas Gerais state.

Additional specimens examined:— Brazil. Minas Gerais: Alvarenga, Pico da Aliança, no topo do pico, 9 Jul 2014, *P.M.Gonella et al.* 696 (SPF); Conselheiro Pena, Pico do Padre Ângelo, no topo do pico, 8 Jul 2014, *P.M.Gonella et al. 683* (SPF).

97. ***Paepalanthus silveirae*** Ruhland, Pflanzenr. IV.30: 131, 1903.

TYPE: BRAZIL. Minas Gerais: In humidis, Serra do Lenheiro, May 1896, A.A. Silveira 1040 (Holotype: B!)

Comments: *Paepalanthus silveirae* is similar to many species, such as *P. ciliolatus*, *P. diplobetor* and species of *Paepalanthus* ser. *Leptocephali* widely distributed in Brazil. The identity of this species will be better elucidated when compared all of them to each other, both species of *P.* ser. *Paepalanthus*, as well as species of *P.* ser. *Leptocephali*.

Distribution: It occurs in the south of the state of Minas Gerais (Brazil).

Additional specimens examined:— Brazil. Minas Gerais: Tiradentes, 1 November 1989, *R. J. V. Alves 1047* (RB); 2 March 1987, *J. V. Alves 25* (RB), Prados, 2 October 2009, *M. Sobral 13008* (RB); São João Del Rei, Serra do Lenheiro, 8 June 2008, *L. Echternacht 1666* (SPF); 15 May 1988, *R. J. V. Alves s.n.* (RB).

98. ***Paepalanthus spathulatus*** Körn., Fl. Bras. 3(1): 389, 1863.

TYPE: BRAZIL. Bahia, Jacobina, 1836, Blanchet 2600 (Lectotype: LE!; Isolectotypes: B!, P!, K!, F!, G) (Fig. 14)

Nomenclatural notes: The specimen deposited in LE is the only one that is annotated by Körnicke, so it was chosen as Lectotype.

Comments: *Paepalanthus sphatulatus*, as the name suggests, can be easily recognized by the spatulate leaves arranged along the elongated stem. The species, however, is often confused with the other robust species that occur in the Chapada Diamantina. It can be distinguished by the numerous scapes emerging from the center of the rosette, and, mainly, by the involucral bracts shigtly surpassing the height of the flowers in the capitula.

Distribution: This species occurs in the states of Bahia (Chapada Diamantina), Espirito Santo and in the north of the state of Minas Gerais (Brazil).

Additional specimens examined:— Brazil. Bahia: 11 September 1956, *Edmundo Pereira 2141* (RB); 24 October 1970, *Andrade-Lima 6113* (SPF); 30 May 1980, *R. M. Harley 22818* (RB); **Abaíra**, Catolés, 06 October 1998, *F. H. F. Nascimento 69* (HUEFS); **Abaíra**, Catolés, 14 May 1992, *W. Ganev 255* (HUEFS, K, NY, SPF); **Andarai**, 23 December 1979, *S. A. Mori s.n.* (CEPEC); **Andaraí**, Velha estrada entre Andarai e **Mucugê** via Igatu, a 2 km ao S de **Igatu**, 1979, *S. A. Mori 13190* (NY); Cairu, 13 September 1993, *M. L. Guedes s.n.* (SPF); **Itaberaba**, August 1974, *G. C. P. Pinto s.n.* (SPF); **Itaberaba**, Em sob-bosque de mata nebular na encosta da Serra do Orobo; +/- 800 m alt. Em associado

com Begonia, Salvai, Ichnanthus, August 1974, *G. C. P. Pinto 30388* (HUEFS); **Itaberaba**, Paraguaçu, em um subbosque de mata nebular na encosta da Serra do Orobó, August 1974, *G. C. P. Pinto 42-357* (ALCB); **Itaberaba**, Paraguaçu, Serra do Orobó, November 1973, *G. C. P. Pinto s/n* (ALCB); **Itaberaba**, Serra 1, Faz. Gameleira, entrando entre a Faz. Monte Verde e a Faz. Leão dos Brejos, 19 August 2005, *L. P. Queiroz 10768* (HUEFS); **Itaberaba**, Serra de Orobó, no caminho da Fazenda Gameleira para o cume da serra, 24 July 2006, *R. M. Harley 55476* (HUEFS); **Jacobina**, 24 April 1999, *R. C. Forzza 1319* (SPF); **Lençóis**, 03 April 1980, *L. R. Noblick 1751* (HUEFS); **Lençóis**, 4 September 1999, *E. B. Miranda 204* (RB); **Lençóis**, Chapada Diamantina, 14 November 1983, *L. S. S. Faria s/n* (ALCB); **Lençóis**, Chapada Diamantina, Foz do rio Capivara, situado a 14 Km de **Lençóis**, com acesso pela estrada de terra Lençóis/Andaraí. Localizado nos limites do Parque Nacional da Chapada Diamantina e a APA de Iraquara/Marimbus,12 October 1999, *M. T. S. Stradmann 653* (ALCB); **Lençóis**, Morro do Pai Inácio, 12 July 2006, *M. Trovó 264* (SPF); **Lençóis**, nas margens do rio Lençóis e afloramentos rochosos da vegetação ciliar, April 2012, *B. F. Farias 141* (HUEFS); **Lençóis**, nas margens do rio **Lençóis** e afloramentos rochosos da vegetação ciliar, August 2011, *B. F. Farias 68* (HUEFS); **Lençóis**, nas margens do rio Lençóis e afloramentos rochosos da vegetação ciliar, September 2010, *B. F. Farias 5* (HUEFS); **Lençóis**, nas margens do rio Lençóis e afloramentos rochosos da vegetação ciliar, September 2011, *B. F. Farias 76* (HUEFS); **Lençóis**, Rio Mandassaia, Barro Branco, Parque Nacional da Chapada Diamantina, 05 September 2000, *A. A. Ribeiro-Filho 108* (HUEFS); **Lençóis**, Serra da Chapadinha, 27 October 1994, *A. M. Carvalho 1067* (ALCB, HUEFS, SPF); **Lençóis**, Trilha para a Gruta do Lapão, 04 September 1999, *E. B. Miranda 204* (HUEFS); **Macarani**, Rod. para Vila das Graças 27.2 km E, ca. 4.4 km de Vila das Graças,2001, *A. M. V. de Carvalho 7014* (NY); **Morro do Chapéu**, 06 October 2008, *N. P. Smith 59* (HUEFS); **Morro do Chapéu**, 15 January 1977, *G. Hatschbach 39618* (MBM); **Morro do Chapéu**, Rodovia BR-052, a 20 Km em direção a Feira de Santana, ponte do rio Ferro doido, 31 August 1990, *J. L. Hage 2350* (HUEFS, MBM, SPF); **Morro do Chapéu**, Serra da Boa Esperança, 05 December 2002, *A. Rapini 987* (HUEFS); **Morro do Chapéu**, Telebahia Tower, ca 6 km S of Morro do Chapeu, 1981, *S. A. Mori 14458* (NY); **Mucugê**, 1 October 1990, *A. Freire-Fierro 1682* (HUEFS, SPF); **Mucugê**, Estrada Mucugê-Andaraí, a 3-5Km N de Mucugê. Arredores da região conhecida como "Gerais do Capa Bode", 21 February 1994, *P. T. Sano CFCR 14379* (HUEFS, SPF); **Mucugê**, Summit of Morro do Chapéu to the west of the road Utinga. Sandstone rocks, with open sand in flatter areas, 30 March 1980, *R. M. Harley 22818* (HUEFS); **Palmeiras**, Morro do Pai Inácio, 1983, *L. P. de Queiroz 634-A* (NY); **Palmeiras**, Morro do Pai Inácio, 20 July 2006, *J. Paula-Souza 6251* (SPF); **Palmeiras**, Morro

do Pai Inácio, 25 September 1994, *A. M. Giulietti 765* (ALCB, HUEFS, SPF); Piatã, **Abaíra**-Catolés. Encosta da Serra do Barbado, após Catolés de Cima, 06 September 1996, *R. M. Harley 28333* (HUEFS); **Pindobaçu**, Cachoeira da Serra da Fumaça, 09 October 2011, *C. R. S. Oliveira 39* (HUEFS); **Pindobaçu**, Cachoeira da Serra da Fumaça. Campo sujo, 26 August 2010, *M. Oliveira 5047* (HUEFS); **Ruy Barbosa,** 16 October 1978, *Adonias Araújo 82* (RB); **Valença**, Litoral Sul, Morro de São Paulo, caminho para a Fonte do Céu, 13 September 1987, *M. L. Guedes 1352* (ALCB, HUEFS, SPF). **Espírito Santo: Cachoeiro de Itapemirim**, 16 August 1981, *F. V. Ferreira 1851* (SPF), *V. F. Ferreira 1851* (RB). **Minas Gerais: Grão Mogol**, arredores, no date, *G. Hatschbach 41521* (MBM); **Grão Mogol**, Parque Estadual de **Grão Mogol**, 24 June 2014, *M. Verdi 7072* (RB); **Rio Vermelho**, Morro do Ambrósio, 15 July 1984, *A. M. Giulietti CFCR 4510* (SPF).

99. ***Paepalanthus sphaerulifer*** Silveira, Floral. Mont.: 103, fig. LXIV. 1928.

TYPE: BRAZIL, Minas Gerais: Entre Serro e Diamantina Serra Geral, *Silveira 785* (**Lectotype**: R000229578! **here designated**; Isolectotype: R!)

Comments: This species also belongs to the *Paepalanthus falcatus* complex. It is reported only from the type, but the group needs revision.

Distribution: Occurs in the municipality of Diamantina, in Espinhaço Range in Minas Gerais (Brazil).

100. ***Paepalanthus stephanophorus*** Silveira, Floral. Mont.: 40, fig. XX. 1928.

TYPE: BRAZIL, Minas Gerais: Entre Itacambira e Juramento, in campis argillosisque, Jul 1906, *Silveira 803* (Holotype R000181909!)

Comments: *Paepalanthus stephanophorus* is another robust species from the north of Minas Gerais, area that needs a more field effort, given the high number of endemic species and known only by type.

Distribution: This species is known only by their type collection, from the northern mountains of Minas Gerais state (Brazil), between the municipalities of Itcambira and Juramento.

Fig. 14. *Paepalanthus spathulatus*. A: Habit. B: Habitat. C;D: Capitula with involucral bracts slightly surpassing the height of the flowers.

101. ***Paepalanthus striatus*** Ruhland, Pflanzenr. IV.30: 149, 1903.

TYPE: BRAZIL. São Paulo: Campos da Bocaina, dans le bois près des sources du Rio Parahybo, 10 Feb 1876, A.F.M. *Glaziou 7994* (Lectotype: B! designated by Trovó & Sano 2010; Isolectotypes: C, G, K!, P!)

Comments: *Paepalanthus striatus* has a short aerial stem, glabrescent leaves, and dark brown involucral bracts. It is similar to *Paepalanthus calvus* Ruhland, species with the same area of occurrence.

Distribution: This species occurs along Mantiqueira mountains, in Minas Gerais, Rio de Janeiro and São Paulo states, in Southeastern Brazil.

Additional specimens examined:— Brazil. Minas Gerais: Caldas, Caldas, 1957, *A. F. Regnell 1800* (NY); **Rio Preto**, Mata do Funil, Burro de Ouro, no Pico-das-Três-Divisas, 29 April 2008, *L. Echternacht 1629* (BHCB). **Paraná:** Palmeira, Rio dos Papagaios, no date, *A. C. Cervi 2212* (MBM). **Rio de Janeiro**: no date, *A. Glaziou 1994* (K). **São Paulo:** Campos do Jordão, 07 October 1990, *L. P. Queiroz 2710* (HUEFS); **Campos do Jordão**, 3 February 1990, s. coll. 1045 (SPF); **Campos do Jordão**, Parque Estadual de Campos do Jordão, 6 December 2000, *C. B. Costa 417* (SPF); **Campos do Jordão**, Parque Estadual, 20 November 1985, *J. R. Pirani 1370* (MBM, NY, SPF); Estação Biológica do Alto da Serra, 2 March 1932, *W. Hoehne s.n.* (SPF).

102. ***Paepalanthus subfalcatus*** Ruhland, Pflanzenr. IV.30: 151, 1903.

TYPE: BRAZIL. Minas Gerais: Serra dos Cristaes, près de Diamantina, 4 Apr 1892, A.F.M. *Glaziou 19958* (Holotype: B!; Isotypes: G, K!, P!)

= *Paepalanthus subfalcatus* var. *villosus* Moldenke, Phytologia 21: 418. 1971.

TYPE: BRAZIL. Minas Gerais: Minas Gerais, São João da Chapada, Ca. 3 km N of São João da Chapada, 24 March 1970, *H.S. Irwin 28201* (**Lectotype:** NY! **here designated**; Isolectotypes: F, UB!, K!, RSA, SP!, US!) **syn. nov.**

Comments: *Paepalanthus subfalcatus* is also treated here as belonging to the *Paepalanthus falcatus* complex.

Distribution: *Paepalanthus falcatus* is widely distributed in Diamantina Plateau, in the Espinhaço Range.

Additional specimens examined:— Brazil. Minas Gerais: **Diamantina**, ca. 3 kilometers north of Sao João Chapada, 24 March 1970, *H. S. Irwin 28201* (F, NY, P); **Diamantina**, Leste da Diamanina, estrada para o povoado de Boa Vista, após o povoado de Extração, 05 May 2008, *P. L. Ribeiro 380* (HUEFS); **Diamantina**, Minas: Serra dos Cristaes, 4 April 1892, *A. Glaziou 19958* (K, P); **Diamantina**, Parque Estadual do Biribiri. Alto da Boa Vista, 18 September 2012, *C. O. Andrino 221* (SPF); **Felício dos Santos**, Cachoeira do Sumidouro, platô adjacente à cachoeira, ao sul, 03 April 2010, *L. Echternacht 2167* (BHCB); Serra do Espinhaço. ca. 8km W of Grão Mogol, 1969, *H. S. Irwin 23355* (NY); Serra do Espinhaço, no date, *H. S. Irwin 28201* (US); **Serro**, 8 April 2010, *C. O. Andrino 36* (DIAM); **Serro**, Milho Verde, 9 April 2010, *M. P. Tannure 16* (DIAM).

103. ***Paepalanthus succisus*** Mart. ex Körn., Fl. Bras. 3: 384, 1863. ≡ *Dupatya succisa* (Mart. ex Körn.) Kuntze, Revis. gen. pl. 2. 746. 1891.

TYPE: BRAZIL. Minas Gerais, district Diamantina, Jun 1818, *Martius, s.n.* (Holotype: M!)

Comments: This name is often misapplied to *Paepalanthus macrocaulon*, *Paepalanthus neglectus* or other species with a similar habit occurring in the Chapada Diamantina, Bahia. However, this species is reported to Minas Gerais state and does not occur in the state of Bahia (Brazil). *Paepalanthus succisus* is also treated here in the *Paepalanthus falcatus* complex, due to its co-occurrence with the species of this group and all the morphological similarity that they share.

Distribution: Occurs in the municipality of Diamantina, in Espinhaço Range in Minas Gerais (Brazil).

104. ***Paepalanthus tricholepis*** Silveira, Floral. Mont.: 32, fig. XV. 1928.

TYPE: BRAZIL, Minas Gerais: Diamantina, *Silveira 703* (Holotype R!)

Comments: This species also belongs to the *Paepalanthus falcatus* complex. It is reported only from the type, but the group needs revision.

Distribution: Occurs in the municipality of Diamantina, in Espinhaço Range in Minas Gerais (Brazil).

105. ***Paepalanthus uleanus*** Ruhland in Engler, Pflanzenr. IV.30: 146, 1903.

TYPE: Brazil. Rio de Janeiro: Auf Stamigen Campo der Serra dos Orgãos, Oct 1896, *G. Ule 4094* (Holotype: B!; Isotype: HBG)

Comments: Frequently confused with *P. caparoensis*. These species need to have their morphology better studied to clarify the circumscription of these species.

Distribution: *Paepalanthus uleanus* occurs in the *campos de altitude* of the *Serra do Mar*, in Rio de Janeiro state. (Brazil).

Specimens examined:— Brazil. Rio de Janeiro: Macaé, 16 April 1985, *G. Martinelli 10703* (RB); **Nova Friburgo**, Subida para o Pico da Caledônia, 26 April 2009, *C. N. Fraga 2559* (RB); **Petrópolis,** 15 May 1986, *G. Martinelli 11580* (RB); **Petrópolis,** APA Petrópolis - Morro do Cuca / Pico do Pindoba, 12 February 2011, *R. Borges 1174* (RB); **Petrópolis**, APA Petrópolis - Serra da Maria Comprida, percurso Palmares - Boi Coroado, 18 November 2009, *R. Borges 992* (RB); **Serra dos Órgãos**, January 1916, *P. von Luetzelburg 6574* (M); **Serra dos Órgãos**, November 1916, *P. von Luetzelburg 7222* (M); **Serra dos Órgãos**, 15 July 1975, *Karin 306* (SPF); **Teresópolis**, 27 September 2007, *G. Heiden 910a* (RB).

106. ***Paepalanthus umbrosus*** Giul. & E. Miranda, Kew Bull. 64: 532. 2009.

TYPE: BRAZIL, Bahia, Lençóis, Serra da Chapadinha, 8 July 1996, *Bautista, Harley, Hind, Smith & Giulietti PCD 3487* (Holotype: ALCB!; Isotype: K!, SPF!).

Comments: This species is a robust herb, up to 30 cm tall, elongate stem, pubescent linear to lanceolate leaves, hemispherical capitullum, brown to dark brown involucral bracts.

Distribution: *Paepalanthus umbrosus* is endemic to the Serra da Chapadinha, also locally known as the Serra do Brejão, in Chapada Diamantina, Espinhaço Range in Bahia state.

Additional specimens examined:— Brazil. Bahia: Lençóis, **Lençóis**, Serras dos Lençóis. Serra do Brejão c. 14 km NW of Lençóis, 1980, *R. M. Harley 22345* (NY).

107. ***Paepalanthus undulatus*** Ruhland, Pflanzenr. IV.30: 150, 1903.

TYPE: BRAZIL. Minas Gerais: Pico do Itabira do Campo, 20 Dec 1888, A.F.M. *Glaziou 17844* (Holotype: B!; Isotypes: C, K!, LE!, P!)

Comments: This species is similar to *Paepalanthus calvus*, both have a short aerial stem, scapes three or four times longer than leaves, glabrescent leaves, and dark brown involucral bracts. The two names are misapplied in the herbarium collections and an in-depth morphological analysis is needed to clarify the delimitation of the species, since they occur in the same environments.

Distribution: This species occurs along Mantiqueira mountains, in Minas Gerais, Rio de Janeiro and São Paulo states, in Southeastern Brazil.

Additional specimens examined:— Brazil. Minas Gerais: 26 March 1907, *L. Damazio 1844* (RB); **Serra do Itabirito**, ca. 45 km S.E. of Belo Horizonte, 7 February 1968, *H. S. Irwin 19524* (NY).

108. ***Paepalanthus velutiphyllus*** F.N. Costa, Andrino & Sano *in* Costa *et al.*, Phytotaxa 247 (2): 118–12.

TYPE: BRAZIL. Minas Gerais: Rio Vermelho, Serra do Ambrósio, alto da Serra, partindo da Comunidade de Penha de França, 1036 m elev., 18°05'38.4"S, 43°04'02.1"W, 25 June 2012, *F.N. Costa, A.B. Sampaio, R. Ramos & S.N. Fonseca 1533* (Holotype DIAM!, Isotypes B!, NY!, SPF!) (Fig. 15)

Comments: *Paepalanthus velutiphyllus* is characterized by its reflexed leaves, which are densely velutinous on the adaxial surface, and its scapes, which are usually as long as the leaves.

Distribution: Five subpopulations of this species are known, all restricted to the Serra do Ambrósio, north of Minas Gerais state (Brasil).

Additional specimens examined:— Brazil. Minas Gerais: Rio Vermelho, Morro do Ambrósio, 14 July 1984, *A. M. Giulietti 4459* (SPF); **Rio Vermelho**, Pedra Menina, 1987, *U. B. Pereira 11313* (SPF); **Rio Vermelho**, Pedra Menina, 13 October 1984, *M. Meguro 5470* (SPF); **Rio Vermelho**, Serra do Ambrósio, 10 January 2006, *P. L. Vianna 2428* (BHCB); **Rio Vermelho**, Serra do Ambrósio, 31 March 1985, *A. M. Giulietti 7782* (SPF).

109. ***Paepalanthus vestitus*** Ruhland, Pflanzenr. IV.30: 150, 1903.

TYPE: BRAZIL. Minas Gerais: au pic d'Itabira, 1843, *P. Claussen 49* (**Lectotype:** P! **here designated**; Isolectotype: B!)

Nomenclatural notes: Ruhland (1903) described *Paepalanthus vestitus* based on the material *Claussen s.n.* deposited in W, but most of the specimens of *Paepalanthus* deposited in this herbarium were lost or destroyed during World War II. Although the specimen deposited in herbarium B contains the original Ruhland calligraphy, the material has only leaf fragments and inflorescences, whereas the material deposited in P has complete individuals. Therefore, we here designate *Claussen s.n.* at P as the lectotype of *P. vestitus.*

Comments: This species is possibly known only by type. The materials with this name do not resemble the species, which has a short stem, leaves ciliated at the base, hairy on both faces, long scapes and spherical capitula.

Distribution: It is reported to Pico Itabira, south of Minas Gerais state.

110. ***Paepalanthus xanthopus*** Silveira, Floral. Mont.: 70, fig. XLI. 1928.

TYPE: BRAZIL, Minas Gerais: Serra do Cabral, Pedra Pintada, *Silveira 589* (**Lectotype:** R000181917! **here designated**; Isolectotypes: R!)

Comments: One of the diagnostic characteristics of this species is the involucral bracts of the external series exceeding the height of the flowers in the capitula. This character is present in other species, such as *Paepalanthus subfalcatus*, which leads to the incorrect application of the name to other species of the Diamantina Plateau.

Distribution: *Paepalanthus xanthopus* is endemic to Serra do Cabral, in Minas Gerais, Brazil.

Additional specimens examined:— Brazil. Minas Gerais: Joaquim Felício, Próximo ao Rio Preto, 23 August 2002, *G. Hatschbach 73732* (MBM); **Joaquim Felício**, Serra do Cabral, 14 July 2006, *P. Fiaschi 3094* (SPF); **Joaquim Felício**, Serra do Cabral, 15 May 2001, *G. Hatschbach 72049* (MBM); **Joaquim Felício**, Serra do Cabral, 17 April 1981, *L. Rossi CFCR 1121* (SPF); **Joaquim Felício**, Serra do Cabral, 2 September 1985, *R. Mello-Silva CFCR 8222* (SPF); **Joaquim Felício**, Serra do Cabral, 22 July 2008, *L. Echternacht 1857* (SPF); **Joaquim Felício**, Serra do Cabral, 28 July 1976, *P. Davis 2393* (R); **Joaquim Felício**, Serra do Cabral, 31 August 1985, *R. Mello-Silva CFCR 8052* (SPF); **Joaquim Felício**, Serra do Cabral, 7 June 2004, *G. Hatschbach 77518* (MBM); **Joaquim Felício**, Serra do Cabral, 9 July 2001, *V. C. Souza 25469* (SPF); **Joaquim Felício**, Serra do Cabral, no date, *G. Hatschbach 72049* (MBM); **Joaquim Felício**, Serra do Cabral, próximo do Rio Preto, no date, *G. Hatschbach 73732* (MBM); **Joaquim Felício**, no date, *R. M. Silva s.n.* (BHCB); **Serra do Cabral**, June 1910, *A. Silveira 589* (R).

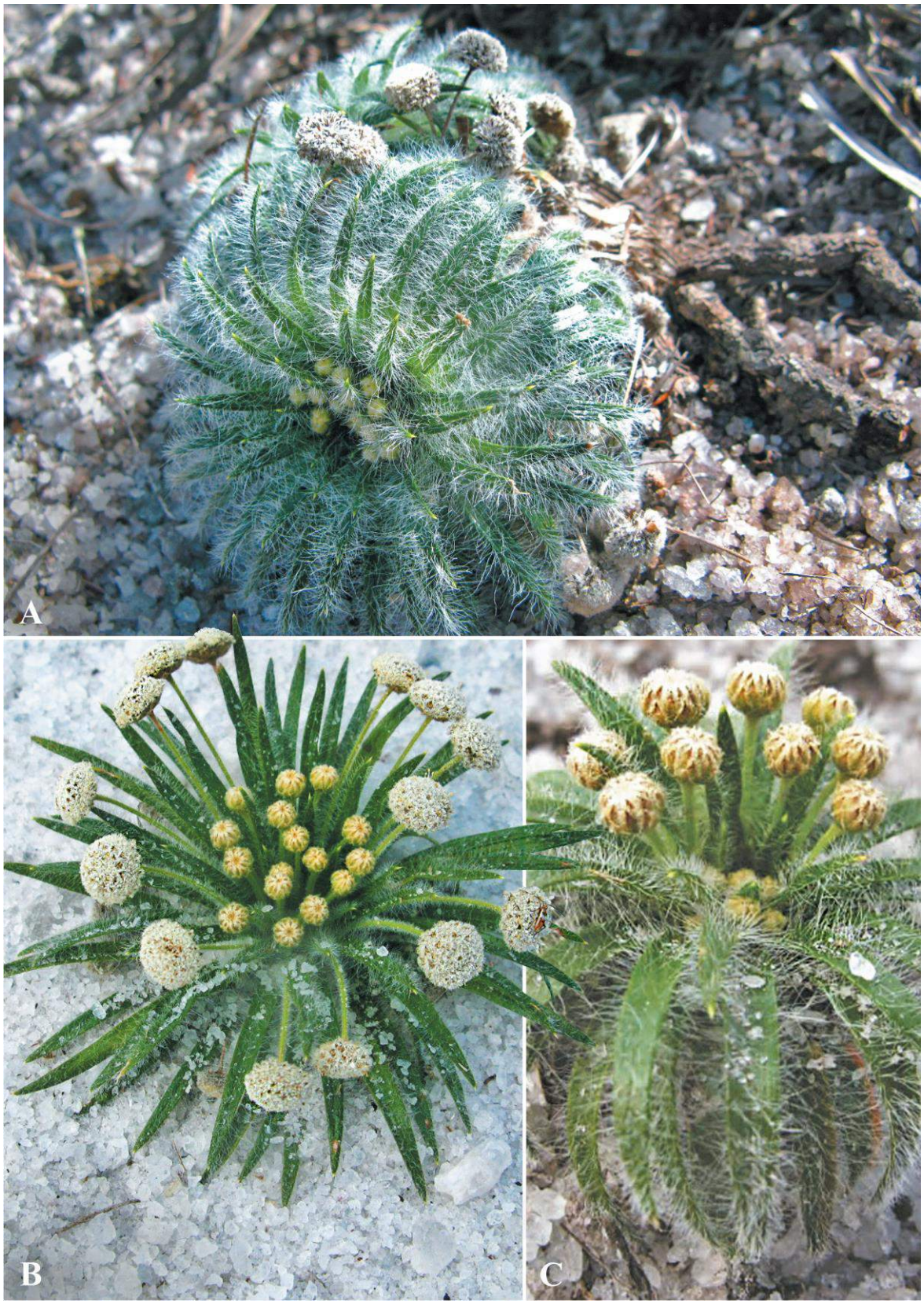


Fig. 15. *Paepalanthus velutiphyllus.* A;B Habit. *C:* Capitula with immature flowers.

Taxa of Doubtful Placement

This section includes taxa possibly not closely related to *Paepalanthus*, which need to be tested in phylogenetic studies or analyzed and compared to other groups. 1) *Paepalanthus microcephalus* (Bong.) Körn., *Paepalanthus pseudoelongatus* Ruhland, *Paepalanthus melanolepis* Silveira, and *Paepalanthus argyropus* Silveira and it varieties (probably all synonyms) may belong to the genus *Actinocephalus*, due to the potential presence of paraclades (putative synapomorphies of the group) reported by Costa (2011); 2) the species occuring in southern of Brazil, usually cushion plants, possibly related to another genus of the family; 3) and the Central American species, which have similarities with other species of *Paepalanthus* ser. *Leptocephali* widely distributed in Brazil (such as *Paepalanthus lamarckii*, *Paepalanthus bifidus*, *Paepalanthus obtsifolius*) but are also possibly related to another genus.

1. ***Paepalanthus argyropus*** Silveira, Fl. Serr. Min.: 36, 1908.

   TYPE: BRAZIL. Minas Gerais: in campis paludosis prope Serrinha da Lapinha, in serra do Cipó, April 1905, *Silveira 354* (Holotype: R!)

2. ***Paepalanthus argyropus*** var. ***brevifolius*** Silveira, Floral. Mont.: 33. 1928.

   TYPE: BRAZIL. Minas Gerais: In campis in Serra do Cabral et in campis prope Milho Verde, in Serra Geral, June 1910, *Silveira 591* (Holotype: R!)

3. ***Paepalanthus balansae*** Ruhland, Pflanzenr. IV.30: 151. 1903.

   TYPE: Paraguay. Pastaréo-mi, à l'Est de la Cordillera de Villa Rica, 25 September 1874, *B. Balansa 568* (Holotype: B! Isotypes: BR, F!, G, K!, LE!, NY!, P!, S)

4. ***Paepalanthus catharinae*** Ruhland, Pflanzenr. IV.30 : 147, 1903.

   TYPE: BRAZIL. Santa Catarina: Im Sumpfe an Rande der Serra do Oratório, Jan 1880, G. Ule 1621 (Holotype: B; Isotype: HBG)

5. ***Paepalanthus jordanensis*** Silveira, Floral. Mont.: 92, fig. LVII.I. 1928.

   TYPE: BRAZIL, São Paulo: Campos do Jordão, Serra da Mantiqueira, Silveira 263 (Lectotype: R! designated by Trovó *et al.* 2015)

6. ***Paepalanthus lundii*** Körn., Fl. Bras. 3: 385. 1863. = *Dupatya lundii* (Körn.) Kuntze, Revis. gen. Pl. 2: 746. 1891.

   TYPE: Brazil. São Paulo, Araracoara, Tietê et prope Villa Franca, May, [year missed]. *L. Riedel* 2204 (Lectotype B!, designated by Trovó & Sano, 2010; isolectotypes G, K!, L, LE!, P!, S, U, UPS).

   = *Paepalanthus macrotrichus* Silveira, Fl. Serr. Min.: 43. 1908.

TYPE: BRAZIL. São Paulo: In propis Corrego Fundo, Nov. 1889, *Magalhaes Gomes 1485 (413 in Herb. Silveira)* (Holotype R!; Isotypes P!, SP!)

7. ***Paepalanthus macrocephalus*** (Bong.) Körn., A. bras. 3(1): 379. 1863 ≡ *Eriocaulon macrocephalum* Bong., Mém. Acad. Imp. Sci. St.-Petérsbourg, Ser. 6, Sci. Math. 1. 630. Fig. 33. 1831≡ *Dupatya macrocephala* (Bong.) Kuntze, Revis. gen. pl. 2. 745. 1891.

   TYPE: BRAZIL. Minas Gerais: "In pratis humidis Serra da Lapa", Nov 1824, *L. Riedel* 1036 (Holotype: LE!; Isotypes: B!, G, K!, P!).

8. ***Paepalanthus macrocephalus*** var. ***minarum*** (Körn.) Ruhland, Pflanzenr. 13(IV.30): 171. 1903. ≡ *Paepalanthus minarum* Körn., Fl. Bras. 3(1): 378. 1863 ≡ *Dupatya minarum* (Körn.) Kuntze, Revis. gen. pl. 2. 745. 1891.

   TYPE: BRAZIL. Minas Gerais: "In altis inter Vila Rica et Tejuco", Mai 1818, Martius s. n. (Holotype: M!)

9. ***Paepalanthus melanolepis*** Silveira, Fl. Serr. Min.: 35. 1908.

   TYPE: BRAZIL. Minas Gerais: in campis prope Capão Redondo in Serra do Cipó, Minas Gerais: April 1905, *Silveira 357* (**Lectotype**: R000139220d! **here designated**; Isolectotypes: R!) ≡ *Paepalanthus argyropus* var. *pubescens* Silveira, Floral. Mont.: 22. 1928, **nom. et stat. nov.**

10. ***Paepalanthus pseudoelongatus*** Ruhland, Pfanzenr. 13 (IV.30): 136. 1903.

    TYPE: BRAZIL. Minas Gerais: "Tombador, près Diamantina, dans le campo", 8 Abr 1892, *Glaziou 19961* (Holotype: B!; Isotype: K!)

11. ***Paepalanthus repens*** (Lam.) Körn., Fl. Bras. 3: 371. 1863.

    TYPE: DOMINICAN REPUBLIC. Santo Domingo, *s.c. s.n.* (Holotype: P)

    = *Paepalanthus domingensis* Ruhland in Urban, Symb. Antill. 1(3): 485, 1900. TYPE: DOMINICAN REPUBLIC. Santo Domingo: inter saxa, Valle Nuevo 2270 m, 29 May 1897, *B. Eggers 2216* (**Lectotype**: C **here designated**; Isolectotypes: G, K, M) = *Paepalanthus tuerckheimii* Ruhland in Urban, Symb. Antill. 7(2): 173, 1912.

    TYPE: DOMINICAN REPUBLIC. Santo Domingo: ad Loma del Hato Quemado, alt. 1400 m., in pinetis inter Constanza et Rio Jimenoa, May 1910, *H. Türckheim 3327* (Holotype: B; Isotypes: BR, G, M, P, S)

12. ***Paepalanthus retusus*** Wright in Sauvalle, Anales Acad. Ci. Med. Habana 8: 50. 1871.

    TYPE: Cuba. En pinares arenosos entre la Grifa y Guames. *Wright n. 3744* (Holotype: GH!; Isotype: K!, NY!, US!, S!)

13. ***Paepalanthus scholiophyllus*** Ruhland, in Engler, A., Pflanzenr. 13 (IV. 30): 172. 1903.
TYPE: Brazil. Goias: "Capelinha de Santo Antonio dans le campo", 23 Out 1894, *Glaziou 22315* (Holotype: B!; Isotypes: G!, K!, P!)
14. ***Paepalanthus oyapockensis*** Herzog, Repert. Spec. Nov. Regni Veg. 29: 206. 1931.
TYPE: BRAZIL, Northern Brazil: Oyapock, Roche Monpére. Luetzelburg, P. von, 21249 (Holotype: M; Isotype: M! LL! Fragment)

Taxa of Uncertain Status

This section includes varieties which seem not to belong to the species in question and needs revision.

1. ***Paepalanthus balansae*** *var.* ***densiflorus*** Moldenke, Phytologia 8: 162. 1962.
TYPE: BRAZIL. Paraná: Serra dos Dourados, Cerradinho, October 1958, *R. Braga & Lange 92* (Holotype: LL!)
2. ***Paepalanthus catharinae*** var. ***hatschbachii*** (Moldenke) Moldenke & L.B.Sm., Phytologia 25: 430. 1973. = *Paepalanthus hatschbachii* Moldenke, Lloydia 13(3): 224–225. 1950.
TYPE: BRAZIL. Paraná; Morretes; Pico Olimpo, 15 Jan 1950, *Hatschbach 1743* (Holotype: NY!; Isotype: MBM!)
3. ***Paepalanthus fasciculifer*** var. ***capillifolius*** Moldenke, Phytologia 32: 336. 1975.
TYPE: BRAZIL. Goiás, Alto Paraíso, Chapada dos Veadeiros, *G. Hatschbach 36839* (Holotype LL; Isotypes: US; C)
4. ***Paepalanthus pubescens*** var. ***longepilosus*** Silveira, Floral. Mont. 1: 79. 1928.
TYPE: BRAZIL, Minas Gerais: Diamantina, Pouso Alto, Silveira 498 (Holotype R!)
5. ***Paepalanthus pubescens*** var. ***chapadensis*** Ruhland, Pflanzenr. IV.30: 143, 1903.
TYPE: BRAZIL. Minas Gerais: ad Serra da Itatiaya, prope Chapada, 12 May 1895, Magalhaes Gomes 2724 (Holotype: B!; Isotype: NY!)
6. ***Paepalanthus pulchellus*** var. ***puberulentus*** Moldenke, Phytologia 51: 244. 1982.
TYPE: BRAZIL. Goiás: Campo Alegre de Goiás, 16 Aug 1980, *Hatschbach 43162* (Holotype LL; Isotypes: US; HBG)

Concluding Remarks

Addressing the question of the title of this work, *Paepalanthus* ser. *Paepalanthus* (=*P.* [unranked] *Variabiles*) is quite morphologically diverse when viewed from the perspective of the large number of possibly unrelated species. However, within the series, we can detect some morphological uniformity that is a remarkable feature of most of all species and it is a factor that complicates the study of the group even more. Another factor is the imprecision of many collecting locations on type colletions, the high number of undetermined species in the herbaria, and the common misapplication of some names.

This study represented a first step in the attempt to revise the species of this group, essential for the understanding of *Paepalanthus,* since phylogenetic studies point to a new circumscription (see chapter 3). In a classification where *Paepalanthus* is recircumscribed in a stricter concept, the species that currently belongs to *Paepalanthus* ser. *Paepalanthus* will represent half of the genus, almost all of them restricted to Brazilian territory.

References

Costa, F. N.; Andrino, C. O.; Trovó, M. T.; Echternacht, L.; Paulo Takeo Sano. Three new micro-endemic species of *Paepalanthus* (Paepalanthoideae, Eriocaulaceae) from Serra do Ambrósio, Minas Gerais, Brazil (2016). *Phytotaxa* 247 (2): 118–126.

Giulietti, A. M., Harley, R. M. & Phillips, S. (1998). (1368) Proposal to change the type of *Paepalanthus*, nom. cons. (Eriocaulaceae). *Taxon* 47: 743–744.

Giulietti, A.M., Andrade, M.J.G, Scatena, V.L., Trovó, M., Coan, A.I., Sano, P.T., Santos, F.A.R, Borges, R.L.B. & van den Berg, C. (2012) Molecular phylogeny, morphology and their implications for the taxonomy of Eriocaulaceae. *Rodriguésia* 63: 1–19.

Giulietti1, A. M. & Miranda E. B. (2009). Five new taxa in Eriocaulaceae from the Chapada Diamantina of Bahia, Brazil. *Kew Bull.* Vol. 64: 525–536.

Hensold, N. (1988) Morphology and Systematics of *Paepalanthus* subgenus *Xeractis* (Eriocaulaceae). *Systematic Botany Monographs* 23: 1–150. Hensold, N. (1991) Revisionary studies in the Eriocaulaceae of Venezuela. Annals of the *Miss. Bot. Garden* 78(2): 426–440.

Hensold, N. (2016) The Andean *Paepalanthus* pilosus complex (Eriocaulaceae): a revision with three new taxa. *PhytoKeys* (64): 1-57.

Herzog, T. (1931). Neue und weniger bekannte Eriocaulaceae aus Nordbrasilien und dem angrenzenden Venezuela. *Feddes Rep.*, vol. XXIX). 202 213 Tab. CXX, CXXI

Koernicke, F. (1863) Eriocaulaceae. In: Martius, K.F.P. & Eichler, A.W. (eds.) Flora brasiliensis, vol. 3(1). *Typographia* Regia. Munique, pp. 271–508.

Koernicke, F. (1863). Eriocaulaceae in Martius, C.F.Ph. von, *Flora Brasiliensis München*, vol. III(1). 273 508 Taf. 38 63

Koernicke, F. (1871) Eriocaulaceae in Warming, E. (2), Symbolae ad floram Brasiliae centralis cognosendum, Particula IX Videsnk. *Medd. naturh. Foren.* P. 316.

Kunth, C. S. (1841). Eriocauleae. Pp. 498–539 in *Enumeratio Plantarum*, vol. 3. J. G. Cottae, Stuttgart.

Kuntze, O. (1891) *Rev. Gen. Leipzig*: Arthur Felix, vol. II. 746 p.

Martius, C. F. P. von. 1841. Herbarium Florae Brasiliensis, 24(2): 275. Monachii, *Typographia* Regia, München.

Martius, C.F.P. (1834) Die Eriocauleae als selbstständige Pflanzen-Familie aufgestellt und erläutert. Anales des Sciences Naturelles, *Botanique*, Sér. 22: 25–43.

Moldenke, H.N. (1937) Eriocaulaceae, *N. Amer. Flora*, vol. 19(1): 17 – 50

Moldenke, H.N. (1948) Eriocaulaceae in Maguire, B. et al., Plant explorations in Guiana in 1944, chiefly to the Tab.berg and the Kaieteur Plateau II *Bull. Torr. Bot. Cl.*, vol. 75.

Moldenke, H.N. (1972) Eriocaulaceae in Steyermark, J.A. & B. Maguire, The flora of the Meseta del Cerro Jaua Mem. *N.Y. Bot. Gard.*, vol. 23: 850 854

Moldenke, H.N. (1972) Four novelties from Brazil. *Phytologia*, vol. 24(5). 498 499.

Moldenke, H.N. (1974) Notes on new and noteworthy plants. *Phytologia*, vol. 29(2).

Moldenke, H.N. (1980) Notes on new and noteworthy plants. CXXXVII, vol. 45(6). 478 p.

Ruhland, W. (1903) Eriocaulaceae. in: Engler, A. (ed.), Das Pflanzenreich 4(3): 1–249. Wilhelm Engelmann. Leipzig, pp. 1–294.

Sano, P.T., Giulietti, A.M., Trovó, M., Parra, L.R. & Müller, G. (2010) Flora de Grão Mogol, Minas Gerais: Eriocaulaceae. Boletim de Botânica da Universidade de São Paulo 28: 125–140.

Silveira, A. (1908) Flora e serras mineiras. Imprensa Official. Bello Horizonte. 79 pp.

Silveira, A. (1928) Floralia montium. vol. 1. Imprensa Official. Bello Horizonte. 206 pp.

Suessenguth, K. (1942) Neue Pflanzen aus Costa Rica Bot. Jahrb. Syst., vol. 72). 293 – 294.

Thiers, B. (2018) Continuously Updated. Index Herbariorum: A Global Directory of Public Herbaria and Associated Staff. New York Botanical Garden's Virtual Herbarium.

Trovó, M. & Sano, P.T. (2010) Nomenclatural and taxonomic changes in *Paepalanthus* (Eriocaulaceae) from São Paulo and Minas Gerais, Brazil. *Kew Bull.* 65: 275–278.

Trovó, M., Andrade, M.J.G., Sano, P.T., Ribeiro, P.L. & van den Berg, C. (2013a) Molecular phylogenetics and biogeography of Neotropical Paepalanthoideae with emphasis on Brazilian *Paepalanthus* (Eriocaulaceae). *Bot. J. Linn. Soc.* 171: 225–243.

Trovó, M., Echternacht, L. & Sano, P.T. (2012a) *Paepalanthus sphaeroides*, a new species of Eriocaulaceae from the Atlantic Forest, Brazil. *Blumea* 57: 105–108.

Trovó, M., Echternacht, L., Sano, P.T. & Costa, F.N. (2013c) *Paepalanthus aleurophyllus*, a new species of Eriocaulaceae from Minas Gerais, Brazil. *Blumea* 58: 77–79.

Trovó, M., Echternacht, L.A. & Sano, P.T. (2011) *Paepalanthus hirtellus*, a new species of Paepalanthus subsection Actinocephaloides (Eriocaulaceae) from Minas Gerais, Brazil. *Phytotaxa* 15: 26–32.

Chapter 3

How big is *Paepalanthus*? A molecular phylogeny of the largest genus of Brazilian Monocots

Abstract

Paepalanthus (Eriocaulaceae) is the third largest genus of angiosperms and the largest among the monocotyledons occurring in Brazil. The genus is distributed mainly in South America and comprehends 404 species arranged in subgenera, with subtended sections, subsections, and series. Such complex infrageneric classification reflects its condition as an artificial grouping, showing great morphological diversity and encompassing other three genera within it, rendering the genus polyphyletic. In order to contribute for a better understanding of the circumscription of the genus, we performed a phylogenetic analysis based on molecular data from the plastidial *trnL-F* and nuclear ITS and ETS regions, using the widest taxa sampling ever performed for the group. Our results show that, to make it monophyletic, *Paepalanthus* must be recircumscribed in a stricter concept, and split into seven new genera. In this new sense, *Paepalanthus* now comprises 277 species, with its greater majority (245) restricted to the Brazilian territory.

Resumo

Paepalanthus (Eriocaulaceae) é o terceiro maior gênero de angiospermas e o maior dentre as monocotiledôneas ocorrentes no Brasil. O gênero é distribuído principalmente na América do Sul e compreende um total de 404 espécies organizadas em subgêneros, com seções, subseções e séries subtendidas. Esta complexa classificação infragenérica reflete a sua condição de agrupamento artificial, com grande diversidade morfológica e incluindo três outros gêneros alojados nele, tornando o gênero polifilético. A fim de contribuir para uma melhor compreensão da circunscrição do gênero, realizamos uma análise filogenética baseada em dados moleculares da região plastidial *trnL-F* e nucleares ITS e ETS, usando a maior amostragem já realizada para o grupo. Nossos resultados mostram que, para tornar o gênero monofilético, *Paepalanthus* deve ser recircunscrito num conceito mais estreito e dividido em sete novos gêneros. Nesse novo conceito, *Paepalanthus* passa a compreender 277 espécies, sua grande maioria (245) restrita ao território brasileiro.

Introduction

Ever since cladistic analysis became a landmark technique in comparative biology, obtaining phylogenetic hypotheses concerning relationships among plant groups has become a primary objective in the field of Botany. The establishment of robust phylogenetic foundations has enabled the elucidation of diversification patterns of major plant lineages and their underlying processes (Soltis *et al.* 1999; LPWG, 2017; Devecchi *et al.,* 2018). Ever since the advent of phylogenetic systematics, the classification of living organisms has become more consistent with their evolutionary relationships, and many groups previously circumscribed based only on morphological evidence could be re-examined and new classifications proposed (APG II, 2003; APG III, 2009; APG IV, 2016).

The family Eriocaulaceae comprises approximately 1400 species belonging to 10 genera distributed throughout the tropical regions of the world (Giulietti e Hensold, 1990; Hensold, 2017). Phylogenetic studies of the family began approximately 20 years ago – almost 100 years after the last taxonomic revision (Ruhland 1903) that presented the current classification. As infrafamiliar taxa began to be examined in terms of their phylogenies, it became clear that the traditional classification was not consistent with the evolutionary relationships within the group. Ruhland (1903) recognized two subfamilies in Eriocaulaceae: Eriocauloideae and Paepalanthoideae. Eriocauloideae comprises the genera *Eriocaulon* L. and *Mesanthemum* Körn., representing nearly 600 species. Paepalanthoideae comprises the other genera (six defined by Ruhland, and eight currently recognized). Although some taxonomic ajustments have been made to improve generic delimitations within Eriocaulaceae [e.g. *Comanthera* L.B. Sm. (Parra *et al.*, 2010), *Syngonanthus* Ruhland (Giulietti *et al.*, 2012), *Actinocephalus* (Körn.) Sano (Sano, 2004; Costa & Sano, 2013)], the largest genus of the family, *Paepalanthus* Mart., remains paraphyletic and its evolutionary history is still poorly understood.

Recent progress in molecular phylogenetic analyses (Andrade *et al.* 2010; Giulietti *et al.* 2012; Trovó *et al.* 2013) resulted in the establishment of a stable topology within the family, providing an updated classification of some genera such as *Blastocaulon* Ruhland being synonymized into *Paepalanthus* (Andrade *et al.* 2011), reestablishing *Comanthera* (Parra *et al.*, 2010), and *Philodice* Mart. combined as a synonym with *Syngonanthus* (Giulietti *et al.*, 2012). The relationships within *Paepalanthus,* and with the other genera of the subfamily are still unclear mainly because of lack of resolution in most phylogenies generated. Another factor that precludes a better understanding of such relationships is the insufficient taxonomic and geographic sampling of *Paepalanthus* and allied genera in phylogenetic studies.

Paepalanthus, as currently circumscribed comprises 404 species, with most of its diversity encountered in South American, with few species in Central America and Africa, and is the largest monocot genus in Brazil (BFG, 2015). However, the genus is clearly polyphyletic, as demonstrated by early phylogenetic analyses were based on just a few morphological characters (Giulietti, 1995), and further confirmed in all recent phylogenetic studies (Giullieti *et al.* 2000; Unwin, 2004; Andrade *et al.* 2010, Giuietti *et al.*, 2012; Trovó *et al.* 2013). *Paepalanthus* is divided into five subgenera, four sections, six subsections, and five series (Ruhland, 1903; Hensold, 1991), but most of all have been shown to be polyphyletic. Among those 20 infrageneric categories, only three subgenera, one section, and two subsections have been reviewed (Hensold, 1988; Tissot-Squalli, 1997; Trovó, 2010; Hensold *et. al.* 2016; Trovó *et al.*[in press]), representing only approximately 20% of the species. However, there is no strong evidence that any of those revised groups are monophyletic.

As currently circumscribed, *Paepalanthus* is characterized by a (usually) hairy capitulum, the absence of lateral branches (paraclades), pistillate flowers with free petals, and stigmatic and nectariferous branches inserted at the same point on the style (Koernicke 1863, Ruhland 1903, Sano 2004). In a certain sense, the genus can be defined by the absence of characteristics present in other genera of the family (although with some exceptions), for example *Actinocephalus*, characterized by the presence of paraclades, and *Leiothrix*, defined by stigmatic and nectariferous branches inserted at different points on the style. *Paepalanthus* encompasses broad morphological variations (Fig. 1) of both vegetative and reproductive organs, and many of these features are more similar to other genera than to species within *Paepalanthus.*

In some phylogenies, *Paepalanthus* species grouped with three others genera: *Tonina*, a monospecific genus defined by the reduction of its pistillate flower petals; *Lachnocaulon*, a group of seven species restricted to North America and characterized by the complete reduction of the petals of the pistillate and staminate flowers; and *Actinocephalus*, a former section of *Paepalanthus* that received generic status due to the presence lateral branches (paraclades) supporting many inflorescences, with an umbellate arrangement of capitula (Giulietti e Hensold, 1990; Sano, 2004). *Actinocephalus* was subsequently re-circumscribed to include species from another section of *Paepalanthus* (*P.* subsect. *Aphorocaulon* Ruhland), which have a single scape or numerous scapes in an umbellate arrangement (Costa & Sano, 2013). In addition, *Paepalanthus sensu stricto*, a strongly-supported but largely unresolved clade that contains most species of the genus, has been frequently recovered in recent phylogenetic studies as isolated from other *Paepalanthus* lineages (Andrade *et al.* 2010, Giulietti *et al.*, 2012; Trovó *et al.*, 2013).

The relationships of *Paepalanthus* with those genera, as well as the relationships within *Paepalanthus senso strictu* remain unclear. In order to and retain *Paepalanthus* as monophyletic genus, Andrade *et al.* (2010) suggested merging all *Paepalanthus* lineages plus the three other closely related genera (*Actinocephalus*, *Lachnocaulon* and *Tonina*) into *Paepalanthus sensu lato*. Trovó (2013) pointed out that this decision would be premature since there is no strong evidence for merging all those groups together. Another possibility of generic rearrangement would be to split *Paepalanthus* into several segregated genera, but this option was also rejected by that author due to lack of morphological and phylogenetic evidence. In fact, prior to any taxonomic change in the group, it is vital to improve the resolution of the phylogenetic hypotheses regarding *Paepalanthus* and closely related genera, and also to include morphologically, taxonomically, and geographically relevant species into the phylogeny. Such analyses would provide more robust evidence for generic rearrangements in *Paepalanthus* based on the delimitation of the main lineages and definition of their associated morphological synapomorphies. Studies on the diversification history of the genus, using a comprehensive sampling from all distribution areas of the group, would also shed light on the evolution of the neotropical monocotyledons that inhabit open areas, as well as provide the foundations for an updated classification of this large genus.

Within that context, we sought to generate the most comprehensive phylogenetic evidence to date for *Paepalanthus* (and related taxa) by significantly increasing the taxonomic and geographic sampling of the genus, and improving the resolution of the phylogeny after the inclusion of a variable nuclear locus (nrETS). We included a broad taxonomic and geographic sampling, including representatives of highly diverse and poorly sampled groups, as well as species from the Andes, Amazonia, and Central America, which enabled us to identify the main lineages within *Paepalanthus* and confirm some relationships already reported in the literature. This robust new phylogenetic hypothesis served the basis for generic rearrangements required in *Paepalanthus,* and provide the foundation for further studies on this diverse group of neotropical monocots.

Materials and methods

Taxa sampling — A total of 242 species (672 accessions) were included in the phylogenetic analyses. The ingroup was composed of 210 species belonging to *Paepalanthus*, *Actinocephalus, Lachnocaulon,* and *Tonina.* We sampled 193 species of *Paepalanthus* (50% of the currently recognized species), covering most of the morphological diversity and the geographical distributions found in the genus.

Representatives of all subgenera, including their type species, were sampled: two species of *P.* subg. *Thelxinöe* Ruhland (100%), 14 species of *P.* subg. *Xeractis* Körn. (50%), 29 species of *P.* subg. *Platycaulon* Mart. (70%), nine species of *P.* subg. *Monosperma* Hensold (40%), and 139 species of *P.* subg. *Paepalanthus* (60%). Most of the sampled species of *Paepalanthus* (70%) are restricted to Brazil, 30 are restricted to Andean mountains, and five to Central America and Caribean. Three species of *Lachnocaulon* (50%) were sampled, 12 of *Actinocephalus* (25%), and one of *Tonina* (100%), as well as species of *Comanthera*, *Leiothrix*, *Rondonanthus* and *Syngonanthus* as outgroups.

DNA extraction and amplification — Total DNA was isolated from silica-dried or herbarium specimen leaf samples and extracted using a modified version of the Cetyl trimethylammonium bromide (CTAB) protocol (Doyle & Doyle 1987). Three molecular fragments were selected: the plastid *trnL-F* region (*trnL* intron and *trnL-F* spacer), the internal transcribed spacer of 18S-26S nuclear ribosomal DNA (ITS), and the external transcribed spacer of nuclear ribosomal DNA (ETS). The *trnL-F* and ITS loci have been widely used in phylogenetic studies in Eriocaulaceae (Andrade *et al.* 2010, Giulietti *et al.* 2012; Trovó *et al.*2013, Tannure *et al.*, 2013; Díaz *et al.,* 2016), while ETS is used for the first time in the family.

Amplification of *trnL-F* was carried out in two PCR reactions using the "C"/"D" and "E"/"F" universal primers (Taberlet *et al.*, 1991) in 30µL solutions containing 1µL of total DNA, 6µL of specific Buffer GoTaq DNA polymerase (Promega), 2.4µL of MgCl2, 2.4µL of dNTPs (at 5mM), 2.4µL of bovine serum albumin (BSA), 1.8µL of each primer (at 5mM), and 0.2µL of Taq DNA polymerase (Ludwig Biotec, Rio Grande do Sul, Brazil).

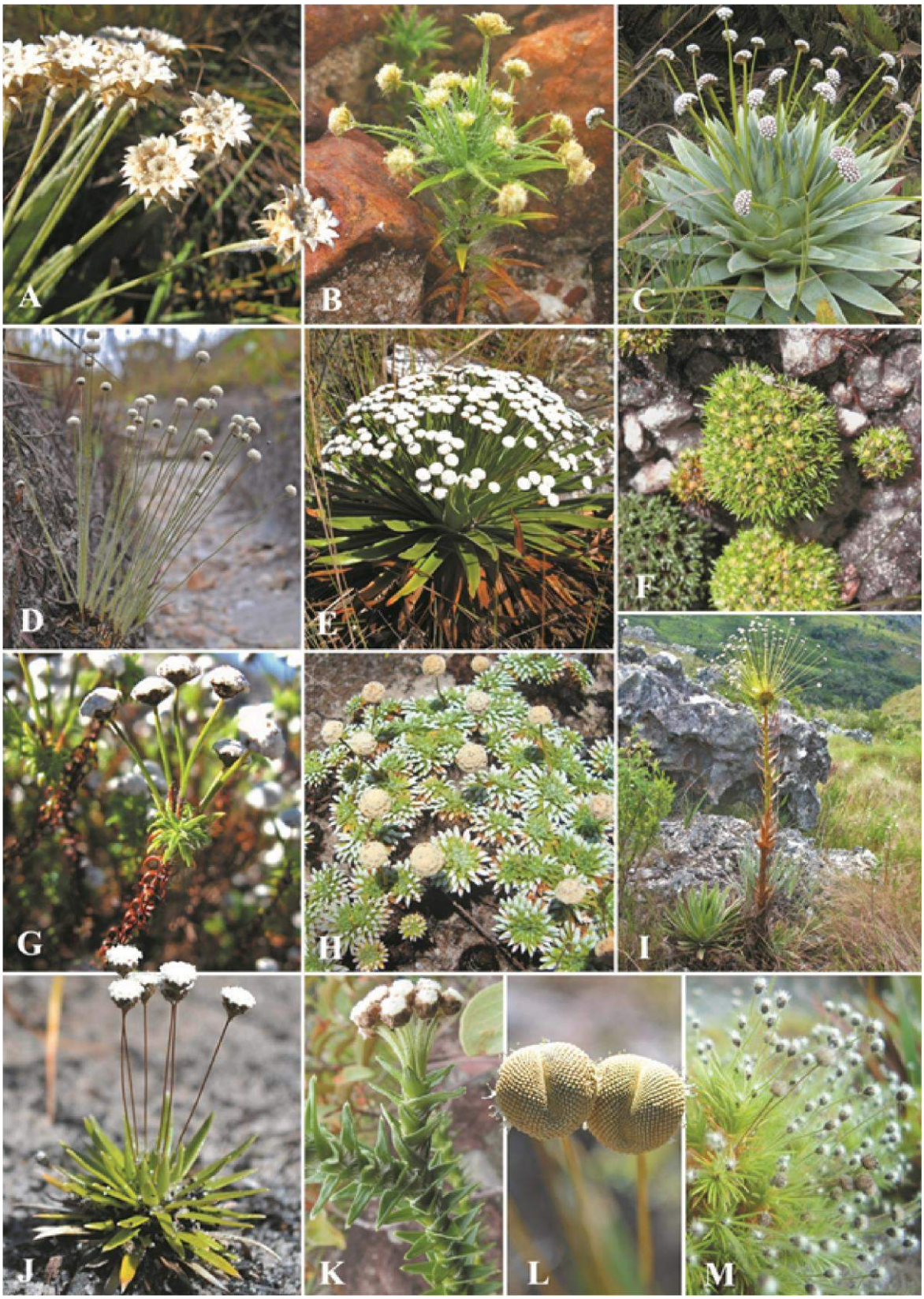


Fig. 1. Representative species of *Paepalanthus* Mart. as currently circumscribed. A: *Paepalanthus argenteus*; B: *Paepalanthus bifidus*; C: *Paepalanthus bromelioides*; D: *Paepalanthus sphaerocephalus*; E: *Paepalanthus eriophaeus*; F: *Paepalanthus leucocephalus*; G: *Paepalanthus microphyllus*; H: *Paepalanthus aretioides*; I: *Paepalanthus chiquitensis*; J: *Paepalanthus pulchellus*; K: *Paepalanthus sp. nov.*; L: *Paepalanthus regalis*; M: *Paepalanthus bryoides*.

The PCR reactions for nuclear regions were conducted using solutions containing 0.2µL Taq DNA polymerase (Ludwig Biotec, Rio Grande do Sul, Brazil), 1.5µL of Buffer (5x Gotaq Promega), 1.2µL of dNTP (2.5 mM), 1.2µL of bovine serum albumin (BSA), 0.45µL of each primer (5µM), 0.45µL of MgCl2 (50mM), 3.9µL of betaine (5 M), 4.5µL ddH2O, and 1µL of template DNA. The PCR profile reactions are described in Table 1. Primers to amplify the ITS and ETS regions were developed for this study and areare detailed in the following sections.

Table 1. PRC reaction profile for amplification of three loci.

Region	Initial denaturation temp./time	Denaturation temp./time	Annealing temp./time	Extension temp./time	Final extension	Number of cycles
trnL-F	92ºC / 2 min	92ºC / 30 sec	52ºC / 40 sec	72ºC / 40 sec	72ºC / 7 min	35
ITS	92ºC / 2 min	92ºC / 1 min	56ºC / 1 min	72ºC / 40 sec	72ºC / 7 min	40
ETS	95ºC / 2 min	95ºC / 20 sec	54ºC / 40 sec	72ºC / 1 min	72ºC / 7 min	35

Development of ITS primers for **Paepalanthus** — We successfully amplified ITS sequences from 102 samples using the universal primers 18D and 28CC (Hillis & Dixon, 1991). Failed amplifications were primary due to mixed PCR products caused by fungus and laboratory contaminants co-amplifying with legitimate *Paepalanthus* rDNA, poor DNA templates from herbarium specimens, as well as primer incompatibilities. For this reason, specific primers were developed for ITS1 and ITS2.

The new "forward" primers were designed in the 5´ portion of ITS1 (near the conserved 18S rDNA region – Fig. 5) and the 3´ portion of ITS1 (near the conserved 5.8S rDNA region). Similar "reverse" primers were designed for ITS2. The primers were chosen with near total identity among *Paepalanthus*, particularly in terms of the last few bases, with as much conservation as possible among the Eriocaulaceae species. Therefore, several *Paepalanthus* sequences were aligned with other Eriocaulaceae and other unrelated genera, and the new primers developed proved to be useful to eliminate mixed products.

We used combinations of a group-specific primer with a universal primer for the PCRs. For ITS1, this was an ITS2-anchored primer near the 5.8S region (ITS2-Paep-R2) with a universal primer in the 18S region (18D). The converse was used for ITS2 (ITS1-Paep-F2 + 28CC – Fig. 5). The specific primers near the 18S and 28S regions were not needed. The PCR cycling conditions used were: 95 °C for 2 mins, then 35 cycles of 95 °C for 20 secs, 54 °C for 40 secs, and 72 °C for 1 min,

followed by 7 minutes at 72 °C. There were no reports from previous studies of parallel copies of ITS that warranted further attention in the fragment amplification process.

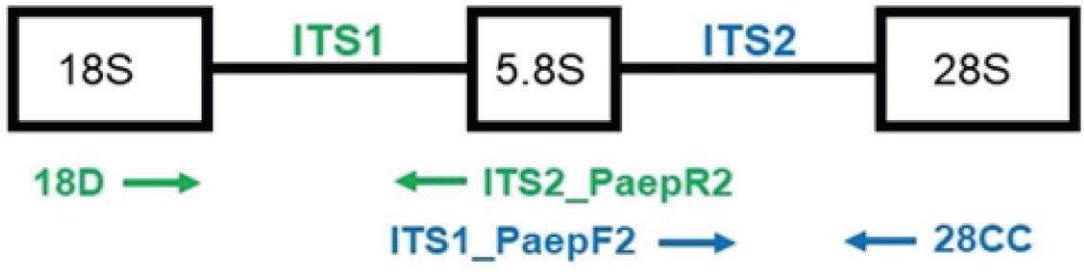


Fig. 2. Structures of ribosomal internal transcribed spacer regions ITS-1 and ITS-2, showing where the specific primers (ITS2-Paep-R2 and ITS1-Paep-F2) were developed.

Development of ETS primers for Paepalanthus — Strategy: Initially, the full ribosomal RNA intergenic spacer region (IGS – Fig.2) between the 28S rRNA and 18S rRNA genes was amplified and sequenced using universal primers anchored in the 3′ portion of the 28S rRNA and the 5′ portion of the 18S rRNA.

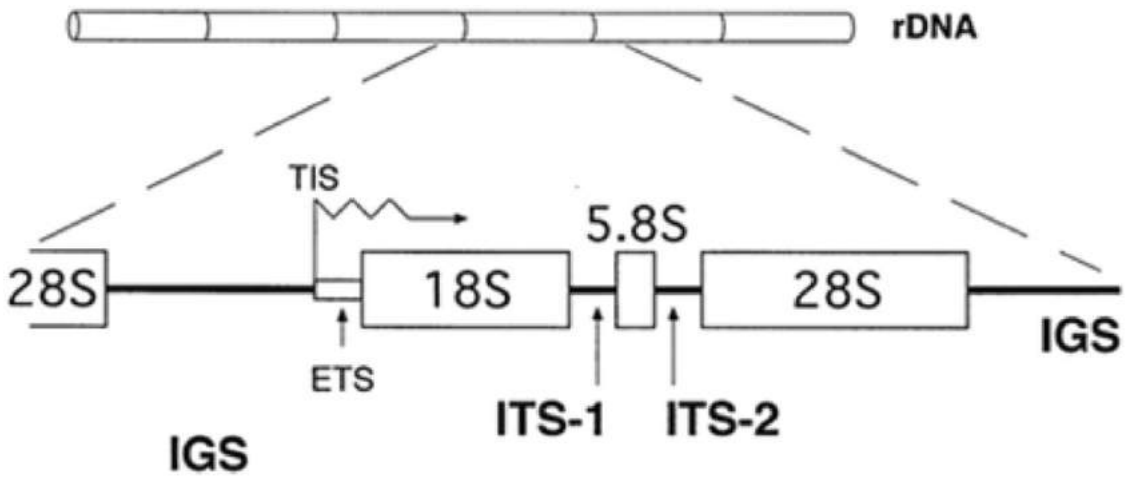


Fig. 3. Organization of the repeating ribosomal RNA genes in rDNA (modified from Polanco *et al.* 1998). The 28S, 18S, and 5.8S boxes indicate rRNA genes; IGS = intergenic spacer region; ETS = external transcribed spacer; ITS-1 and ITS-2 = internal transcribed spacer regions; TIS = transcription initiation site.

The ETS-18S primer (5′-CTGTGAAACTGCGAATGGCTC-3′; Wright *et al.*, 2001) was chosen because of its identity with the conserved 5′ portion of the 18S rRNA gene of *Eriocaulon septangulare* (obtained from Genbank, accession number: AY952402) and the possibility of nested PCR with other internal primers such as 18SE (=ETS-A) and ETS18S-N.

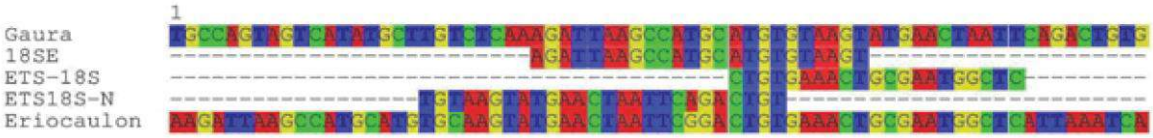


Fig. 4. Alignment of the 5′ portion of the *Eriocaulon septangulare* 18S rRNA gene with available 18S primers designed for the amplification of both IGS and ETS regions.

The universal 28S-IGS primer (Baldwin & Markos, 1998; 5′-GGATTGTTCACCCACCAATAGGGAACGTGAGCTG-3′), which was designed to anneal to the conserved 3′ portion of the 26S rRNA gene, was also chosen.

A first test using standard PCR was performed with DNA from eight different *Paepalanthus* species using a program consisting of exposure to 95 °C for 2 mins, then 35 cycles of 95 °C for 20 secs, 54 °C 40 secs, 72 °C for 2 mins, followed by 7 minutes at 72 °C. Agarose gel electrophoresis of the PCR products revealed amplification of a single band of approximately 650 bp in five species. This amplicon size is much smaller than expected for full-length IGS but, after sequencing it, we found that it corresponded to ETS sequences from other monocotyledons, as verified by BLASTn searches of the NCBI Genbank. Alignment of the sequences obtained with ETS sequences from several related genera revealed that the long 28S-IGS primer had serendipitously annealed near the transcription initiation site (TIS; Fig.2) of the ETS. The ETS-18S primer annealed in the expected position. We then designed two ETS primers near to the end of the binding site of the 28S-IGS primer (ETS-Paep1: 5′-GACCCTGCGGGCCCCCTG-3′ and ETS-Paep2: 5′-CCCCCTGCTATTGAGCAGC-3′) that were conserved among the five *Paepalanthus* ETS sequences and possessed as many conserved bases as possible among some of the other aligned monocotyledonous plants. The two ETS primers would thus make nested PCR possible, if required, in combination with alternative 18S rRNA primers.

We first tested the primer combinations ETS-Paep1 and ETS-18S. The PCR cycling conditions used were 95 °C for 2 mins, then 35 cycles at 95 °C for 20 secs, 54 °C for 40 secs, and 72 °C for 1 min, followed by 7 minutes at 72 °C. This primer pair produced a very high rate of PCR success among *Paepalanthus* samples, including many herbarium-derived samples, where single bands of the expected size of approximately 550 bp were amplified. The PCR products sequenced easily under standard conditions.

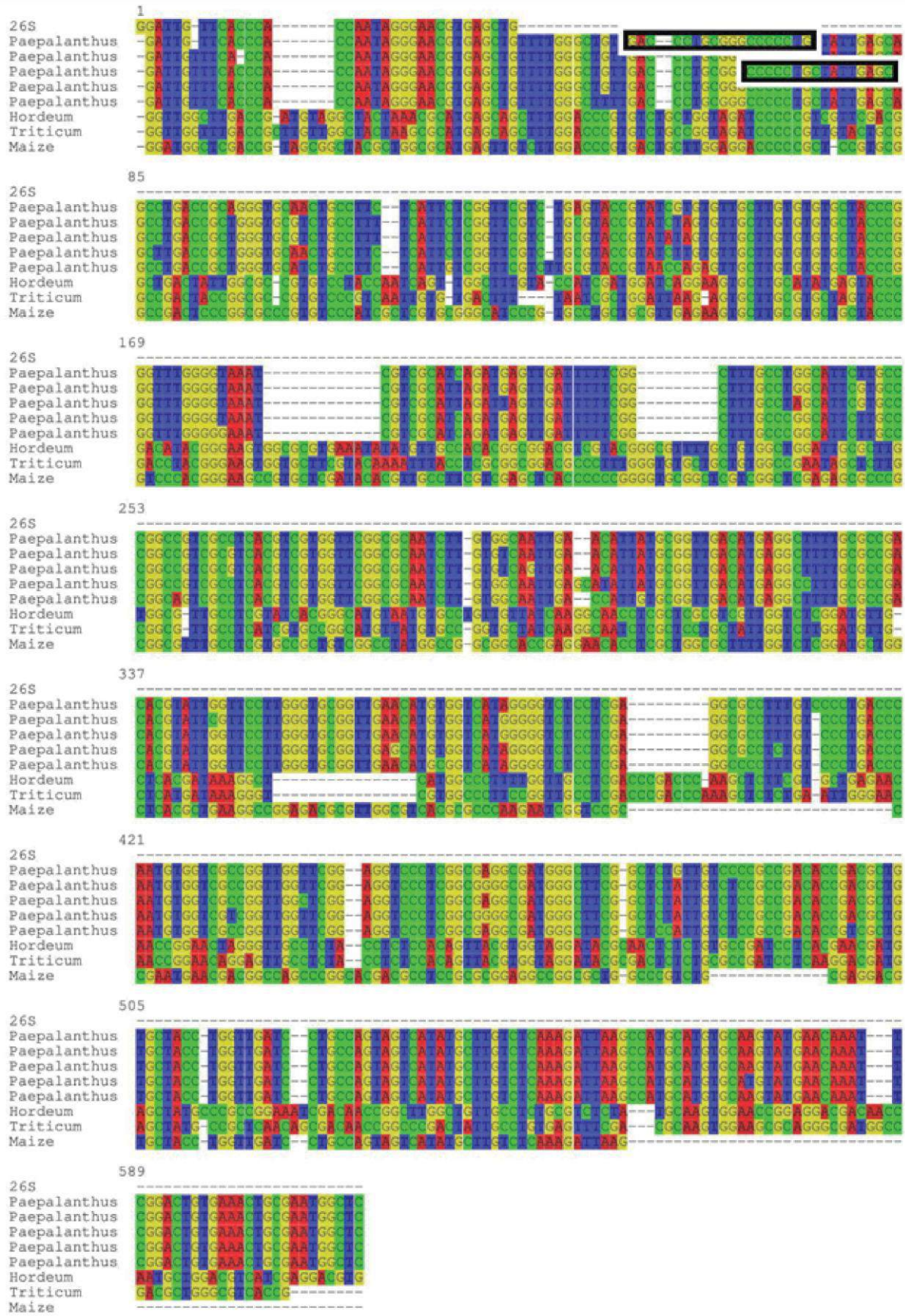


Fig. 5. Alignment of the 28S-IGS primer with *Paepalanthus* IGS sequences and ETS sequences obtained from three monocot genera. The designed primers are black-highlighted.

Table 2. List of primer sequences used for amplification and sequencing of DNA fragments

Fragment	Primer name	Sequence (5'–3')	Reference
TrnL-F	C	CGAAATCGGTAGACGCTACG	Taberlet *et al.* 1991
	D	GGGGATAGAGGGACTTGAAC	Taberlet *et al.* 1991
	E	GGTTCAAGTCCCTCTATCCC	Taberlet *et al.* 1991
	F	ATTTGAACTGGTGACACGAG	Taberlet *et al.* 1991
ITS 1	18S (18D)	CACACCGCCCGTCGCTACTACCGATTG	Hillis & Dixon, 1991
	ITS2-Paep-R2	CGTGGGAGCGCTACTTGGAA	This study
ITS 2	ITS1-Paep-F2	TCTCGGTGCCACTCCGTGAG	This study
	28CC	CGCCGTTACTAGGGGAATCCTTGTAAG	Hillis & Dixon, 1991
ETS	ETS-18S	CTGTGAAACTGCGAATGGCTC	Wright *et al.* , 2001
	ETS-Paep1	GACCCTGCGGGCCCCCTG	This study
	ETS-Paep2	CCCCCTGCTATTGAGCAGC	This study

DNA sequencing and alignments — To remove the excess dNTPs and PCR primer products, Exonuclease (EXO) and Shrimp Alkaline Phosphatase (SAP) (1:10) were mixed with Tris Buffered Saline (pH 8); 2 µl was subsequently added to all PCR-products (Exosap; USB Corp., Cleveland, Ohio, USA). EXOSAP reactions were run at 37°C for 45 min and at 80°C for 20 min. The 10µL sequencing reactions contained 6.2 µL of sterile water, 1.8 µL of 5X Big Dye buffer, 0.5 µl of Big Dye Terminator 3.1, 0.5 µL of each primer, and 1 µL of the DNA template. The final product of the cycle sequencing and purification was sequenced on an ABI 3730XL DNA sequencer (Applied Biosystems) at the Laboratório de Genética Vegetal (Embrapa Recursos Genéticos e Biotecnologia). Complementary sequences were assembled and the chromatograms were edited using Geneious R7 (Biomatters Ltd.). Alignments were performed using MAFFT v.6 (Katoh & Toh, 2008), followed by manual adjustments in Bioedit (Hall 1999).

Phylogenetic analysis — A total of 551 new sequences of three molecular regions were generated during this study. Additionally, 124 sequences from published EMBL/GenBank accessions derived from three other studies (Andrade *et al.* 2010; Trovó *et al.* 2013; Díaz 2016) were aslo used in the analyses. Multiple sequences per species that clustered together were reduced to a single terminal in the final analysis. Full species names and authorities, voucher information (Appendix 1) and GenBank accession numbers (Appendix 2) of all samples are provided in the Appendix.

Alignments of individual molecular fragments were concatenated to generate five taxa data sets: 1) the *trnL-F* matrix of newly generated sequences and sequences from Genbank; 2) the ITS matrix of newly generated sequences and sequences from GenBank; 3) the ETS matrix; 4) the nuclear matrix, including nuclear regions ITS and ETS; and, 5) matrix of all the concatenated data (t*rnL-F*+ITS+ETS), including newly generated sequences and sequences available in GenBank. For concatenated analysis, only samples with at least one nuclear loci were selected. Aligned matrices of DNA regions were combined using SequenceMatrix version 1.7 (Vaidya G., Lohman D.J., Meier R., 2011). Indels were coded as missing data ('–').

Bayesian Inference (BI) and Maximum Likelihood (ML) methods were used for phylogenetic reconstruction. Partioned BI analyses were performed using MrBayes version 3.2.3 (Ronquist *et al.* 2012), with DNA substitution models selected for each gene partition using the Bayesian information criterion (BIC) on jModeltest version 2 (Posada 2008). The best-fit models used for each DNA region are listed in Table 3. Markov Chain Monte Carlo (MCMC) analyses were run on MrBayes for 10,000,000 generations for each dataset, with each run comprising two incrementally heated chains. The BI analyses were started with a random tree and sampled every 1000 generations. The first 25% of the trees were discarded as burn-ins, and the remaining trees were used to generate a majority-rule consensus tree. Clades with posterior probability values (PP) ≥ 0.95 were considered well-supported (Alfaro *et al.*, 2003; Erixon *et al.*, 2003; Kolaczkowski and Thornton, 2007). ML tree searches and bootstrap estimations of clade support were conducted with RAxML (Stamatakis, 2006) using the GTR substitution model with gamma-distributed rate heterogeneity among sites and the proportions of invariable sites estimated from the data. For the ML analyses, bootstrap support (BS) ≥ 75 % were considered thresholds for strongly-suported clades (Hillis & Bull, 1993). Both BI and ML analyses, as well as jModeltest, were performed at the CIPRES Science Gateway (Miller *et al.*, 2010; http://www.phylo.org).

Results

A total of 672 sequences of three molecular regions, including 551 sequences generated during this study, were gathered. Varition in sample number in data matrices was due to differences in amplification success and the number of sequences available in GenBank for each locus. Proportionally ITS produced larger number of variable characters, while *trnL-F* presented lowest nucleotide variation (Table 3).

Table 3. Summary statistics for the datasets used for phylogenetic inference

Matrix	Species	Samples	Aligned length (bp)	Best-fit model (AIC criterion)	Variable DNA sites (%)
trnL-F	222	304	1218	TVM + G	32.6
ITS	150	206	858	GTR + I + G	62.9
ETS	129	162	553	GTR + I + G	61
Combined ITS+ETS	185	263	1455	-	61.9
Combined *trnL-F*+ITS+ETS	202	256	2682	-	50.4

Preliminary analyses identified inconsistencies in the phylogenetic position of five sequences downloaded from GenBank, which did not group with other samples of the same taxa. Because such issues were difficult to address without access to the chromatograms, we excluded them from the analyses. This was the case with *Paepalanthus almasensis* (GI: 218551983), *Paepalanthus lamarckii* (GI: 218551818); *Paepalanthus polygonus* (GI: 307149472), *Paepalanthus repens* (GI: 218551911), and *Paepalanthus sphaerocephalus* (GI: 218551842).

Analyses based on single loci were largely congruent with each other and with the combined analyses (Supplementary Data Figs. S1 to S5), although the *trnL-F* yielded poorly resolved topologies when analyzed alone. Therefore, the topology derived from the three-marker phylogeny (Fig. 6) will serve as the basis for all discussion presented in the text (unless otherwise indicated). A total of 36 clades with high support (PP>0.95; BS>80) were recovered in the three-marker analysis, of which 26 are discussed in detail (Table 4). Most of these clades also received strong support from individual and combined nrDNA analyses (ITS+ETS), although many of them were not recovered in the plastid *trnL-F* analysis.

In all analyses, *Paepalanthus,* as currently circumscribed, was not recovered as monophyletic because *Actinocephalus*, *Lachnocaulon,* and *Tonina* are nested within it. Relationships among early diverging clades within the ingroup (clades B, C, O, P) are unclear since nodes received low support. The strongly supported clade formed by *Paepalanthus bifidus* and *Paepalanthus sessiliflorus*, which appeared as monophyletic in all analyzes, except for ETS for which sequences could not obtained due to difficulties in PCR amplification.

A large and morphologically diverse clade representing species of *Paepalanthus* with wide geographic distributions, as well as three other genera of Eriocaulaceae: *Actinocephalus, Lachnocaulon*

and *Tonina* (clade C; Fig. 6), and. *Tonina* and *Lachnocaulon* (clade D; Fig. 6), which share the absence of petals in pistillate flowers, appeared as sister groups in a strongly supported clade in all analyses, but their relationships with other groups are not yet clear. A clade formed by Cuban species *Paepalanthus nipensis* and *Paepalanthus pungens* (clade E; Fig. 6) was also recovered. *Paepalanthus tortilis*, *Paepalanthus obtusifolius*, and *Paepalanthus lamarckii* formed a monophyletic group (clade F), which is sister to a larger group that contains clades G-N (Fig. 6); both share the same caulescent habit and show broad distribution in South America. Clades G-N include eight strongly-supported groups with high morphological correspondence. Those clades were recovered in all combined analyses, and in separate analyses of the nuclear loci. Species of clade H (Fig. 6) were not sampled in previous phylogenies, and some species of clades G, J, and M (Fig. 6) had already been sampled, but with no resolution (Andrade *et al.*, 2010; Trovó *et al.* 2013). The genus *Actinocephalus* (clade K; Fig. 6) appeared as non-monophyletic with *Paepalanthus camptophyllus* and *Paepalanthus macrocephalus* nested within it. Clade N corresponds to *Paepalanthus* sect. *Diphyomene* Ruhland but also included *Paepalanthus canescens* var. *atratus*. Other samples of *Paepalanthus canescens* not belonging to var. *atratus* gruped with the distantly related clade T (Fig. 6).

A large clade designed here as *Paepalanthus* sensu stricto (clade P, Fig. 6) comprises only *Paepalanthus* species, and is formed by a several strongly-supported clades but with low internal resolution (clades R-Z). The main novelties in clade P (*Paepalanthus* s. s.) were the monophyly of *Paepalanthus* subg. *Platycaulon* (clade Z; Fig. 6), clade V and clade S (Fig. 6). Some of these clades are morphologically distinct: *Paepalanthus* subg. *Platycaulon* (clade Z), which has totally or partially united scapes; clade V can be distinguished by the dichotomous branching of its stems; and clade S by its elongated stems with the terminal inflorescences in umbels. The *Peapalanhus* s.s. clade appeared as sister to subg. *Monosperma* (clade O; Fig. 6), however, with low support.

Table 4. Support values (PP / BS) for 26 clades derived from individual and combined Bayesian an ML analyses of plastid (*trnL-F*) and nuclear (ITS, ETS) loci. Informal names were given to particular clades that corresponded to infrageneric taxa or genera. Clades assigned as – are not present in that analysis.

DNA Region / CLADES	***trnL-F***	**ITS**	**ETS**	**ITS+ETS**	**ITS+ETS+*TrnL-F***
A	1 / 97	1 / 100	1 / 74	0.60 / 100	1 / 100
B	Not sampled	1 / 100	Not sampled	0.86 / 100	1 / 100
C	0.77 / 44	0.85 / 100	0.96 / 71	0.97 / 100	1 / 99
D	1 / 100	–	1 / 100	– 100	1 / 100
E	1 / 78	1 / 100	1 / 100	1 / 100	1 / 100
F	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100
G / Dyostiche	–	1 / 100	–	1 / 98	1 / 100
H / Cryptantella	–	1 / 98	1 / 100	1 / 100	1 / 100
I	–	1 / 97	1 / 100	1 / 100	1 / 100
J / Conodiscus	1 / 85	1 / 100	1 / 100	1 / 100	1 / 100
K / Actinocephalus	0.51 / 60	0.95 / 52	0.99 / 94	0.99 / 80	0.99 / 81
L	1 / 66	–	–	–	0.99 / 81
M / Dimeri	–	0.99 / 99	0.99 / 78	1 / 95	1 / 96
N / Diphyomene	–	1 / 99	0.99 / 99	1 / 96	1 / 98
O / Monosperma	1 / 100	1 / 100	–	0.99 / 100	1 / 100
P / Paepalanthus s.s.	0.79 / 34	0.63 / 39	0.99 / 52	1 / 55	1 / 100
Q	–	0.99 / 76	0.90 / 81	1 / 94	1 / 95
R	–	0.84 / 34	0.87 / 60	0.99 / 15	0.98 / 85
S	–	0.99 / 100	1 / 99	1 / 99	1 / 100
T	–	– 35	0.74 / 36	0.99 / 75	0.87 / 48
U	–	0.70 / 85	0.80 / 47	1 / 86	0.97 / 52
V	–	0.80 / 82	1 / 93	1 / 84	1 / 91
X	–	1 / 99	1 / 99	1 / 100	1 / 99
Y	–	1 / 91	1 / 97	1 / 99	1 / 100
W	–	0.99 / 98	0.99 / 87	0.99 / 84	1 / 99
Z	–	0.99 / 91	0.73 / 37	0.99 / 94	0.99 / 91

Discussion

The phylogenetic analyses presented here achieved our principal goal of providing a robust phylogenetic hypothesis for *Paepalanthus*, and the identities and inter-relationships of many clades within the genus are well-resolved here for the first time. Our results provide new insights into long-standing taxonomic problems encountered in the genus. The taxonomic concepts of Ruhland (1903)

traditionally used in the classification of the *Paepalanthus* were found to be widely incongruent with the results of our phylogenetic analyses of molecular sequence data. The present study therefore encourages a new way of looking at the morphology of *Paepalanthus*, which has been anchored by Ruhland's (1903) concepts for more than a century.

Some relationships reported in earlier phylogenies (Andrade *et al.* 2010; Trovó *et al.* 2013; Dìaz, 2016) were confirmed here, such as the deep division of *Paepalanthus* s.l. into two major lineages, one of which is composed of three other genera in addition to *Paepalanthus*. However, the increased taxonomic and geographic sampling and the inclusion of a new nuclear locus brought greater resolution and support within these two major lineages, unraveling new relationships and morphologically coherent clades.

Taxonomic sampling increased from 94 species (73 of *Paepalanthus*) in the most recent phylogeny (Trovó *et al.*2013) to the present total sample of 242 species (193 of *Paepalanthus*).

The genus has been recovered as polyphyletic since the earliest phylogenetic studies, irrespective to the methodological approach adopted (Giulietti *et al.*, 1995; Giulietti *et al.*, 2000; Andrade et. al, 2010; Giullieti *et al.* 2012, Trovó et al, 2013). The existence of a clade that includes *Actinocephalus*, *Lachnocaulon*, *Tonina*, and part of *Paepalanthus* is also not new, but the relationships of those groups to each other, and the recovery of a number of well-supported clades in that lineage represent a significant progress in terms of previous phylogenies. Some of these clades broadly correspond to infrageneric groups proposed for *Paepalanhtus* (Ruhland, 1903; Hensold, 1991; Hensold, 2016), and were named accordingly.

The main clades recovered here include: *Paepalanthus s.l.* which includes all species currently assigned to *Paepalanhtus*, as well as *Actinocephalus*, *Lachnocaulon*, *Tonina* (clade A); the clade Dyostiche (clade G), comprising species of *Paepalanthus* with unique branching patterns; the clade Cryptantella (clade H) composed of cushion-plant species of *Paepalanthus* from the Andean paramos and southern Brazil; the clade Conodiscus (clade J), comprising dimerous species with a gynoecium without nectariferous branches; the clades Actinocephalus (clade K), Dimeri (clade M), and Diphyomene (clade N), corresponding to the genera *Actinocephalus*, *Paepalanthus* ser. *Dimeri* (Ruhland) Giul., and *Paepalanthus* sect. *Diphyomene* respectively; the clade composed strictly of species of *Paepalanthus*, here designated *Paepalanthus s.s.* (clade P); and the clade Monosperma (clade O), comprising species of *P.* sug. *Monosperma*, endemic to the Tepuis. More detailed information on major clades recovered is presented in the following sessions.

Paepalanthus sensu lato clade

Although strongly supported in nearly all analyses, the relationships among early diverging clades within *Paepalanthus s.l.* (clade A) remain unclear. The clade formed by *Paepalanthus bifidus* + *Paepalanthus sessiliflorus* (clade B) is sister to all remaining *Paepalanthus s.l.*, but with low support value (PP=0.86, BS=80). These two species had not been sampled in previous phylogenetic studies. Andrade *et al.* (2010) excluded samples of those species from their work, arguing that their phylogenetic position were inconsistent in the analyses, while Trovó *et al.* (2013) likewise did not include them, justifying that decision based on the fact that their nucleotide substitution rates were distinctly higher, which implied long-branch attraction problems. However, those two species emerged together in our analyses, with strong support.

The remaining species of *Paepalanthus s.l.* are split into three major clades, C, O and P. Within clade C, the species from Cuba, which likewise had not yet been previously sampled, *Paepalanthus nipensis* + *Paepalanthus pungens*, formed a monophyletic group (clade D) with very strong support, indicating that *Paepalanthus* species from Central America may be closer to *Lachnocaulon* and *Tonina* than to other *Paepalanthus* species. The *Paepalanthus* species from Cuba need to be better sampled. Eight species of *Paepalanthus* occur in Cuba, including seven endemics, and also the widespread *Paepalanthus lamarckii.* Another clade was the group composed of the widely distributed *Paepalanthus tortilis*, *Paepalanthus obtusifolius*, and *Paepalanthus lamarckii*, which is one of the few species of the genus that occurs in the African continent (Phillips, 1997).

Although not particularly closely related in our phylogeny, species from clades B and F appear morphologically similiar. Some of the species from clades B and F species belong to *Paepalanthus* ser. *Leptocephali* Ruhland, an artificial group of reduced, mostly annual, species with erect stems and inflorescences in terminal fascicles (Fig. 7) – but there is no other strong morphological character common to them all. It is important to note that they are all widely distributed in Brazil or occur in the Guiana Shield and Central America. There are approximately 30 species in *Paepalanthus* demonstrating such distribution pattern that need to be more intensely studied and sampled to provide a better understanding of the relationships between these lineages. Other individual clades within *Paepalanthus s.l.* have been recovered as monophyletic and are discussed below.

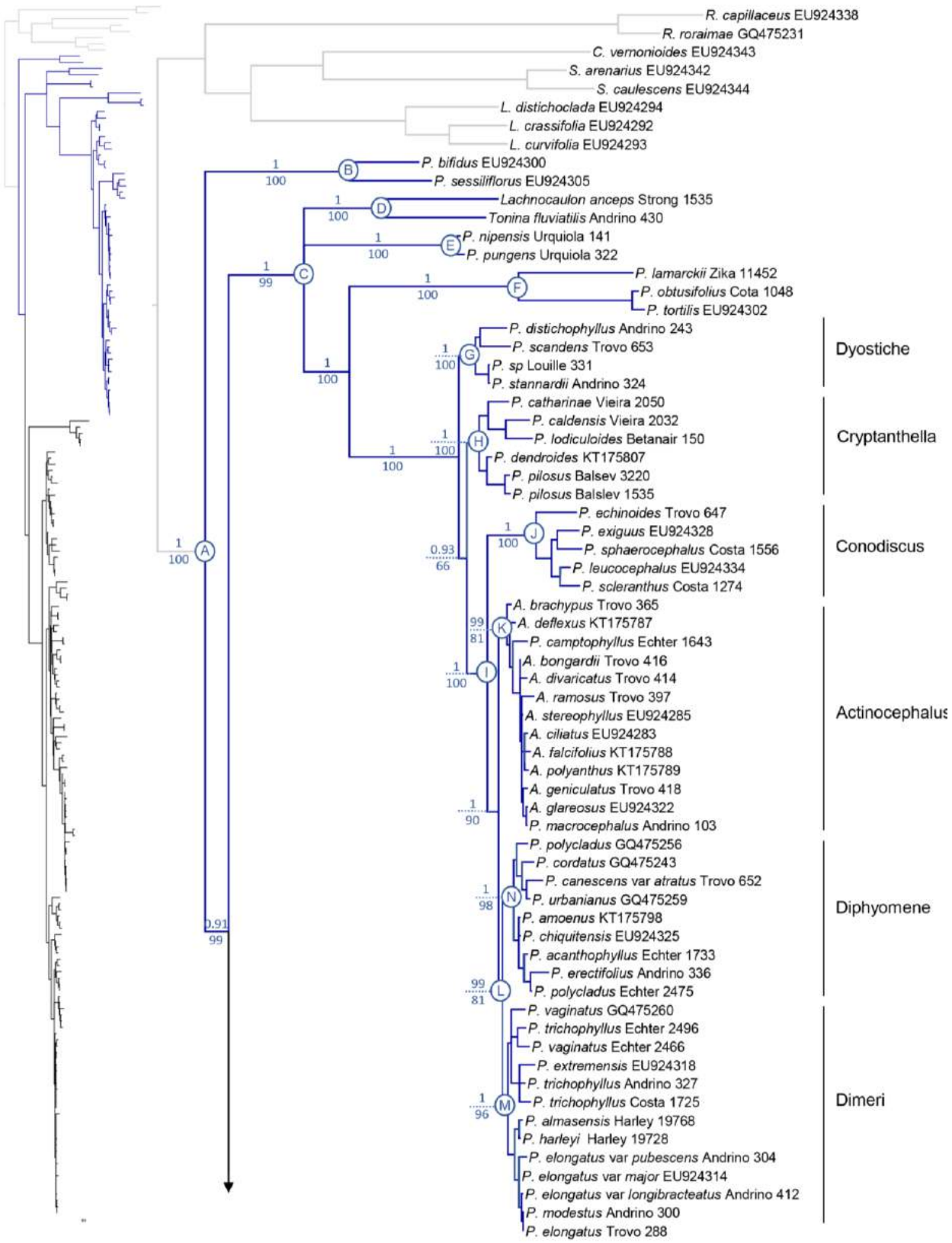


Fig. 6. Majority-rule consensus tree based on Bayesian analysis of the combined dataset (*trnL-F*, ITS, ETS) showing the main clades (A-Z) discussed in the thext. Values indicated above the branches are Posterior probabilities (PP) and those below Bootstrap (BS) percentages resulting from the ML analysis.

Fig. 6. (Continued)

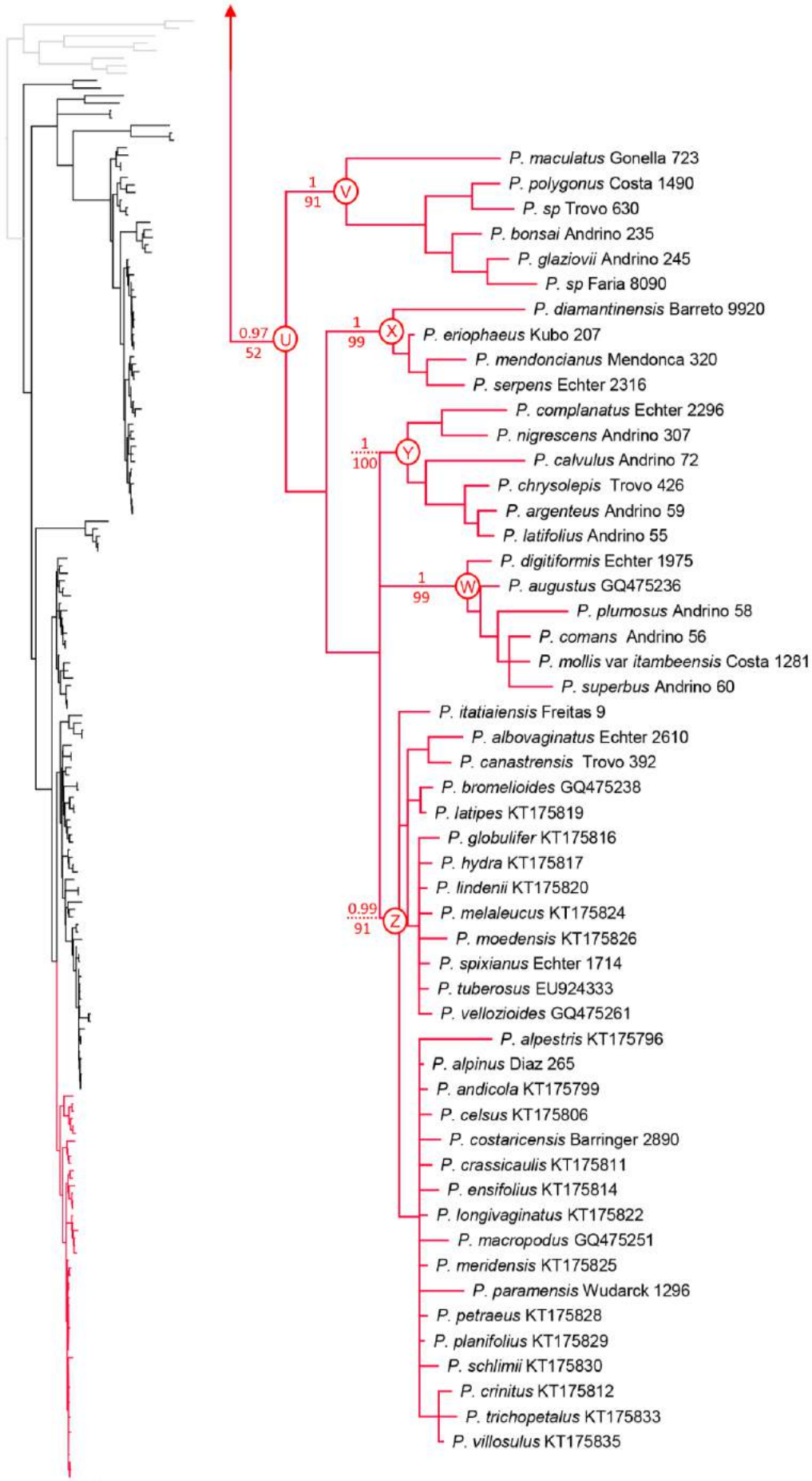


Fig. 6. (Continued)

Dyostiche Clade (Fig.8)

The species of clade G show the same growth patterns, and have at least two different types of morphological features, as described by Stützel & Trovó (2013): One renewal type forms in the axils of the two leaves directly preceding the stand of the capitula; the other renewal type originates from the base of the entire plant. It seems that those basal renewals are lateral to a flowering stem that has grown for several seasons (Stützel & Trovó; 2013). This is the most striking characteristic of the group, and a putative synapomorphy. In addition to the species sampled, three additional species of *Paepalanthus* (*Paepalanthus intermedius, Paepalanthus piscatorum,* and *Paepalanthus lycopodioides*) fit this pattern and would expect them to group within this clade based on morphological resemblance.

Among the species within clade G, only *Paepalanthus distichophyllus* has been previously assigned to an infrageneric taxon, the monospecific *P.* sect *Dyostiche*, which was defined by Ruhland (1903) by its elongated stem and dystic phyllotaxy.

Cryptanthella Clade (Fig.9)

All species within clade H appear to show the same branching patterns and inflorescence type. Stützel & Trovó (2013) described this pattern for two species of this clade, *Paepalanthus caldensis* and *Paepalanthus catharinae,* as having solitary capitula in the axils of normal rosette leaves. The capitula are formed in a series of consecutive leaves during the flowering season; the closed sheath is always in an adaxial position and represents the prophyll of the pedunculate capitulum. After the flowering season, one to several vegetative branches may arise at the lower side of the rosette in the axils of the leaves that did not form capitula. This leads to the formation of cushion-like groups or flat mats of rosettes, which resemble the habit of species of clade H that belong *Paepalanthus* subsect. *Cryptantella* Suess.. *Paepalanthus* subsect. *Cryptantella* was recently re-circumscribed by Hensold (2016), who recognized five species, of which three were sampled in our analyses and show close ties to other Neotropical species, *Paepalanthus caldensis* e *Paepalanthus catharinae*, wich belongs to *P.* ser. *Paepalanthus*. Therefore, *P.* sect. *Cryptantella* must expand to include these species and others with similar growing pattern. None of those species were sampled before, and they represented a strongly supported clade here in all of the analyses (apart from the individual *trnL-F* analysis).

Clade I - Evolution of dimerous flowers in *Paepalanthus sensu lato*

Clade I brings important information about floral merism that is worth highlighting. *Paepalanthus* flowers are mostly trimerous, but dimerous flowers occur in some species - a feature that has been interpreted in different ways for more than a century. Bongard (1831) united species with dimerous flowers under the name "Staminibus duobus", based exclusively on that character. Koernicke (1863), followed by Bongard (1831), later denominated the category as *Paepalanthus* subgen. *Dimeranthus* Körn. Ruhland (1903), however, disagreed with the systematic association of dimerous species in a single group, arguing that they share no other consistent features and show evident differences in their vegetative morphologies, making any close relationships between them questionable. *Paepalanthus* subgen. *Dimeranthus* was then divided by Ruhland (1903) into three new categories: *Paepalanthus* sect. *Conodiscus* Ruhland, *Paepalanthus* ser. *Dimeri*, and *Paepalanthus* sect. *Diphyomene*. Subsequent analyses (Andrade, 2010, Trovó 2013) found support for the hypothesis that dimerous flowers evolved several times in *Paepalanthus*. Their conclusion was based on the position of *Paepalanthus almasensis* in Andrade *et al.* (2010), and *Paepalanthus sphaerocephalus* in Andrade *et al.* (2010) and Trovó *et al.* (2013) – both species with dimerous flowers that grouped with species from *Paepalanthus s.s.* with trimerous flowers. However, new accessions belonging to these species were sequenced in the present study, and grouped in clade J (*P. sphaerocephalus*) and clade M (*P. almasensis*) together with dimerous species. This result casts doubt on the correct identification of the samples assigned to these species that were used in the studies of Andrade *et al.* (2010) and Trovó *et al.* (2013). It is more likely that the position of these two-species reported by these authors was based on sample misidentification.

A new dimerous species of *Paepalanthus* was sampled in our study (*Paepalanthus* sp.6 *Forzza 8002*) and grouped with species of *P.* subg. *Monosperma* in clade O (Fig. 6) and another dimerou species from Cuba (*P. pungens*) was sampled and grouped with species with trimerous flowers in clade D. Overall, taking together the evidence provided by our results supports the view that dimerous flowers evolved three times in *Paepalanthus s.l.*: one in the node that leads to clade I, with a reversal to trimerous florwers in *Actinocephalus* clade; and another shift from trimery to dimery represented by *Paepalanthus* sp. 6 *Forzza 8002* in clade O.

Conodiscus Clade (Fig.10)

The species within this clade belong to *Paepalanthus* subg. *Thelxinöe* and *Paepalanthus* sect. *Conodiscus*, and have dimerous flowers with fused stigmatic branches, features that may be considered synapomorphies of clade J. Six species of a total of seven in the group were sampled; the only species missing was *Paepalanthus eriocauloides,* which may be a synonym of *Paepalanthus sphaerocephalus.*

Silva *et al.* (2016) examined floral development to explain merism evolution in *Paepalanthus* and found that *Paepalanthus echinoides* (which belongs to *P.* ser. *Conodiscus*) has flowers with the gynoecium having two nectariferous branches inserted at the low-median position of fused stigmatic branches, whereas *P. scleranthus* (*P.* subg. *Thelxinöe*) has gynoecium without nectariferous branches. Those authors hypothesized that nectariferous branches may have been lost after the fusion of stigmatic branches in the clade that groups together *P.* subg. *Thelxinoë* and *P.* sect. *Conodiscus.* The position of *Paepalanthus echinoides* in our analysis as the first lineage to diversify within clade J so far confirms this hypothesis, but further studies involving other species of the group will be necessary. The position of *P. sphaerocephalus* with other members of *P.* sect. *Conodiscus* clade is confirmed here. As already mentioned, grouping of this species with *Paepalanthus s.s.* in previous studies (Andrade *et al.* 2010, Giulietii *et al.* 2012; Trovó *et al.* 2013) was possibly caused by sample misidentification.
Species of Conodiscus clade are distributed in savannas in central Brazil (Chapada dos Veadeiros) and in the Espinhaço Range (Minas Gerais and Bahia states).

Actinocephalus clade (Fig.11)

This clade was strongly supported in our study as well as in previous publications (Andrade *et al.* 2010, Giulietti *et al.* 2012, Trovó *et al.* 2013, Tannure 2013). The main characteristic of this group is the presence of an axillary reproductive stem supporting the scapes in an umbelliferous co-florescence at the apex. Those lateral branches are called paraclades, and are covered by bracts. There is a central elongate axis where these paraclades emerge in some species. The terminologies used for the elongated axis of *Actinocephalus* and the reproductive axis of *P.* sect. *Diphyomene* need to be revised, as both represent extensions of the central axis of the rosette and appear to be homologous structures.

Actinocephalus was originally described as a subgenus of *Paepalanthus* (Koernicke, 1963), and classified into two infrageneric categories (*P.* sect. *Actinocephalus, P.* subsect. *Aphorocaulon*) by Ruhland (1903). *Actinocephalus* was elevated to generic status (Sano, 2004) and the genus was later re-

circumscribed to include the species of *P.* subsect. *Aphorocaulon* (Costa & Sano, 2013). The present study suggests a broader circumscription of the genus to include *Paepalanthus camptophyllus* and *Paepalanthus macrocephalus*. The inclusion of these species into *Actinocephalus* was also supported by the phylogenetic analysis of Tannure (2013 – unpublished data), but the low resolution of the clades implied inconsistency and lack of reliability for taxonomic modifications. Paraclades are often inconspicuous in these two species, but their phylogenetic position nested within *Actinocephalus* suggests that further morphological and anatomical investigations are required.

With the new circumscription proposed here, the genus *Actinocephalus* comprises 51 species restricted to Brazil, occurring mainly in the Espinhaço Range of Minas Gerais and Bahia states.

Dimeri Clade (Fig.12)

Clade M is distinct in having dimerous flowers, short stems, bifid stigmatic branches, and flat receptacles. Its cespitose habit forms small clumps of sprouting ramets, each bearing a single terminal capitulum (Ruhland, 1903, Silveira 1928, Moldenke 1980, Costa & Sano 2013). Seven species of the group were sampled, from an estimated total of 12 species that share those characteristics.

However, the species diversity within the group is probably underestimated, as just one species, *Paepalanthus elongatus*, for example, has 11 varieties that are morphologically quite distinct (Trovó *et al.*, 2017). Four samples of *Paepalanthus elongatus* included in this study (two varieties from Chapada dos Veadeiros and two from Minas Gerais State) emerged along with *Paepalanthus modestus*, indicating that further detailed studies of these taxa will be necessary to clarify species boundaries.

The species of this clade have the same distribution as the Dyostiche and Conodiscus clades, occurring in the Espinhaço Range and in the savannas of Goias State, Chapada dos Veadeiros.

Diphyomene Clade (Fig.13)

This clade is composed of species of *Paepalanthus* that show a unique inflorescence pattern for the family, which represents a possible synapomorphy in the group – a reproductive axis emerging from the center of the rosette bearing the inflorescence. All species that grouped in clade N are included in *P.* sect. *Diphyomene*, which comprises 21 species distributed throughout savannas and on rocky outcrops in South America. Its center of diversity is concentrated in the highlands of Goiás State. Most

species are narrowly distributed, although *Paepalanthus chiquitensis* Herzog is widely distributed in South America and *Paepalanthus erectifolius* occurs throughout the Espinhaço Range.

This group was strongly supported in our analyses (clade N) and coincides with *P.* sect. *Diphyomene*, but requires the inclusion (and a new combination) of *Paepalanthus canescens* var. *atratus*, which belongs to *P.* sect *Actinoephaloides.* This taxon has no close relationship to other samples of *P. canescens* var. canescens, which grouped in the clade *Paepalanthus s.s.*. In fact, both taxa have distinct morphologies, and the var. atratus is described for the highlands of Goiás State, the center of diversity of *P.* sect. *Diphyomene*, while *P. canescens* var. canescens only occurs in the Espinhaço Range.

Although with low support (PP < 0.9; BS < 80) in individual analyses, the Diphyomene clade appeared as sister to the Actinocephalus clade, and both clades comprise the sister group to the Dimeri clade. This relationship makes sense morphologically, as the Diphyomene + Actinocephalus clade share a stem axis supporting the inflorescence, while Diphyomene + Dimeri clade share dimerous flowers. However, this topology was not confirmed in the combined analyses, where the Diphyomene and Dimeri clades formed a monophyletic group that is sister to Actinocephalus. Even though those three groups are monophyletic and strongly supported, that lack of congruence in the analyses indicates that further studies are necessary to clarify the relationship between them.

Monosperma Clade (Fig.14)

The species of this clade O are characterized by the production of single-seeded indehiscent fruits, in contrast to the multi-seeded capsular fruits produced by all other known taxa of the family (Hensold, 1991). The group is restricted to the pantepuis, comprising 24 species, and was also recovered in other phylogenetic study (Trovó *et al.*2013). Although strongly-suported in most analyses, its position related to other *Paepalanthus* lineages is uncertain. It appears as sister to *Paepalanthus s.s.* in the combined analyzes, but with very low support, which does not yet allow us to infer its relationship with other lineages. A newly described species with dimerous flowers from an isolated Tepui in the Brazilian Amazon (Paepalanths sp.6; Barbosa-Silva *et al.*, in press) grouped within the Monosperma clade.

Paepalanthus sensu stricto clade

Paepalanthus s.s. is the largest group reported here in terms of number of species and includes the generic type, *Paepalanthus erigeron*. All species within the group have trimerous and isostemonous flowers, pistillate flowers with free petals, and a gynoecium with stigmatic and nectariferous branches inserted at the same level. However, these characteristics are not unique to Paepalanthus s.s. since they are shared by species of clades B, F, G, H, which makes it difficult to establish synapomorphies for this group.

Unlike the clades described above, which have clear morphological characteristics supporting them, the morphological variation within *Paepalanthus s.s.* needs to be better investigated. However, we found that some clades were geographically structured, a pattern that has been reported in previous studies. In the phylogeny presented by Andrade *et al.* (2010), with a sample of 24 species of *Paepalanthus* s.s., there is a clear division of this lineage into a group of species restricted to Bahia State and another group restricted to Minas Gerais State. Trovó *et al.* (2013) increased the sampling to 42 species, and once again found a clade strictly comprising species from Bahia, which was sister to a clade formed by species mostly from Minas Gerais and adjacent mountains.

In the present study (with a sample size of 137 species), a strongly-supported clade formed by species mostly from Bahia (but also containing some species from northern Minas Gerais) emerged in all analyses (clade Q) as sister to all remaining *Paepalanthus s.s.*. A connection between species from Bahia highlands and northern Minas Gerais State and the Diamantina Plateau has been observed in several other plant groups, such as *Richterago* Kuntze, Asteraceae (Roque & Pirani 2014), *Moquinia* DC. and *Lychnophora* Mart., Asteraceae (Roque *et al.*, 2016), and *Drosera* L., Droseraceae (Rivadavia *et al.*, 2014). Geographic distribuitions of some species within Clade Q represent disjunctions between the extrazonal formations of *campos rupestres* (rocky grasslands) in the Espinhaço Range and restinga areas (coastal strand vegetation). For example, *Paepalanthus klotzschianus*, *Paepalanthus pulchellus,* and *Paepalanthus pulvinatus* occur mainly in the restingas of Bahia and form a monophyletic group which is sister to a clade restricted to the Espinhaço Range of Bahia highlands. Trovó (2013) noted that disjunctions between and campo rupestre and restingas is recurrent in Eriocaulaceae, and such pattern is observed in several other plant groups (Alves *et al.*2009). Overall, this large clade requires further studies to allow a better understanding of their morphological, ecological, and evolutionary aspects.

Within *Paepalanthus* s.s., the strongly supported Clade R is formed by a lineage containing *Paepalanthus albiceps*, *Paepalanthus chrysophorus*, *Paepalanthus capillifolius,* and *Paepalanthus*

multistelaris (clade S), which is sister to all remaining taxa (clade T). All clade S species have an elongated and unbranched stem with a fasciculate inflorescence, usually inserted in the distal portion of the stem. Species with these characteristics are placed in *Paepalanthus* subsect. *Actinocephaloides* Ruhland, but the character that defines it – the stem branching pattern – is susceptible to environmental alterations during the life cycles of the plants (Trovó *et al.* 2011; Andrino *et al.* 2016) and has therefore often been misinterpreted. For example, *Paepalanthus chrysophorus* Silveira and *Paepalanthus albiceps* Silveira both are assigned to *P.* subsect. *Polyactis* (Silveira, 1928), but clearly have the branching pattern defined by Ruhland (1903) for the *P.* subsect. *Actinocephaloides*. On the other hand, *P. canescens*, which was classified as a member of *Paepalanthus* sect. *Actinocephaloides* by Ruhland grouped within clade T, indicating that this subsection is not monophyletic.

Clade T, which received high support only in the ITS+EST analysis, is poorly-resolved. A possible cause for lack of internal resolution is that it might represente a recent radiation of species confined to the Diamantina Plateau, which comprises most members of the clade. Sampling within this clade may have been insufficient as approximately 120 species of *Paepalanthus* occur in the Diamantina Plateau (Costa et al., submitted), but less than 25 species were sampled here. Despite the sparse sampling, it is possible to observe the close relationships of the species of the Diamantina Plateau with species occurring in the Mantiqueira Mountains (e.g. *Paepalanthus leucoblepharus*, *Paepalanthus calvus*, *Paepalanthus freyreissii*, *Paepalanthus harmsii*, *Paepalanthus ovatus*) another mountain range in Southeastern Brazil that extends through parts of the states of São Paulo, Minas Gerais, and Rio de Janeiro.

Within clade U, five strongly-supported clades (V-Z) with supporting morphological characteristics were recoverd. Clade V comprises groups of species with elongated dichotomously branched stems – a feature that defines the infrageneric taxon *Paepalanthus* subsect. *Dichocladus* Ruhland (FIG.15). Although well sampled for other areas, we did not include in the phylogeny species of subsect *Dichocladus* from the Guiana Shield, which would have been necessary to better evaluate the monophyletism of the group as currently circumscribed. Clade V also includes species of *P.* subsect *Polycladus* and *P.* ser. *Polyactis*, all with very similar branching patterns (*Paepalanthus polygonus*, and *Paepalanthus maculatus*) In previous phylogenetic analysis (Trovó et al 2013), *P. polygonus* (belonging to *P.* sect. *Polycladus*) grouped within the clade formed by species from the Diamantina Plateau and Mantiqueira Mountains (equivalent to clade T). However, we assumed that this position is more likely to be a mistake, since another accession of this species sampled here grouped with other members of *P.* subsect. *Polycladus* and *P.* subsect *Dichocladus*, as expected. Two new species in the process of

description, which also have elongated dichotomously branched stems, were included in the analysis (*Paepalanthus* sp.2_Trovo630 and *Paepalanthus* sp.5_Faria8090) and grouped within clade V, reinforcing that this is a morphologically coherent group. There are at least ten other species with those characteristics in *Paepalanthus*, and they deserve further study. The species of this group are usually microendemics and are restricted to one or two localities from the northern region of Serra do Cipó in the Espinhaço Range) to the mountains of northern Minas Gerais.

The clade X contains species with leaves forming rosettes, usually with scapes the same size as the leaves (or slightly larger), and species that have a caudex (the persistent and woody stem of perennial herbs). Those characteristics correspond to the group comprised by the *Paepalanthus aequalis* complex (see chapter 2), *Paepalathus eriophaeus* and morphologically related species. There are about 15 species in this group, and all of them occur in the Espinhaço Range of Minas Gerais, with high diversity in the Serra do Cipó.

Clades Y and W comprise species belonging to *Paepalanthus* subg. *Xeractis*, which was initially recognized by Bongard (1831) but only formally proposed by Koernicke (1863) based on the presence of long involucral bracts surpassing the diameter of the capitula. Hensold (1988, 1996) provided the most recent taxonomic review of the group, recognizing 28 species with the common characteristic of internal pubescence of the corolla of the staminate flowers, classifying them into four sections and two series. No phylogenetic analysis was presented in that taxonomic revision, but Hensold (1988) proposed several scenarios for the evolution of the group, including potential synapomorphies for the subgenus and groups within it. Morphological synapomorphies for the subgenus were tested by Trovó *et al.* (2013), who proposed as a secondary homology the presence of trichomes on the adaxial surface of the involucral bracts. That study included only five species of *P.* subg. *Xeractis*, a sample size insufficient for such inferences. In our analyzes, with a larger sampling (12 species), the subgenus appeared in two clades in a polytomy with *P.* subg. *Platycaulon* (clade Z). Lack of resolution precludes any inference about the monophyly of the subg. *Xeractis*, but the high support of these three clades allows us to make some inferences about their sections and about those morphological characteristics.

Clade Y comprises species placed in *P.* sect. *Chrysostegis*, which are the species of the *P.* subg. *Xeractis* with involucral bracts beige to golden. The species of *P.* sect. *Xeractis* ser. *Albidi* (*Paepalanthus complanatus* and *Paepalanthus nigrescens*) that do not have involucral bracts surpassing the height of the flowers represent the sister group to *P.* sect. *Chrysostegis*. The other species of *P.* sect *Xeractis*, however, emerged as a monophyletic group in clade W, all of which with brown involucral bracts exceeding the capitula diameter.

Species with trichomes on the adaxial surfaces of their involucral bracts are found in both clades, along with species without this feature, which for the moment appears to be a homoplastic character.

Clade Z corresponds to species belonging to *P.* subg. *Platycaulon* – a group easily distinguished by the fusion of their scapes at various levels (FIG. 16) (Tissot-Squali, 1997). The group formed a polytomy with species of *P.* subg. *Xeractis* in a recent phylogenetic study (Dìaz, 2016). Although the relationships between those two groups were not elucidated in our study, *P.* subg. *Platycaulon* formed a strongly supported monophyletic group in analyses. This subgenus comprises 47 species disjunctly distributed in the high Andean páramos of Venezuela, Colombia, Ecuador, and northern Peru (16 species), and in the *campos rupestres* and *campos de altitude* of southern Brazil (31 species). The study conducted by Dìaz (2016) was the first to include the Andean species, which are essential to testing the monophyletism of the subgenus. However, the resolution of the phylogeny presented in Dìaz (2016) were not sufficient to recover the group as monophyletic. Unfortunately, we were unable to obtain ETS sequences for the Andean species, which could have improved the resolution within this clade. The results of Dìaz (2016) indicated that the distribution pattern of *P.* subg. *Platycaulon* is the result of a single colonization event from Brazil to the Andes. This is very similar to the pattern found in the fern genera *Eriosorus* and *Jamesonia* (Sanchez-Baracaldo, 2004) that appear to have experienced independent colonization events from Brazilian ancestors to the Andes, followed by rapid radiation. This pattern is possibly the same as observed with species of the Cryptantella clade in the present study.

Towards a new classification of *Paepalanthus*

Our results reinforce the need of a new circusncription of *Paepalanthus* s.l. in order to make it monophyletic. One possible manner of doing that would be to expand the circumscription of *Paepalanthus* to include *Actinocephalus*, *Lachnocaulon*, and *Tonina* – although that would not be the best option: first because there are several distinct morphological features that can define the segregated clades Dyostiche, Crypthantella, Conodiscus, Dimeri, Diphyomene and Monosperma (as previously discussed), and treating all of them as a single genus would result in a morphologically poorly defined taxon; secondly, the other three genera that would be included in a broader circumscription of *Paepalanthus* are currently well-defined on the basis of morphological characters and geography; thirdly, according to the rules of ICN (2011), the monotypic genus *Tonina* would have priority over

Paepalanthus, and as a consequence a large number of combinations involving 463 names (*Paepalanthus* + *Actinocephalus* + *Lachnocaulon*) would be required.

A more reasonable approach supported by our findings would be to restrict the definition of *Paepalanthus* to the *Paepalanthus s.s.* clade, which has the type species of the genus, and keep *Actinocephalus, Lachnocaulon,* and *Tonina* within their current definitions. This approach would also require treating the six clades (G, H, J, M, N, O) that contain the remaining species of *Paepalanthus*, for which there are compeling molecular, morphological, and geographic support, as distinct genera. Under this new circunscription, *Paepalanthus* would have 277 species mainly distributed in the *campos rupestres* of the Espinhaço Range, and few species in *campos de altitude*, restingas, and the Andean Páramos. A table circumscribing the proposed new genera and new circumscriptions of *Actinocephalus* and *Paepalanthus s.s.* is presented (Table 5).

This study represents a major advance in the establishment of phylogenetic relationships within *Paepalanthus s.l.*, which culminated in a generic rearrangement of this large but problematic group. However, there is still some gaps in taxon sampling and relationships that need to be clarified, and these issues should be addressed in future studies (see Insertae sedis in Table 5). In adition, our work could be used as a framework for future investigations about the diversification and biogeographic history of the species-rich lineage of neotropical monocots.

Table 5. Proposal for the new genera segregated from *Paepalanthus* s.l and new circumscription of *Actinocephalus* and *Paepalanthus* s.s. Species listed in alphabetical order within the clades names. Estimated number of species within each clade was based clade composition and on morphological resemblance of non-sampled taxa.

Clade	Species
DYOSTICHE (G) (7 species; 4 sampled)	*Paepalanthus distichophyllus* Mart.; *Paepalanthus intermedius* Körn.; *Paepalanthus lycopodioides* Silveira; *Paepalanthus piscatorum* Hensold; *Paepalanthus scandens* Ruhland; *Paepalanthus stannardii* Giul.; *Paepalanthus* sp. nov.
CRYPTANTHELLA (H) (14 species; 5 sampled)	*Paepalanthus balansae* Ruhland; *Paepalanthus bellus* Moldenke; *Paepalanthus caldensis* Malme; *Paepalanthus caryonauta* Hensold; *Paepalanthus catharinae* Ruhland; *Paepalanthus dendroides* (Kunth) Kunth; *Paepalanthus huancabambensis* Hensold; *Paepalanthus jordanensis* Silveira; *Paepalanthus karstenii* Ruhland; *Paepalanthus lodiculoides* Moldenke; *Paepalanthus macarenensis* Moldenke; *Paepalanthus pilosus* (Kunth) Kunth; *Paepalanthus tessmannii* Moldenke; *Paepalanthus weberbaueri* Ruhland
CONODISCUS (J) (7 species; 6 sampled)	*Paepalanthus echinoides* Trovó; *Paepalanthus eriocauloides* Ruhland; *Paepalanthus exiguus* (Bong.) Körn.; *Paepalanthus leucocephalus* Ruhland; *Paepalanthus scleranthus* Ruhland; *Paepalanthus sphaerocephalus* Ruhland
***ACTINOCEPHALUS* (K)** (51 species; 14 sampled)	*Actinocephalus actinocephaloides* (Silveira) F.N.Costa, *Actinocephalus aggregatus* F.N.Costa, *Actinocephalus arenicola* (Silveira) F.N.Costa, *Actinocephalus armeria* (Mart. ex Körn.) F.N.Costa, *Actinocephalus bahiensis* (Bong.) F.N.Costa, *Actinocephalus barbiger* (Silveira) F.N.Costa, *Actinocephalus bongardii* (A.St.-Hil.) Sano, *Actinocephalus brachypus* (Bong.) Sano, *Actinocephalus cabralensis* (Silveira) Sano, *Actinocephalus callophyllus* (Silveira) Sano, *Actinocephalus ciliatus* (Bong.) Sano, *Actinocephalus cipoensis* (Silveira) Sano, *Actinocephalus claussenianus* (Körn.) Sano, *Actinocephalus compactus* (Gardner) Sano, *Actinocephalus coutoensis* (Moldenke) Sano, *Actinocephalus deflexus* F.N.Costa, *Actinocephalus delicatus* Sano, *Actinocephalus denudatus* (Körn.) Sano, *Actinocephalus diffusus* (Silveira) Sano, *Actinocephalus divaricatus* (Körn.) Sano, *Actinocephalus falcifolius* (Körn.) Sano, *Actinocephalus fimbriatus* (Silveira) Sano, *Actinocephalus geniculatus* (Bong.) F.N.Costa, *Actinocephalus giuliettiae* Sano, *Actinocephalus glabrescens* (Silveira) Sano, *Actinocephalus glareosus* (Bong.) F.N.Costa, *Actinocephalus graminifolius* F.N.Costa, *Actinocephalus herzogii* (Moldenke) Sano, *Actinocephalus heteropus* (Silveira) F.N.Costa, *Actinocephalus heterotrichus* (Silveira) Sano, *Actinocephalus incanus* (Bong.) F.N.Costa, *Actinocephalus ithyphyllus* (Mart.) Sano, *Actinocephalus koernickeanus* Trovó & F.N.Costa, *Actinocephalus longifolius* (Körn) F.N.Costa, *Actinocephalus nodifer* (Silveira) Sano, *Actinocephalus ochrocephalus* (Körn.) Sano, *Actinocephalus pachyphyllus* F.N.Costa, Trovó & Echtern., *Actinocephalus perbracchiatus* (Silveira) F. N. Costa, *Actinocephalus phaeocephalus* (Ruhland) F. N. Costa, *Actinocephalus polyanthus* (Bong.) Sano, *Actinocephalus ramosus* (Wikstr.) Sano, *Actinocephalus rhizomatosus* (Silveira) F.N.Costa, *Actinocephalus rigidus* (Bong.) Sano, *Actinocephalus robustus* (Silveira) Sano, *Actinocephalus*

	scytophyllus (Ruhland) *F. N.* Costa, *Actinocephalus stereophyllus* (Ruhland) Sano, *Actinocephalus trichopeplus* (Silveira) F.N.Costa, *Actinocephalus velutinus* (Silveira) F.N.Costa, *Actinocephalus verae* Sano & Trovó; *Paepalanthus camptophyllus* Ruhland; *Paepalanthus macrocephalus* (Bong.) Körn.
Dimeri (M) (12 species; 6 sampled)	*Paepalanthus almasensis* Moldenke; *Paepalanthus elongatus* (Bong.) Körn.; *Paepalanthus extremensis* Silveira; *Paepalanthus flaccidus* (Bong.) Kunth; *Paepalanthus guaraiensis* Moldenke; *Paepalanthus harleyi* Moldenke; *Paepalanthus microphorus* Silveira; *Paepalanthus milho verdensis* Silveira; *Paepalanthus modestus* Trovó; *Paepalanthus oxyphyllus* Körn; *Paepalanthus trichophyllus* (Bong.) Körn.; *Paepalanthus vaginatus* Körn.;
Diphyomene (N) (21 species; 9 sampled)	*Paepalanthus acanthophyllus* Ruhland; *Paepalanthus amoenus* (Bong.) Körn.; *Paepalanthus arcuatus* Trovó; *Paepalanthus brevis* Trovó; *Paepalanthus canescens* var. *atratus* Moldenke; *Paepalanthus chiquitensis* Herzog; *Paepalanthus conjunctus* Trovó; *Paepalanthus cordatus* Ruhland; *Paepalanthus decorus* Abbiatt; *Paepalanthus decussus* Körn; *Paepalanthus erectifolius* Silveira; *Paepalanthus flexuosus* Trovó; *Paepalanthus koernickei* (Ruhland) Trovó; *Paepalanthus linearis* Trovó; *Paepalanthus longiciliatus* Trovó; *Paepalanthus macer* Trovó; *Paepalanthus polycladus* Silveira; *Paepalanthus rectifolius* Trovó; *Paepalanthus sericiscapus* Trovó; *Paepalanthus stellatus* Trovó; *Paepalanthus strictus* Körn; *Paepalanthus urbanianus* Ruhland; *Paepalanthus weddellianus* Körn;
Monosperma (O) (24 species; 9 sampled)	*Paepalanthus apacarensis* Moldenke; *Paepalanthus auyantepuiensis* Moldenke; *Paepalanthus cardonae* Moldenke; *Paepalanthus chimantensis* Hensold; *Paepalanthus convexus* Gleason; *Paepalanthus cumbricola* Moldenke; *Paepalanthus ferreyrae* Moldenke; *Paepalanthus fraternus* N.E.Br.; *Paepalanthus fulgidus* Moldenke; *Paepalanthus gleasonii* Moldenke; *Paepalanthus holstii* Steyerm; *Paepalanthus kunhardtii* Moldenke; *Paepalanthus major* (Moldenke) Hensold; *Paepalanthus parvicephalus* (Moldenke) Hensold; *Paepalanthus phelpsiae* Moldenke; *Paepalanthus roraimensis* Moldenke; *Paepalanthus schomburgkii* Klotzsch ex Körn; *Paepalanthus scopulorum* Moldenke; *Paepalanthus septentrionalis* Trovó; *Paepalanthus squamuliferus* Moldenke; *Paepalanthus stegolepoides* Moldenke; *Paepalanthus subcaulescens* N.E.Br.; *Paepalanthus sulcatus* Hensold; *Paepalanthus turbinatus* (Gleason) Hensold; *Paepalanthus venustus* Moldenke
***Paepalanthus sensu stricto* (P)** (277 species; 140 sampled)	*Paepalanthus acantholimon* Ruhland; *Paepalanthus accrescens* Silveira; *Paepalanthus aculeatus* Silveira; *Paepalanthus acuminatus* Ruhland; *Paepalanthus acutipilus* Silveira; *Paepalanthus aequalis* (Vellozo) J.F.Macbr.; *Paepalanthus aereus* Silveira; *Paepalanthus albiceps* Silveira; *Paepalanthus albidus* Gardner; *Paepalanthus albotomentosus* Herzog; *Paepalanthus albovaginatus* Silveira; *Paepalanthus albovillosus* Silveira; *Paepalanthus aleurophyllus* Trovó; *Paepalanthus alpestris* (Körn) Tissot-Sq.; *Paepalanthus alpinus* Körn; *Paepalanthus altamirensis* Tissot-Squalli & Sauthier; *Paepalanthus anamariae* Hensold; *Paepalanthus andicola* Körn; *Paepalanthus aretioides* Ruhland; *Paepalanthus argenteus* (Bong) Körn.;

***Paepalanthus sensu stricto* (P)** (277 species; 140 sampled)	*Paepalanthus argillicola* Silveira; *Paepalanthus argyrolinon* Körn; *Paepalanthus argyrotrichus* F.N. Costa, Andrino & Echtern.; *Paepalanthus aristatus* Moldenke; *Paepalanthus ascendens* Silveira; *Paepalanthus ater* Silveira; *Paepalanthus atrovaginatus* Ruhland; *Paepalanthus augustus* Silveira; *Paepalanthus aureus* Silveira; *Paepalanthus baraunensis* Silveira; *Paepalanthus barbulatus* Herzog; *Paepalanthus batalensis* Silveira; *Paepalanthus benedicti* Silveira; *Paepalanthus blepharophorus* (Bong) Körn.; *Paepalanthus bombacinus* Silveira; *Paepalanthus bongardii* Kunth; *Paepalanthus bonsai Trovó & Sano*; *Paepalanthus brachyphyllus* Ruhland; *Paepalanthus brevicaulis* Silveira; *Paepalanthus bromelioides* Silveira; *Paepalanthus brunnescens* Ruhland; *Paepalanthus bryoides* (Bong) Körn.; *Paepalanthus cachambuensis* Silveira; *Paepalanthus cacuminis* Ruhland; *Paepalanthus caespititius* Mart.; *Paepalanthus callocephalus* Silveira; *Paepalanthus calvoides* Ruhland; *Paepalanthus calvulus* (Ruhland) Hensold; *Paepalanthus calvus* Körn; *Paepalanthus canastrensis* Silveira; *Paepalanthus candidus* Silveira; *Paepalanthus canescens* (Bong) Körn.; *Paepalanthus capanemae* Silveira; *Paepalanthus caparoensis* Ruhland; *Paepalanthus capillaris* (Bong) Körn.; *Paepalanthus capillatus* Silveira; *Paepalanthus capillifolius* Moldenke; *Paepalanthus capitatus* Silveira; *Paepalanthus capito* Körn; *Paepalanthus capixaba* Trovó; *Paepalanthus carvalhoi Giul.*; *Paepalanthus celsus* Tissot-Sq; *Paepalanthus cephalotrichus* Silveira; *Paepalanthus chaseae* Moldenke; *Paepalanthus chloroblepharus* Ruhland; *Paepalanthus chlorocephalus* Silveira; *Paepalanthus chloronema* Silveira; *Paepalanthus chlorophyllus* Silveira; *Paepalanthus chloropus* Silveira; *Paepalanthus chrysolepis* Silveira; *Paepalanthus chrysophorus* Silveira; *Paepalanthus ciliolatus* Ruhland; *Paepalanthus cinereus Giul*; *Paepalanthus clausenii* Hensold; *Paepalanthus coloides* Ruhland; *Paepalanthus comans* Silveira; *Paepalanthus complanatus* Silveira; *Paepalanthus conduplicatus* Körn; *Paepalanthus contasensis* Moldenke; *Paepalanthus coronarius* Silveira; *Paepalanthus corymbosus* (Bong) Körn.; *Paepalanthus costaricensis* Moldenke; *Paepalanthus crassicaulis* Körn; *Paepalanthus crateriformis* Silveira; *Paepalanthus crinitus* Tissot-Sq; *Paepalanthus cryocephalus* Silveira; *Paepalanthus cuspidatus* Silveira; *Paepalanthus damazioi* Beauverd; *Paepalanthus dasynema* Ruhland; *Paepalanthus desperado* Ruhland; *Paepalanthus diamantinensis* Moldenke; *Paepalanthus dianthoides* Mart.; *Paepalanthus dichotomus* Klotzsch ex Körn; *Paepalanthus dichromolepis* Silveira; *Paepalanthus diffissus* Moldenke; *Paepalanthus digitiformis* Hensold; *Paepalanthus diplobetor* Ruhland; *Paepalanthus diversifolius* Silveira; *Paepalanthus dupatya* Mart.; *Paepalanthus elatissimus* Silveira; *Paepalanthus elongatulus* Ruhland; *Paepalanthus ensifolius* (Kunth) Kunth; *Paepalanthus erigeron* Mart.; *Paepalanthus eriophaeus* Ruhland; *Paepalanthus falcatus* (Bong) Körn.; *Paepalanthus fallax* Beauverd; *Paepalanthus farinaceus* F.N. Costa, Adrino & Trovó; *Paepalanthus fasciculifer* Silveira; *Paepalanthus fastigiatus* (Bong) Körn.; *Paepalanthus flaviceps* Körn; *Paepalanthus flavorutilus* Ruhland; *Paepalanthus freyreissii* (Thunb.) Körn.; *Paepalanthus fuscoater* Körn; *Paepalanthus gardnerianus* (Gardner) Walp; *Paepalanthus garimpensis* Silveira; *Paepalanthus glabrescens*

***Paepalanthus sensu stricto* (P)** (277 species; 140 sampled) **Continued**	(Moldenke) Hensold; *Paepalanthus glabrifolius* Ruhland; *Paepalanthus glaucescens* Körn; *Paepalanthus glaucophyllus* Silveira; *Paepalanthus glaucopodus* Silveira; *Paepalanthus glaziovii* Ruhland; *Paepalanthus globosus* Ruhland; *Paepalanthus globulifer* Silveira; *Paepalanthus grao mogolensis* Silveira; *Paepalanthus gyrotrichus* Ruhland; *Paepalanthus harmsii* Ruhland; *Paepalanthus henriquei* Silveira; *Paepalanthus hirtellus* Trovó; *Paepalanthus homomallus* (Bong) Körn.; *Paepalanthus hydra* Ruhland; *Paepalanthus hymenolepis* Silveira; *Paepalanthus implicatus* Silveira; *Paepalanthus inopinatus* Moldenke; *Paepalanthus itacambirensis* Silveira; *Paepalanthus itambeensis* Silveira; *Paepalanthus itatiaiensis* Ruhland; *Paepalanthus kleinii* (Moldenke & L.B.Sm) Trovó; *Paepalanthus klotzschianus* Körn; *Paepalanthus lanatus* Silveira; *Paepalanthus langsdorffii* (Bong) Körn.; *Paepalanthus latifolius* Körn; *Paepalanthus latipes* Silveira; *Paepalanthus laxifolius* Körn; *Paepalanthus leiseringii* Ruhland; *Paepalanthus lepidus* Silveira; *Paepalanthus leucoblepharus* Körn; *Paepalanthus lindenii* Ruhland; *Paepalanthus linearifolius* Silveira; *Paepalanthus lingulatus* (Bong) Körn.; *Paepalanthus lombensis* Silveira; *Paepalanthus longicaulis* Silveira; *Paepalanthus longivaginatus* Tissot-Sq; *Paepalanthus luetzelburgii Herzog*; *Paepalanthus lundii* Körn; *Paepalanthus luteolus* Silveira; *Paepalanthus macaheensis* Körn; *Paepalanthus macrocaulon* Silveira; *Paepalanthus macropodus* Ruhland; *Paepalanthus maculatus* Silveira; *Paepalanthus magalhaesii* Silveira; *Paepalanthus magistrae Sano*; *Paepalanthus melaleucus* (Bong) Körn.; *Paepalanthus melanthus* Silveira; *Paepalanthus mendoncianus* Ruhland; *Paepalanthus meridensis* Klotzsch ex Körn; *Paepalanthus mexiae* Moldenke; *Paepalanthus michaelii* Silveira; *Paepalanthus microphyllus* (Guill.) Kunth; *Paepalanthus minasensis* Moldenke; *Paepalanthus minimus* Silveira; *Paepalanthus minutulus* Mart.; *Paepalanthus miser* Ruhland; *Paepalanthus moedensis* Silveira; *Paepalanthus mollis Kunth*; *Paepalanthus montanus* Silveira; *Paepalanthus multicapitatus* Giul. & E. Miranda; *Paepalanthus multistellaris* Andrino & Sano; *Paepalanthus muscosus* Körn; *Paepalanthus nanus* Silveira; *Paepalanthus neglectus* Körn; *Paepalanthus neopulvinatus* Moldenke; *Paepalanthus nigrescens* Silveira; *Paepalanthus nigricans* Silveira; *Paepalanthus nigricaulis* Silveira; *Paepalanthus nigriflorus* Silveira; *Paepalanthus obconicus* Silveira; *Paepalanthus oblongifolius* Giul. & E. Miranda; *Paepalanthus obnatus* Tissot-Sq; *Paepalanthus ocreatus* Silveira; *Paepalanthus oerstedianus* Körn; *Paepalanthus oligocephalus* Körn; *Paepalanthus orthogonalis* Silveira; *Paepalanthus ovatus* Körn; *Paepalanthus oyapockensis* Herzog; *Paepalanthus pallidus* Silveira; *Paepalanthus parallelinervius* Silveira; *Paepalanthus paramensis* Moldenke; *Paepalanthus parviflorus* (Hensold) Hensold; *Paepalanthus parvifolius* Silveira; *Paepalanthus paulensis* Ruhland; *Paepalanthus paulinus* Ruhland; *Paepalanthus pauper* Moldenke; *Paepalanthus petraeus* Körn; *Paepalanthus planifolius* (Bong) Körn.; *Paepalanthus plantagineus* (Bong) Körn.; *Paepalanthus platycaulis* Silveira; *Paepalanthus plumosus* (Bong) Körn.; *Paepalanthus polygonus* Körn; *Paepalanthus praedensatus* Silveira; *Paepalanthus praemorsus* Ruhland; *Paepalanthus prostratus* Körn; *Paepalanthus pruinosus* Ruhland; *Paepalanthus pseudoelongatus* Ruhland;

***Paepalanthus sensu stricto* (P)** (277 species; 140 sampled) **Continued**	*Paepalanthus pubescens* Körn; *Paepalanthus pulchellus* Herzog; *Paepalanthus pullus* Körn; *Paepalanthus pulvinatus* N.E.Br.; *Paepalanthus reflexus* Silveira; *Paepalanthus refractifolius* Silveira; *Paepalanthus regalis* Mart.; *Paepalanthus regelianus* Körn; *Paepalanthus retusus* Wright; *Paepalanthus revolutus* Hensold; *Paepalanthus rhizocephalus* Silveira; *Paepalanthus riedelianus* (Bong) Körn.; *Paepalanthus rigidifolius* Silveira; *Paepalanthus rigidulus* Mart.; *Paepalanthus rufescens* Silveira; *Paepalanthus ruficeps* Ruhland; *Paepalanthus rufo albus* Silveira; *Paepalanthus rupestris* Gardner; *Paepalanthus saxatilis* (Bong) Körn.; *Paepalanthus schlimii* Körn; *Paepalanthus scholiophyllus* Ruhland; *Paepalanthus schuechianus* Körn; *Paepalanthus scirpeus* Mart.; *Paepalanthus sedoides* Körn; *Paepalanthus senaeanus* Ruhland; *Paepalanthus sericeus* Silveira; *Paepalanthus serpens* Echtern. & Trovó; *Paepalanthus serrinhensis* Silveira; *Paepalanthus sicaefolius* Silveira; *Paepalanthus silverae* Ruhland; *Paepalanthus singularius* Moldenke; *Paepalanthus spathulatus* Körn; *Paepalanthus speleicolus* Silveira; *Paepalanthus sphaeroides* Trovó; *Paepalanthus sphaerulifer* Silveira; *Paepalanthus spirophorus* Silveira; *Paepalanthus spixianus* Mart.; *Paepalanthus stenolepis* Silveira; *Paepalanthus stephanophorus* Silveira; *Paepalanthus striatus* Ruhland; *Paepalanthus stuetzelii* Hensold; *Paepalanthus subfalcatus* Ruhland; *Paepalanthus succisus* Mart.; *Paepalanthus suffruticans* Ruhland; *Paepalanthus superbus* Ruhland; *Paepalanthus supinus* Körn; *Paepalanthus tricholepis* Silveira; *Paepalanthus trichopetalus* Körn; *Paepalanthus tuberosus* (Bong) Körn.; *Paepalanthus uleanus* Ruhland; *Paepalanthus umbrosus* A.M.Giulietti & E. Miranda; *Paepalanthus uncinatus* Gardner; *Paepalanthus undulatus* Ruhland; *Paepalanthus usterii* Beauverd; *Paepalanthus vaginans* Silveira; *Paepalanthus vellozioides* Körn; *Paepalanthus velutiphyllus* F.N.Costa, Andrino & Sano; *Paepalanthus vestitus* Ruhland; *Paepalanthus villosulus* Mart.; *Paepalanthus viridipes* Silveira; *Paepalanthus viridulus* Ruhland; *Paepalanthus xanthopus* Silveira; *Paepalanthus xiphophyllus* Ruhland
Insertae sedis (30 species)	*Paepalanthus bosseri* (Morat) Stützel; *Paepalanthus cristatus* Moldenke; *Paepalanthus itremensis* (Morat) Stützel; *Paepalanthus kanaii* Satake; *Paepalanthus leiothricoides* Silveira; *Paepalanthus moaensis* Gonzales Geigel; *Paepalanthus nipensis* Gonzales; *Paepalanthus alsinoides* Wright; *Paepalanthus belizensis* Moldenke; *Paepalanthus bifidus* (Schrad) Kunth.; *Paepalanthus cururensis* Moldenke; *Paepalanthus fasciculatus* (Rottb.) Kunth; *Paepalanthus fasciculoides* Hensold; *Paepalanthus gentlei* Moldenke; *Paepalanthus lamarckii* Kunth; *Paepalanthus manicatus* Poulsen; *Paepalanthus mellii* Moldenke; *Paepalanthus microcaulon* Ruhland; *Paepalanthus myocephalus* (Mart.) Körn.; *Paepalanthus obtusifolius* (Steud) Körn; *Paepalanthus parvus* Ruhland; *Paepalanthus perpusillus* Kunth; *Paepalanthus plagiostigma* Silveira; *Paepalanthus polytrichoides* Kunth; *Paepalanthus pseudotortilis* Ruhland; *Paepalanthus sessiliflorus* Mart.; *Paepalanthus subtilis* Miq.; *Paepalanthus tenuicaulis* Silveira; *Paepalanthus tortilis* (Bong) Körn.; *Paepalanthus viridis* Körn.

Figure 7: Representative species of *Paepalanthus* within the **B** and **F clades,** showing their delicated habit, erect stems and inflorescences in terminal fascicles. A. *Paepalanthus fasciculoides*; B: *Paepalanthus lamarckii*; C: *Paepalanthus obtusifolius*; D: *Paepalanthus bifidus*.

Figure 8. Representative species of *Paepalanthus* within the **Dyostiche clade (**showing the branching pattern and insertion of the inflorescence. A-B: *Paepalanthus stannardi*; C-D: *Paepalanthus distichophyllus*. Photos: A;B: Thomas Stützel; C: Caroline Andrino; D: Lívia Echternacht.

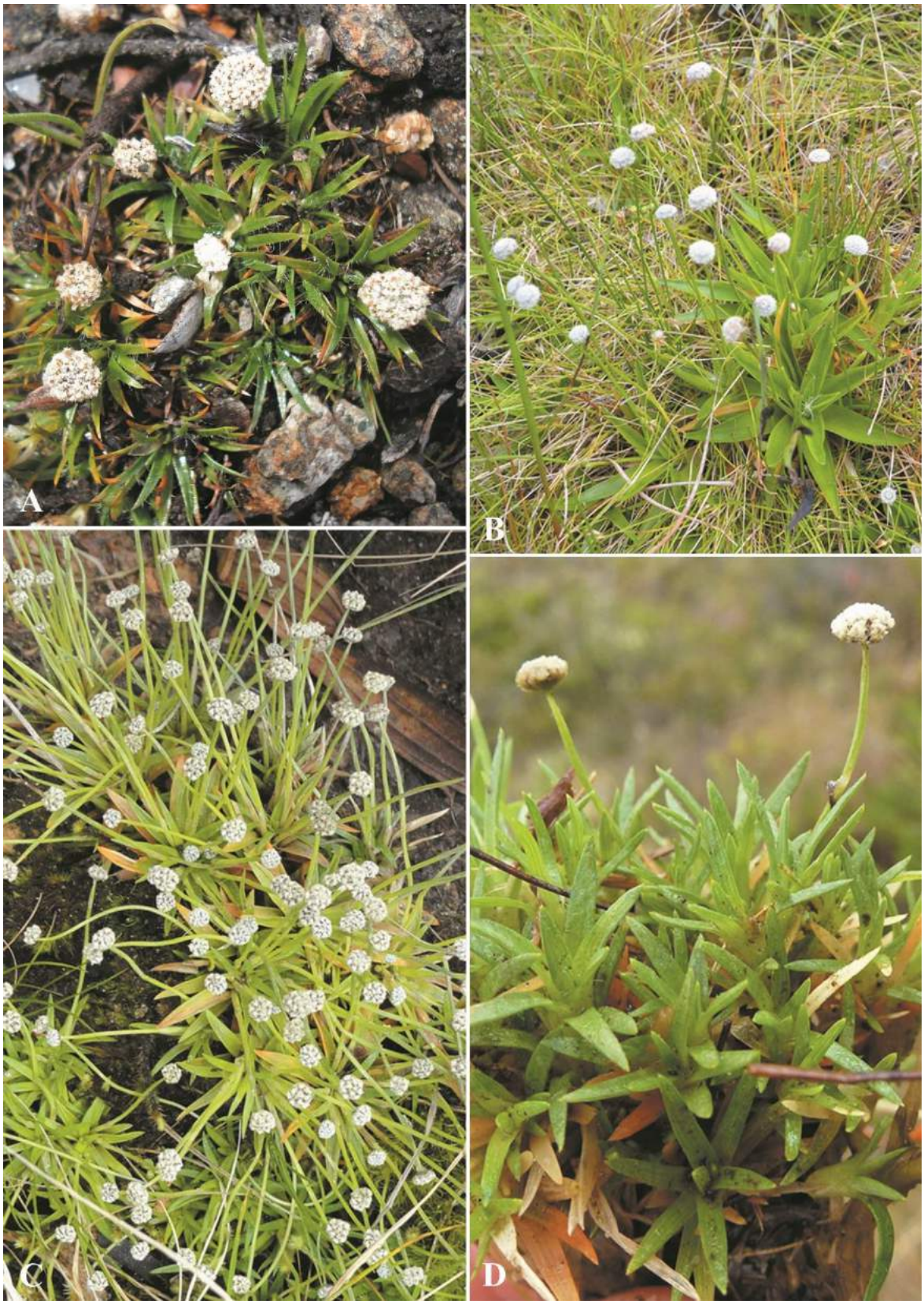


Figure 9. Representative species of *Paepalanthus* within the **Cryptanthella clade**, showing cushion plant growth form. A: *Paepalanthus pilosus*; B: *Paepalanthus catharinae*; C-D: *Paepalanthus dendroides*. Photos: A;C;D. Amalia Dìaz; B; Paulo Schwirkowski.

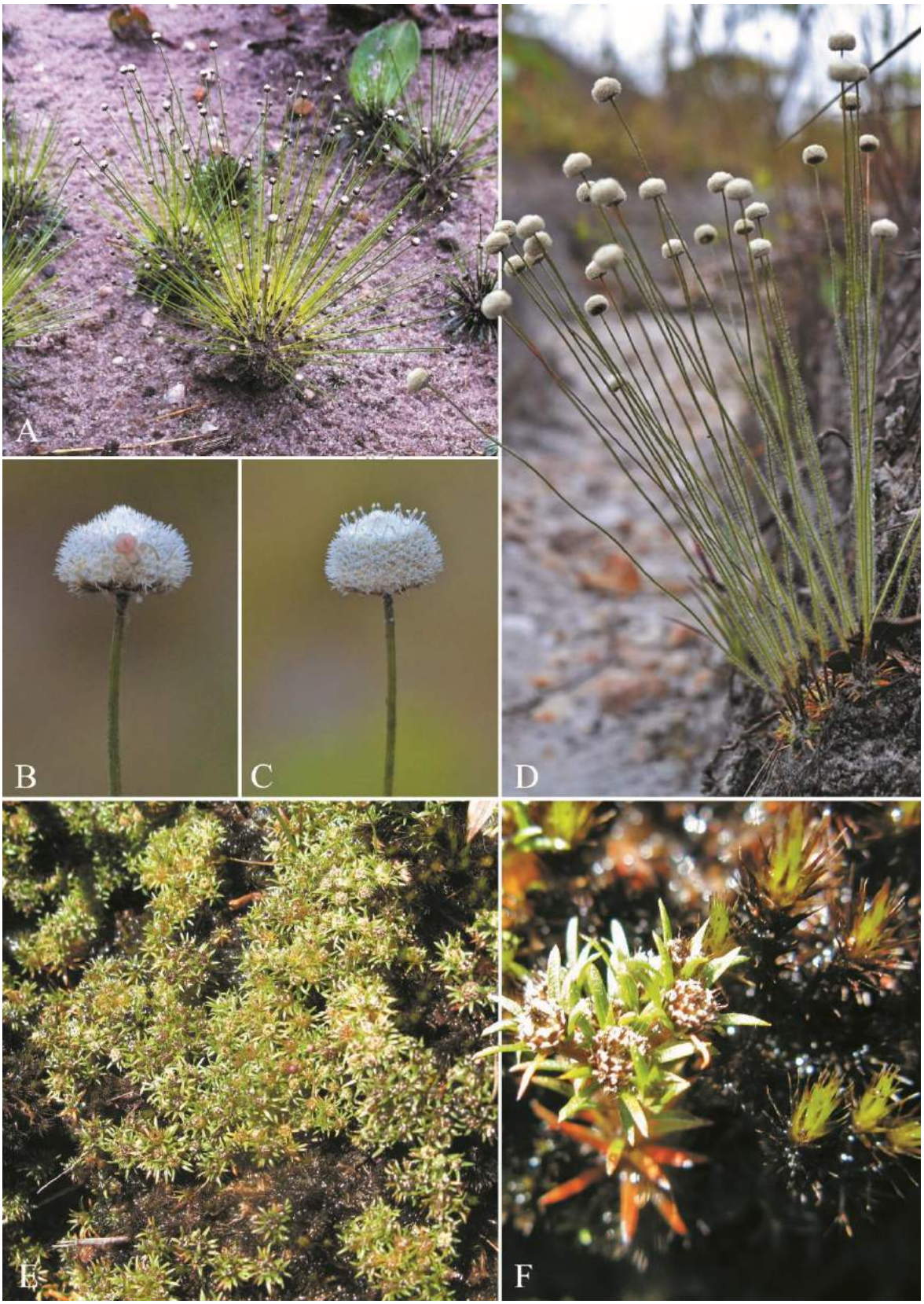


Figure 10. Representative species of *Paepalanthus* within the **Conodiscus clade.** A. *Paepalanthus echinoides*; B-D. *Paepalanthus sphaerocephalus;* E-F. *Paepalanthus scleranthus*. Photos: A: Marcelo Trovó; B-D: Matheus Cota; E-F: Fabiane Costa.

Figure 11. Representative species of ***Actinocephalus***. A;C;D;H: *Actinocephalus polyanthus*. B. *Actinocephalus compactus*. E. *Actinocephalus divaricatus*. F. *Actinocephalus bongardii*. G. *Actinocephalus rigidus*. Photos: A;C;D;H: Mateus Cota; B;E;F;G: Caroline Andrino.

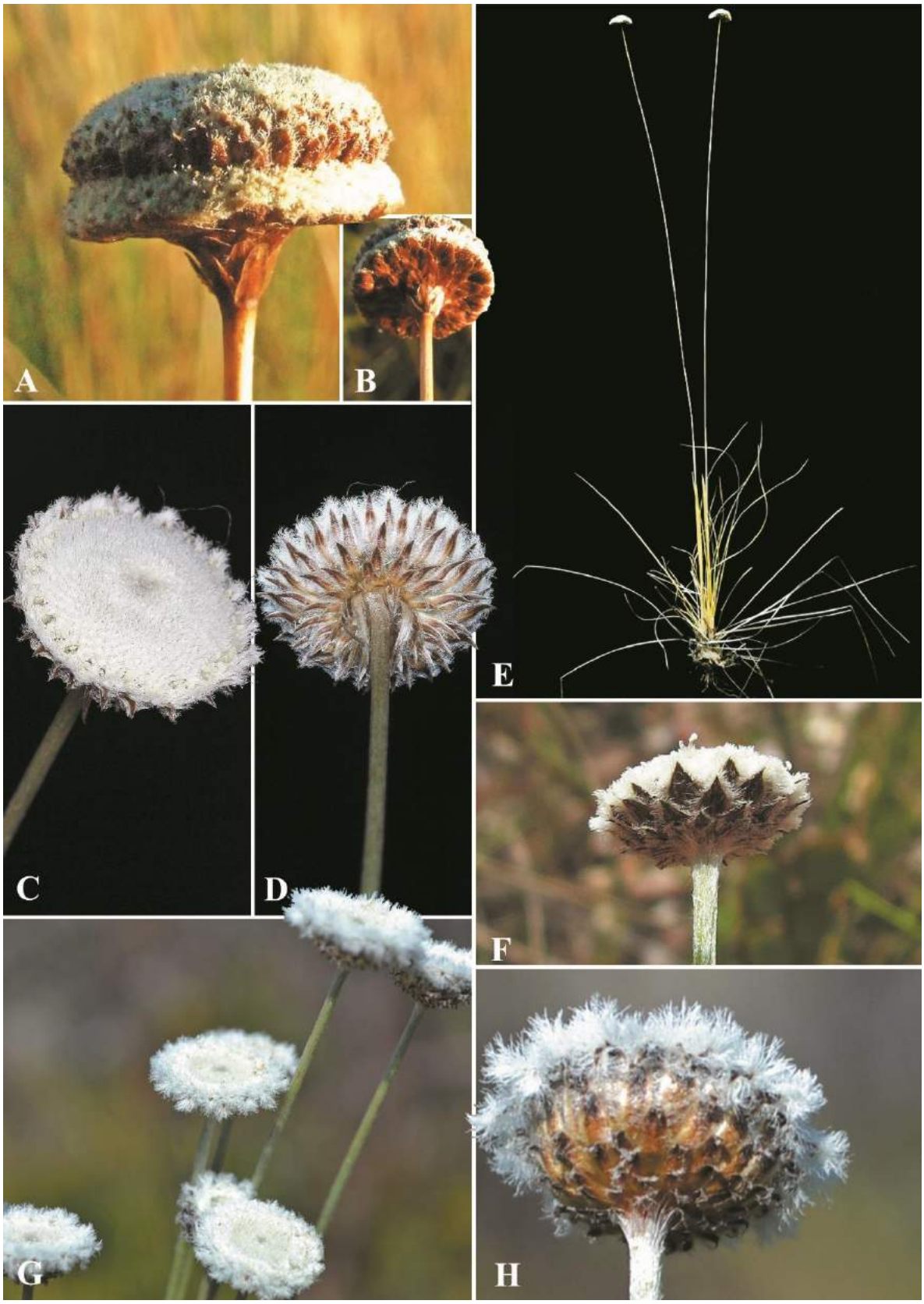


Figure 12. Representative species of *Paepalanthus* within the **Dimeri clade.** A-B: *Paepalanthus vaginatus*; C-E: *Paepalanthus elongatus*; F: *Paepalanthus modestus*; G-H: *Paepalanthus almasensis*. Photos: A-B: Lívia Echternacht; C-E: Maurício Mercadante; G-H: Matheus Cota.

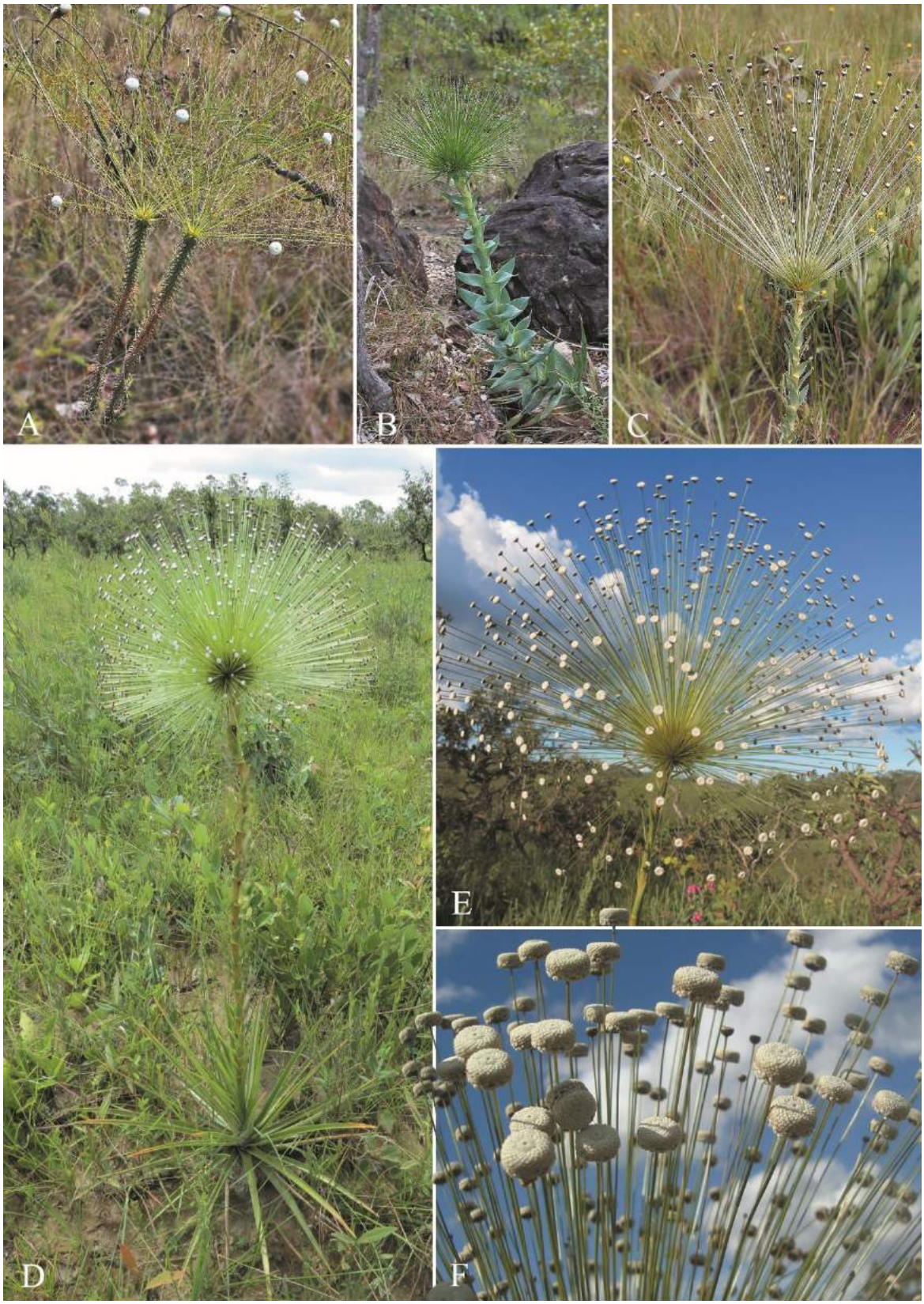


Figure 13. Representative species of *Paepalanthus* within the **Diphyomene clade.** A: *Paepalanthus acanthophyllus*; B: *Paepalanthus koernickei*; C: *Paepalanthus urbanianus*; D-F: *Paepalanthus chiquitensis*. Photos: A-C: Maurício Mercadante; D-F: Caroline Andrino.

Figure 14. Representative species of *Paepalanthus* within the **Monosperma clade.** A: *Paepalanthus roraimensis*; B: *Paepalanthus convexus*. C;D: *Paepalanthus schomburgkii*. Photos: Heike Fürderer.

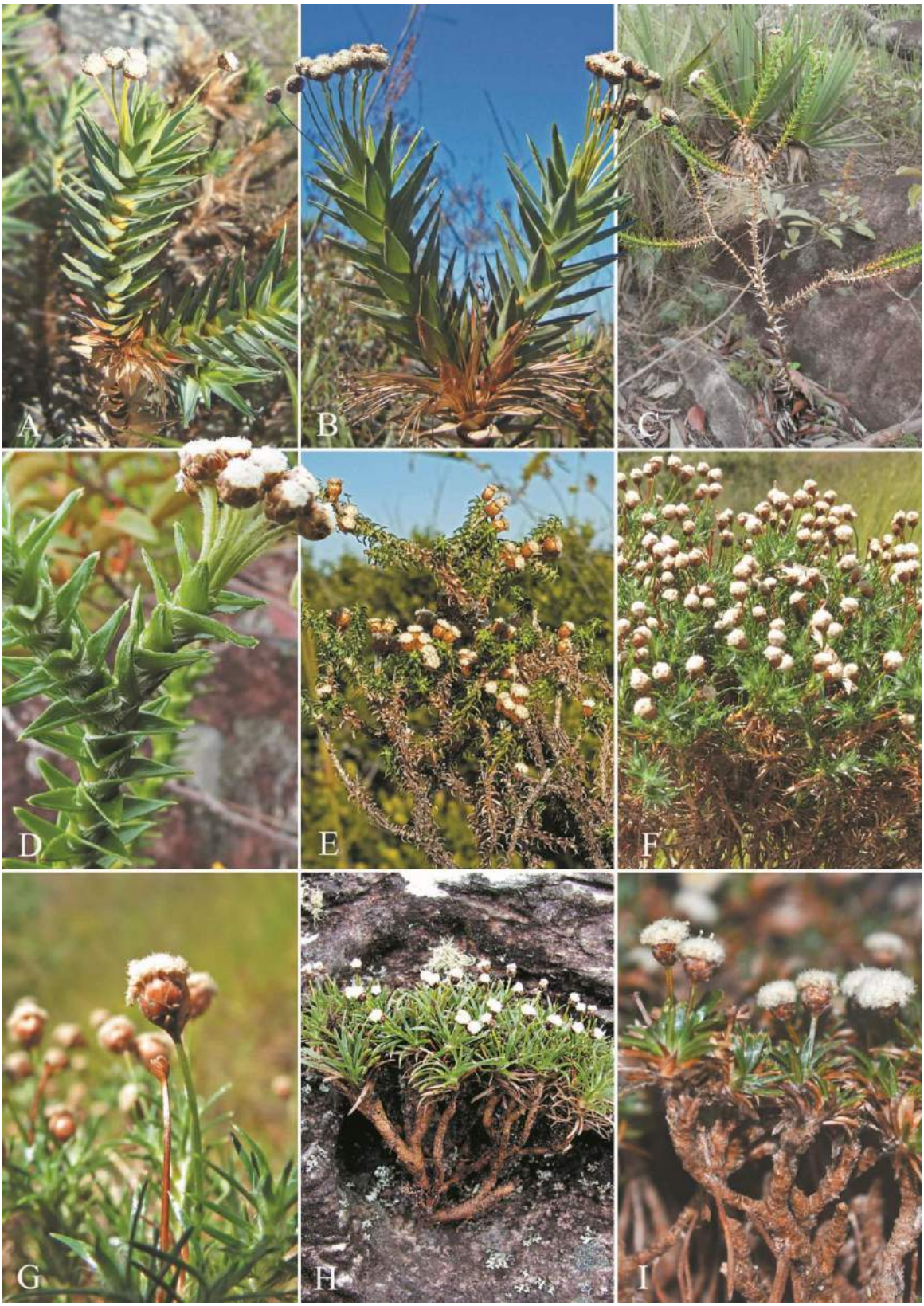


Figure 15. Representative species of *Paepalanthus* within the **V clade.** A;B: *Paepalanthus polygonuss*; C;D: *Paepalanthus sp.* Trovó 630; E: *Paepalanthus sp.* JFaria 8090; F;G: *Paepalanthus glaziovii*. H;I: *Paepalanthus bonsai*. Photos: A;B: Fabiane Costa; C;D;F;G: Caroline Andrino; E: Jair Faria; H: Pedro Fiaschi; I: Matheus Cota.

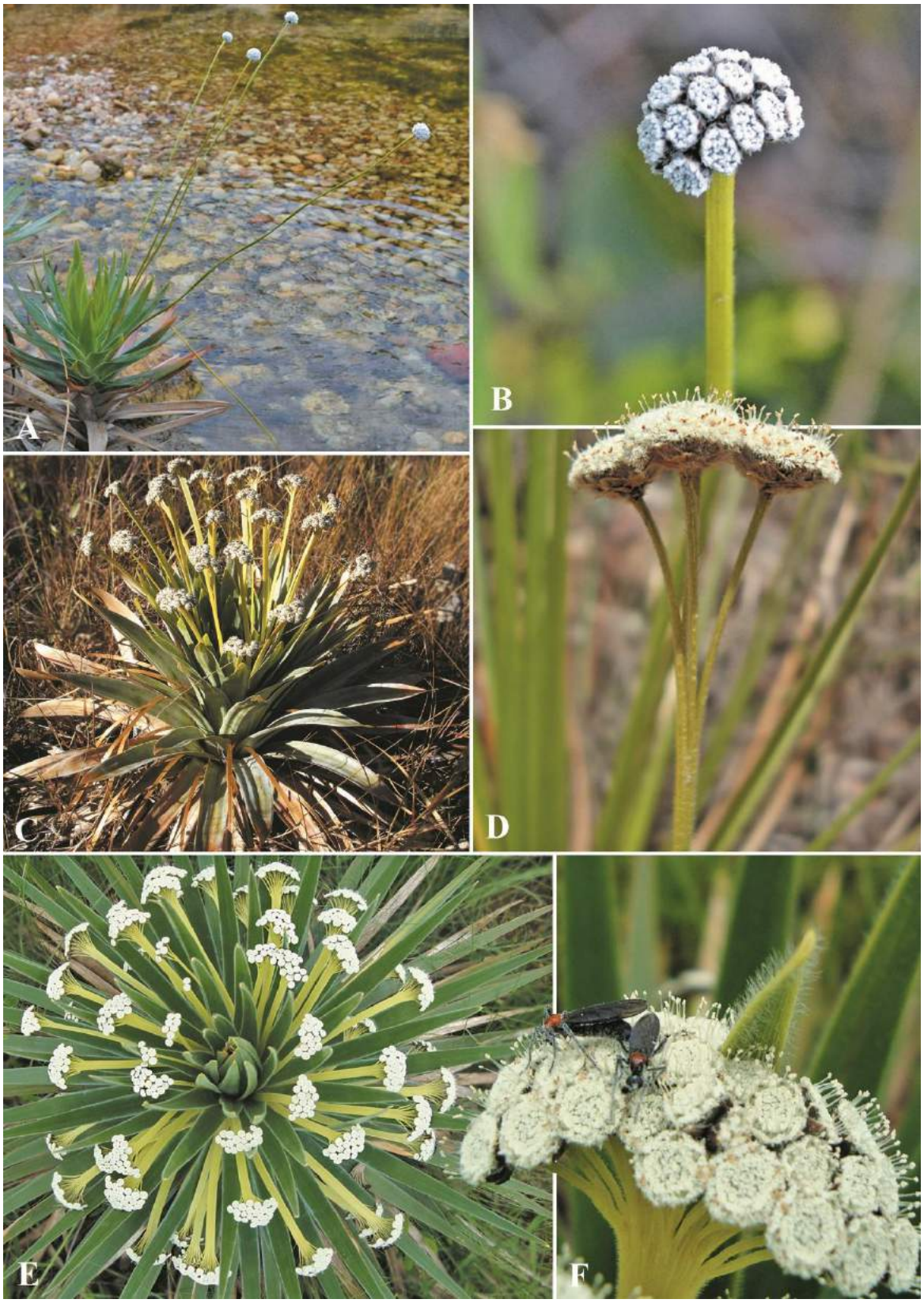


Figure 16. Representative species of ***Paepalanthus* subgen. *Platycaulon*** showing the diagnostic characteristics of the group, the complete (A;B) or partial (C;D;E;F) union of the scapes. A;B: *Paepalanthus macropodus*; C: *Paepalanthus bromelioides*. D: *Paepalanthus trichopetalus*; E;F: *Paepalanthus villosulus*.

References

Andrade, M. J. G. de, A.M. Giulietti, A. Rapini, L.P. de Queiroz, A. de S. Conceição, P.R.M. de Almeida, C. Van den Berg. (2010). A comprehensive phylogenetic analysis of Eriocaulaceae: Evidence from nuclear (*ITS*) and plastid (*psbA-trnH* and *trnL-F*) DNA sequences. *Taxon* 59: 379–388.

Andrino, C.O., Trovó, M. & Sano, P.T. (2016) A field full of green stars: *Paepalanthus multistellaris* (Eriocaulaceae), a new species from Minas Gerais, Brazil. *Phytotaxa* 278 (1): 55–61.

APG II. (2003). An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG II. *Bot. J. Linn. Soc.* 141: 399-436.

APG III. (2009). An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG III. *Bot. J. Linn. Soc.* 161: 105-121.

Baldwin, B. G., and S. Markos. (1998) Phylogenetic utility of the external transcribed spacer (ETS) of 18S–26S rDNA: congruence of ETS and ITS trees of Calycadenia (Compositae). *Mol. Phylogenet. Evol.* 10: 449–463.

Bongard, M. (1831) Essai monographique sur les espèces d'Ériocaulon du Brésil. *Mém Acad. Imp. Sci. St-Pétersbourg*, Sér. 6, Sci Math.: 601–655.

Costa, F.N. & Sano, P.T. (2013) New Circumscription of the Endemic Brazilian Genus Actinocephalus (Eriocaulaceae). *Novon* 22: 281–287.

Devecchi, M. F., Thomas, W. W., Plunkett, G. M. & Pirani, J. R. (2018). Testing the monophyly of Simaba (Simaroubaceae): Evidence from five molecular regions and morphology. *Mol. Phylogenet. Evol.* 120: 63-82.

Doyle, J.J., and J.L. Doyle. (1987). A rapid DNA isolation procedure for small amounts of fresh leaf tissue. *Phytochem. Bull.* 19: 11–15.

Echternacht, L., P.T. Sano, M. Trovó, J.-Y. Dubuisson. (2011). Phylogenetic analysis of the Brazilian microendemic *Paepalanthus* subgenus *Xeractis*(Eriocaulaceae) inferred from morphology. *Bot. J. Linn. Soc.* 167: 137–152.

Giulietti, A. M. and J. R. Pirani. (1988). Patterns of geographic distribution of some plant species from the Espinhaço Range, Minas Gerais and Bahia, Brazil. Pp. 39-69 in *Proceedings of a workshop*

on neotropical distribution patterns held 12-16, January 1987, eds. P. E. Vanzolini, W. R. Heyer. Rio de Janeiro: Academia.

Giulietti, A. M., Amaral, M. C. & Bittrich, V. (1995). Phylogenetic analysis of inter- and infrageneric relationships of Leiothrix Ruhl. (Eriocaulacaceae). *Kew Bull.* 50: 55–71.

Giulietti, A. M., Harley, R. M. & Phillips, S. (1998). (1368) Proposal to change the type of Paepalanthus, nom. cons. (Eriocaulaceae). *Taxon* 47: 743–744.

Giulietti, A.M. & Hensold, N. (1990) Padrões de distribuição geográfica dos gêneros de Eriocaulaceae. *Acta Bot. Bras.* 4: 133–158.

Giulietti, A.M., Andrade, M.J.G, Scatena, V.L., Trovó, M., Coan, A.I., Sano, P.T., Santos, F.A.R, Borges, R.L.B. & van den Berg, C. (2012) Molecular phylogeny, morphology and their implications for the taxonomy of Eriocaulaceae. *Rodriguésia* 63: 1–19.

Givnish, T. J., M. Ames, J. R. McNeal, M. R. McKain, P. R. Steele, S. W. Graham, J. C. Pires, D. W. Stevenson, W. B. Zomlefer, B. G. Briggs, M. R. Duvall. (2010). Assembling the Tree of the monocotyledons: Plastome Sequence Phylogeny and Evolution of Poales. *Ann. Mo. Bot. Gard.* 97: 584-616.

Hensold, N. (1988) Morphology and Systematics of Paepalanthus Subgenus Xeractis (Eriocaulaceae). In: Anderson, C. (ed.), Systematic Botany Monographs 23. The American Society of Plant Taxonomists. Michigan. 150 pp.

Hensold, N. (1991) Revisionary studies in the Eriocaulaceae of Venezuela. *Ann. Mo. Bot. Gard.* 78(2): 426–440.

Hensold, N. (2016) The Andean *Paepalanthus pilosus* complex (Eriocaulaceae): a revision with three new taxa. *PhytoKeys* (64): 1-57.

Hillis, D. M and Dixon, M. T. (1991) Ribosomal DNA: molecular evolution and phylogenic infrrence. *Quar. Rev. Biol.* 66: 411-453.

Koernicke, F. (1863) Eriocaulaceae. In: Martius, K.F.P. & Eichler, A.W. (eds.) *Flora brasiliensis*, vol. 3(1). Typographia Regia. Munique, pp. 271–508. Monachii, Typographia Regia, München.

Kunth, C. S. (1841). Eriocauleae. Pp. 498–539 *in Enumeratio Plantarum*, vol. 3. J. G. Cottae, Stuttgart.

Lovo, J. & Mello–Silva, R. (2015) Two new species of *Pseudotrimezia* (Iridaceae) endemic to Diamantina Plateau, Minas Gerais, Brazil. *Phytotaxa* (Online) 195: 145–153

LPWG - The Legume Phylogeny Working Group. (2017). A new subfamily classification of the Leguminosae based on a taxonomically comprehensive phylogeny. *Taxon* 66 (1): 44–77.

Martius, C. F. P. von. (1841). Herbarium Florae Brasiliensis, 24(2): 275. Monachii, Typographia Regia, München.

Martius, C.F.P. (1834) Die Eriocauleae als selbstständige Pflanzen-Familie aufgestellt und erläutert. *Annls. Sci. Nat.*, Botanique, Sér. 22: 25–43.

Miller M.A., W. Pfeiffer, T. Schwartz (2010) Creating the CIPRES Science Gateway for inference of large phylogenetic trees in pages 1–8 in *Institute of Electrical and Electronics Engineers,* eds. Proceedings of the Gateway Computing Environments Workshop (GCE), November 14, 2010, New Orleans, LA.

Mittermeier, R.A., Gil, R.P., Hoffman, M., Pilgrim, J., Brooks, T., Mittermeier, C.G., Lamoreux, J. & Fonseca, G.A.B. (2005) Hotspots revisited: earth's biologically richest and most endangered terrestrial ecoregions, 2. ed. University of Chicago Press, Boston. 392 p.

Moldenke, H.N. (1980) Notes on new and noteworthy plants. CXXXVII, Vol. 45 (6): 468 - 478

Parra, L.R., Giulietti, A.M., Andrade, M.J.G. & van den Berg, C. (2010) Reestablishment and a new circumscription of Comanthera (Eriocaulaceae). *Taxon* 59: 1135–1146.

Posada D. (2008). jModelTest: phylogenetic model averaging. *Mol. Biol. Evol.* 25: 1253–1256.

Rando, J.G. & Pirani, J.R. (2011) Padrões de distribuição geográfica das espécies de *Chamaecrista* sect. *Chamaecrista* ser. *Coriaceae* (Benth.) H. S. Irwin & Barneby, Leguminosae – Caesalpinioideae. *Rev. Bras. Bot.* 34(4): 499–513.

Rapini, A., Mello-Silva, R. & Kawasaki, M.L. (2002) Richness and endemism in Asclepiadoideae (Apocynaceae) from the Espinhaço Range of Minas Gerais, Brazil – a conservationist view. *Biodivers. Conserv.* 11: 1733–1746.

Rapini, A., Ribeiro, P.L., Lambert, S. & Pirani, J. R. (2008) A flora dos campos rupestres da Cadeia do Espinhaço. *Megadiversidade* 4: 16–24.

Ribeiro, P.L., Rapini, A., Silva, U. C. S., Konno, T. U. P., Damascena, L.S., Berg, C. Van Den. (2012) Spatial analyses of the phylogenetic diversity of Minaria (Apocynaceae): assessing priority areas for conservation in the Espinhaço Range, Brazil. *Syst. Biodivers.*: 317–331.

Ruhland, W. (1903) Eriocaulaceae. In: Engler, A. (ed.), Das Pflanzenreich 4(3): 1–249. Wilhelm Engelmann. Leipzig, pp. 1–294.

Sanderson M.J., Driskell A.C., Ree R.H., Eulenstein O, Langley S. (2003) Obtaining maximal concatenated phylogenetic data sets from large sequence databases. *Mol. Biol. Evol.* 20: 1036–42.

Sano, P.T., Giulietti, A.M., Trovó, M., Parra, L.R. & Müller, G. (2010) Flora de Grão Mogol, Minas Gerais: Eriocaulaceae. Boletim de Botânica da Universidade de São Paulo 28: 125–140.

Silva, Arthur de Lima Silva, Marcelo Trovó, Alessandra Ike Coan (2016) Floral development and vascularization help to explain merism evolution in Paepalanthus (Eriocaulaceae, Poales). *PeerJ.* 4: e 2811.

Silveira F.A.O., Negreiros D., Barbosa N.P.U., Buisson E., Carmo F.F., Carstensen D.W., Conceição A.A., Cornelissen T.G., Echternacht L., Fernandes G.W., Garcia Q.S., Guerra T.J., Jacobi C.M., Lemos-Filho J.P., Le Stradic S., Morellato L.P.C., Neves F.S., Oliveira R.S., Schaefer C.E., Viana P.L., Lambers H. (2016) Ecology and evolution of plant diversity in the endangered campo rupestre: a neglected conservation priority. Plant Soil 403: 129–152.

Silveira, A. (1908) Flora e serras mineiras. Imprensa Official. Bello Horizonte. 79 pp.

Silveira, A. (1928) Floralia montium. Vol. 1. Imprensa Official. Bello Horizonte. 206 pp.

Stamatakis A, Ludwig T, Meier H. (2005) Raxml-iii: a fast program for maximum likelihood-based inference of large phylogenetic trees. *Bioinformatics* (21): 456–463.

Stützel, T. & and Trovó, M. (2013) Inflorescences in Eriocaulaceae: taxonomic relevance and practical implications. *Ann Bot.* 112(8): 1505–1522.

Tissot-Squalli, H.M.L. (1997) Monographische Bearbeintung von Paepalanthus subgenus Platycaulon. *J. Cramer. Berlin.* 242 pp.

Trovó, M., Andrade, M.J.G., Sano, P.T., Ribeiro, P.L. & van den Berg, C. (2013) Molecular phylogenetics and biogeography of Neotropical Paepalanthoideae with emphasis on Brazilian *Paepalanthus* (Eriocaulaceae). *Bot. J. Linn. Soc.* 171: 225–243.

Appendix

Appendix I. List of species of newly generated sequences of Eriocaulaceae included in the molecular analysis with voucher information.

Species	Provenance	Voucher
Actinocephalus bongardii (A.St.-Hil.) Sano	Brazil	M.Trovó 416 (SPF)
Actinocephalus brachypus (Bong.) Sano	Brazil	M.Trovó 365 (SPF)
Actinocephalus divaricatus (Körn.) Sano	Brazil	M.Trovó 414 (SPF)
Actinocephalus geniculatus (Bong.) F.N.Costa	Brazil	M.Trovó 418 (SPF)
Actinocephalus glareosus (Bong.) F.N.Costa	Brazil	M.Trovó 143 (SPF)
Actinocephalus phaeocephalus (Ruhland) F.N.Costa	Brazil	C.O.Andrino 413 (SPF)
Actinocephalus ramosus (Wikstr.) Sano	Brazil	M.Trovó 397 (SPF)
Comanthera magnifica (Giul.) L.R.Parra & Giul.	Brazil	L.Echter 2309 (BHCB)
Comanthera mucugensis (Giul.) L.R.Parra & Giul.	Brazil	C.O.Andrino 334 (SPF)
Lachnocaulon anceps (Walter) Morong	United States	M.T.Strong 1535 (SPF)
Lachnocaulon beyrichianum Sporl. ex Körn.	United States	D.S.Correll 51940 (NY)
Lachnocaulon digynum Körn.	United States	S.L.Orzell 12359 (NY)
Lachnocaulon engleri Ruhland	United States	R.Kral 18426 (NY)
Leiothrix crassifolia (Bong.) Ruhland	Brazil	M.Trovó 145 (SPF)
Leiothrix distichoclada Herzog	Brazil	M.Trovó 271 (SPF)
Leiothrix raymondii Giul. & D.M.Silva	Brazil	C.O.Andrino 329 (SPF)
Paepalanthus acanthophyllus Ruhland	Brazil	L.Echter 1733 (BHCB)
Paepalanthus albiceps Silveira	Brazil	C.O.Andrino 241 (SPF)
Paepalanthus albo-vaginatus Silveira	Brazil	L.Echter 2610 (BHCB)
Paepalanthus albo-villosus Silveira	Brazil	F.N.Costa 265 (SPF)
Paepalanthus almasensis Moldenke	Brazil	R.Barbosa 848 (HUEFS)
Paepalanthus almasensis Moldenke	Brazil	R.M. Harley 19768 (LL)
Paepalanthus alpinus Körn.	Colombia	A.Díaz 265 (LL)
Paepalanthus alsinoides C.Wright	Cuba	W.Greute 25933 (NY)
Paepalanthus alsinoides C.Wright	Cuba	Brother Leon 17797 (NY)
Paepalanthus aretioides Ruhland	Brazil	L.Echter 1831 (BHCB)
Paepalanthus argenteus (Bong.) Körn.	Brazil	C.O.Andrino 59 (SPF)
Paepalanthus argyrotrychus F.N.Costa, Andrino & Echtern.	Brazil	F.N.Costa 1542 (DIAM)
Paepalanthus aristatus Moldenke	Venezuela	G.Davidse 16947 (NY)
Paepalanthus balansae Ruhland	Paraguai	D. R. Brunner 1510 (SPF)
Paepalanthus baraunensis Silveira	Brazil	F.N.Costa 1461 (DIAM)
Paepalanthus baraunensis Silveira	Brazil	M.Trovó 412 (SPF)
Paepalanthus barbulatus Herzog	Brazil	M.Cota 1069 (SPF)
Paepalanthus barbulatus Herzog	Brazil	P.T.Sano 52167 (SPF)
Paepalanthus belizensis Moldenke	Belize	J.D.Dwyer 10719 (NY)
Paepalanthus bifidus (Schrad.) Kunth	Brazil	M.Trovó 262 (SPF)
Paepalanthus bifidus (Schrad.) Kunth	Brazil	F.N.Costa 1567 (DIAM)
Paepalanthus bombacinus Silveira	Brazil	F.N.Costa 1438 (DIAM)
Paepalanthus bonsai Trovó & Sano	Brazil	C.O.Andrino 235 (SPF)

Paepalanthus brevicaulis Silveira	Brazil	L.Echter 1720 (BHCB)
Paepalanthus bryoides (Bong.) Kunth	Brazil	F.N.Costa 1456 (DIAM)
Paepalanthus caldensis Malme	Brazil	F.C.Vieira 2032 (SPF)
Paepalanthus calvulus (Ruhland) Hensold	Brazil	C.O.Andrino 72 (SPF)
Paepalanthus calvus Körn.	Brazil	W.P.Leite 01 (RB)
Paepalanthus camptophyllus Ruhland	Brazil	L.Echter 1643 (BHCB)
Paepalanthus canastrensis Silveira	Brazil	M.Trovó 392 (SPF)
Paepalanthus canescens (Bong.) Körn.	Brazil	C.O.Andrino 302 (SPF)
Paepalanthus canescens (Bong.) Körn.	Brazil	C.O.Andrino 68 (SPF)
Paepalanthus canescens var. *atratus* Moldenke	Brazil	M.Trovó 652 (SPF)
Paepalanthus capillifolius Moldenke	Brazil	C.O.Andrino 230 (SPF)
Paepalanthus carvalhoi Giul. & E.B.Miranda	Brazil	C.O.Andrino 345 (SPF)
Paepalanthus catharinae Ruhland	Brazil	F.C.Vieira 2050 (SPF)
Paepalanthus cephalotrichus Silveira	Brazil	J.R.Pirani 5525 (SPF)
Paepalanthus chiapensis Moldenke	Mexico	C.A.Purpus 179 (NY)
Paepalanthus chrysolepis Silveira	Brazil	M.Trovó 426 (SPF)
Paepalanthus ciliolatus Ruhland	Brazil	L.Echter 1639 (BHCB)
Paepalanthus cinereus Giul. & L.R.Parra	Brazil	C.O.Andrino 328 (SPF)
Paepalanthus comans Silveira	Brazil	C.O.Andrino 56 (SPF)
Paepalanthus complanatus Silveira	Brazil	L.Echter 2296 (BHCB)
Paepalanthus contasensis Moldenke	Brazil	R.M.Harley 19900 (LL)
Paepalanthus convexus Gleason	Venezuela	J.A.Steyermark 58351 (NY)
Paepalanthus cordatus Ruhland	Brazil	M.Trovó 443 (SPF)
Paepalanthus costaricensis Moldenke ex Standl.	Costa Rica	G.Davidse 28567 (NY)
Paepalanthus costaricensis Moldenke ex Standl.	Costa Rica	K.Barringer 2890 (NY)
Paepalanthus crateriformis Silveira	Brazil	M.M.Arbo 4574 (SPF)
Paepalanthus dasynema Ruhland	Brazil	C.O.Andrino 61 (SPF)
Paepalanthus dendroides (Kunth) Kunth	Costa Rica	G.Davidse 25928 (NY)
Paepalanthus diamantinensis Moldenke	Brazil	Mello-Barreto 9920 (NY)
Paepalanthus dichotomus Klotzsch ex Körn.	Venezuela	B.Maguire 33729 (NY)
Paepalanthus dichotomus Klotzsch ex Körn.	Venezuela	R.Kral 70603 (NY)
Paepalanthus digitiformis Hensold	Brazil	L.Echter 1975 (BHCB)
Paepalanthus diplobetor Ruhland	Brazil	M.Trovó 359 (SPF)
Paepalanthus distichophyllus Mart.	Brazil	C.O.Andrino 243 (SPF)
Paepalanthus echinoides Trovó	Brazil	M.Trovó 647 (SPF)
Paepalanthus elongatus (Bong.) Körn.	Brazil	C.O.Andrino 304 (SPF)
Paepalanthus elongatus (Bong.) Körn.	Brazil	C.O.Andrino 412 (SPF)
Paepalanthus elongatus (Bong.) Körn.	Brazil	M.Trovó 288 (SPF)
Paepalanthus elongatus (Bong.) Körn.	Brazil	C.O.Andrino 300 (SPF)
Paepalanthus erectifolius Silveira	Brazil	C.O.Andrino 336 (SPF)
Paepalanthus erigeron Mart. ex Körn.	Brazil	C.O.Andrino 337 (SPF)
Paepalanthus eriophaeus Ruhland	Brazil	C.O.Andrino 62 (SPF)
Paepalanthus eriophaeus Ruhland	Brazil	M.Kubo 207 (SPF)
Paepalanthus eriophaeus Ruhland	Brazil	M.Trovó 348 (SPF)
Paepalanthus farinaceus F.N.Costa, Andrino & Trovó	Brazil	F.N.Costa 1538 (DIAM)
Paepalanthus fasciculifer Silveira	Brazil	F.N.Costa 1510 (DIAM)
Paepalanthus flaccidus (Bong.) Kunth	Brazil	C.O.Andrino 223 (SPF)
Paepalanthus flavorutilus Ruhland	Brazil	M.Trovó 341 (SPF)
Paepalanthus fraternus N.E.Br.	Guiana	R.Liesner 23223 (NY)

Paepalanthus freyreissii (Thunb.) Körn.	Brazil	P.M.Gonella 619 (SPF)
Paepalanthus fulgidus Moldenke	Venezuela	R.Liesner 2339 (NY)
Paepalanthus glabrifolius Ruhland	Brazil	H.Freitas 11 (RB)
Paepalanthus glaziovii Ruhland	Brazil	C.O.Andrino 245 (SPF)
Paepalanthus gleasonii Moldenke	Venezuela	J.Steyermark 103892 (NY)
Paepalanthus gomesii Silveira	Brazil	L.Echter 2263 (BHCB)
Paepalanthus guaraiensis Moldenke	Brazil	G.Hatschbach (LL)
Paepalanthus harleyi Moldenke	Venezuela	J.A.Steyermark 101060 (SPF)
Paepalanthus harleyi Moldenke	Brazil	R.M.Harley 19728 (LL)
Paepalanthus harmsii Ruhland	Brazil	L.Echter 1623 (BHCB)
Paepalanthus implicatus Silveira	Brazil	F.N.Costa 1367 (DIAM)
Paepalanthus itambeensis Silveira	Brazil	L.Echter 1781 (BHCB)
Paepalanthus itatiaiensis Ruhland	Brazil	H.Freitas 9 (RB)
Paepalanthus karstenii Ruhland	Colombia	A.Díaz 235 (LL)
Paepalanthus klotzschianus Körn.	Brazil	C.O.Andrino 322 (SPF)
Paepalanthus lamarckii Kunth	Belize	P.F.Zika 11452 (NY)
Paepalanthus latifolius Körn.	Brazil	C.O.Andrino 55 (SPF)
Paepalanthus leucoblepharus Körn.	Brazil	L.Echter 1641 (BHCB)
Paepalanthus lodiculoides Moldenke	Colombia	J.Betanair 150 (NY)
Paepalanthus loxensis Moldenke	Ecuador	H.Balsev 3220 (NY)
Paepalanthus lundii Körn.	Brazil	M.R.Fantinati (SPF)
Paepalanthus macaheensis Körn.	Brazil	P.M.Gonella 620 (SPF)
Paepalanthus macrocaulon Silveira	Brazil	C.O.Andrino 323 (SPF)
Paepalanthus macrocaulon var. *contasensis* Moldenke	Brazil	R.M.Harley 19804 (LL)
Paepalanthus macrocephalus (Bong.) Körn.	Brazil	C.O.Andrino 103 (SPF)
Paepalanthus macrocephalus (Bong.) Körn.	Brazil	C.O.Andrino 311 (SPF)
Paepalanthus macrocephalus (Bong.) Körn.	Brazil	C.O.Andrino 316 (SPF)
Paepalanthus macrocephalus (Bong.) Körn.	Brazil	F. Machado 6 (HUFU)
Paepalanthus macrocephalus (Bong.) Körn.	Brazil	L.Echter 2194 (BHCB)
Paepalanthus maculatus Silveira	Brazil	P.M.Gonella 723 (SPF)
Paepalanthus mendoncianus Ruhland	Brazil	R. Mendonça 320 (LL)
Paepalanthus microphyllus (Guill.) Kunth	Brazil	C.Costa 13 (DIAM)
Paepalanthus mollis Körn. var. *itambeensis* Hensold	Brazil	F.N.Costa 1281 (DIAM)
Paepalanthus montanus Silveira	Brazil	F.N.Costa 1465 (DIAM)
Paepalanthus multistellaris Andrino & Sano	Brazil	C.O.Andrino 236 (SPF)
Paepalanthus nigrescens Silveira	Brazil	C.O.Andrino 307 (SPF)
Paepalanthus nipensis Gonz.Géigel	Cuba	A.Urquiola 141 (NY)
Paepalanthus obconicus Silveira	Brazil	L.Echter 2154 (BHCB)
Paepalanthus oblongifolius Giul. & E.B.Miranda	Brazil	R.Barbosa 770 (HUEFS)
Paepalanthus obtusifolius (Steud.) Körn.	Brazil	M.Cota 1048 (SPF)
Paepalanthus oerstedianus Körn.	Brazil	Custódio-Filho 2660 (SPF)
Paepalanthus orthogonalis Silveira	Brazil	L.Echter 1876 (BHCB)
Paepalanthus ovatus Körn.	Brazil	H.Freitas 4 (RB)
Paepalanthus paramensis Moldenke	Colombia	A.Díaz 228 (LL)
Paepalanthus paramensis Moldenke	Peru	J.J.Wudarck 1296 (NY)
Paepalanthus pilosus (Kunth) Kunth	Equador	B.Ollgard 9557 (NY)
Paepalanthus pilosus (Kunth) Kunth	Brazil	R.W.Lent 143 (NY)
Paepalanthus planifolius (Bong.) Körn.	Brazil	M.Trovó 643 (SPF)
Paepalanthus plumosus (Bong.) Körn.	Brazil	C.O.Andrino 58 (SPF)

Paepalanthus polycladus Silveira	Brazil	L.Echter 2475 (BHCB)
Paepalanthus polygonus Körn.	Brazil	F.N.Costa 1490 (DIAM)
Paepalanthus polytrichoides Kunth	Brazil	A.C.Sevilha 5640 (SPF)
Paepalanthus praemorsus Ruhland	Brazil	C.O.Andrino 319 (SPF)
Paepalanthus pseudotortilis Ruhland	Brazil	H.Freitas 10 (RB)
Paepalanthus pulchellus Herzog	Brazil	C.O.Andrino 339 (SPF)
Paepalanthus pulchellus Herzog	Brazil	M.Trovó 261 (SPF)
Paepalanthus pulchellus Herzog	Brazil	C.O.Andrino 331 (SPF)
Paepalanthus pulvinatus N.E.Br.	Brazil	C.O.Andrino 338 (SPF)
Paepalanthus reflexus Silveira	Brazil	G.Hatschbach 72139 (NY)
Paepalanthus reflexus Silveira	Brazil	L.Echter 1853 (BHCB)
Paepalanthus regalis Mart. ex Körn.	Brazil	M.Cota 1108 (SPF)
Paepalanthus regalis Mart. ex Körn.	Brazil	M.Trovó 270 (SPF)
Paepalanthus regalis Mart. ex Körn.	Brazil	L.Echter 1696 (BHCB)
Paepalanthus regelianus Körn.	Brazil	M.Trovó 377 (SPF)
Paepalanthus repens (Lam.) Körn.	Dominican Republic	A.H.Liogier 21742 (NY)
Paepalanthus ruficeps Ruhland	Brazil	M.P.Tannure 29 (SPF)
Paepalanthus rupestris Gardner	Brazil	F.N.Costa 1534 (DIAM)
Paepalanthus scandens Ruhland	Brazil	M.Trovó 653 (SPF)
Paepalanthus scirpeus Mart. ex Körn.	Brazil	M.Trovó 217 (SPF)
Paepalanthus scleranthus Ruhland	Brazil	F.N.Costa 1274 (DIAM)
Paepalanthus scleranthus Ruhland	Brazil	M.Trovó 355 (SPF)
Paepalanthus serpens Echtern. & Trovó	Brazil	L.Echter 2316 (BHCB)
Paepalanthus serrinhensis Silveira	Brazil	P.M.Gonella 696 (SPF)
Paepalanthus serrinhensis Silveira	Brazil	P.M.Gonella 768 (SPF)
Paepalanthus seslerioides Griseb. var. *carabiae* Moldenke	Cuba	J.P.Carabia 3995 (NY)
Paepalanthus silveirae Ruhland	Brazil	L.Echter 1666 (BHCB)
Paepalanthus sp.	Brazil	C.O.Andrino 340 (SPF)
Paepalanthus sp.	Brazil	C.O.Andrino 310 (SPF)
Paepalanthus sp.	Brazil	C.O.Andrino 327 (SPF)
Paepalanthus sp. 1	Brazil	B.Louille 331 (SPF)
Paepalanthus sp. 2	Brazil	M.Trovó 630 (SPF)
Paepalanthus sp. 5	Brazil	J.Faria 8090 (UB)
Paepalanthus sp. 6	Brazil	R.Forzza 8002 (RB)
Paepalanthus sp. 7	Brazil	C.O.Andrino 318 (SPF)
Paepalanthus spathulatus Körn.	Brazil	R.Barbosa 852 (HUEFS)
Paepalanthus sphaerocephalus Ruhland	Brazil	F.N.Costa 1556 (DIAM)
Paepalanthus sphaerocephalus Ruhland	Brazil	M.Trovó 285 (SPF)
Paepalanthus spixianus Mart.	Brazil	L.Echter 1714 (BHCB)
Paepalanthus stannardii Giul. & L.R.Parra	Brazil	C.O.Andrino 324 (SPF)
Paepalanthus stannardii Giul. & L.R.Parra	Brazil	C.O.Andrino 342 (SPF)
Paepalanthus subfalcatus Ruhland	Brazil	C.O.Andrino 303 (SPF)
Paepalanthus subfalcatus Ruhland	Brazil	C.O.Andrino 317 (SPF)
Paepalanthus subfalcatus Ruhland	Brazil	F.N.Costa 1336 (DIAM)
Paepalanthus subfalcatus Ruhland	Brazil	M.Cota 973 (SPF)
Paepalanthus subfalcatus Ruhland	Brazil	M.P.Tannure 28 (SPF)
Paepalanthus subfalcatus Ruhland	Brazil	M.P.Tannure 30 (SPF)
Paepalanthus subfalcatus var. *villosus* Moldenke	Brazil	H.S.Irwin 28201 (LL)

Paepalanthus succisus Mart. *ex* Körn.	Brazil	M.Trovó 281 (SPF)
Paepalanthus superbus Ruhland	Brazil	C.O.Andrino 60 (SPF)
Paepalanthus tessmannii Moldenke	Brazil	V.C.Souza 7373 (SPF)
Paepalanthus tortilis (Bong.) Mart.	Brazil	M.Trovó 259 (SPF)
Paepalanthus trichopetalus Körn.	Brazil	F.N.Costa 1557 (DIAM)
Paepalanthus trichophyllus (Bong.) Körn.	Brazil	L.Echter 2496 (BHCB)
Paepalanthus trichophyllus (Bong.) Körn.	Brazil	F.N.Costa 1725 (DIAM)
Paepalanthus urbanianus Ruhland	Brazil	M.Trovó 435 (SPF)
Paepalanthus vaginatus Körn.	Brazil	L.Echter 2466 (BHCB)
Paepalanthus vellozioides Körn.	Brazil	L.Echter 1734 (BHCB)
Paepalanthus velutiphyllus F.N.Costa, Andrino & Sano	Brazil	F.N.Costa 1533 (DIAM)
Paepalanthus viridipes Silveira	Brazil	M.Trovó 337 (SPF)
Paepalanthus xanthopus Silveira	Brazil	L.Echter 1817 (BHCB)
Paepalanthus xanthopus Silveira	Brazil	L.Echter 1857 (BHCB)
Paepalanthus xanthopus Silveira	Brazil	P.Fiaschi 3094 (SPF)
Paepalanthus macrocaulon var. *kingii* Moldenke	Brazil	S.A.Mori 12478 (LL)
Paepalanthus pedunculatus (Bong.) Ruhland	Brazil	F.N.Costa 1361 (DIAM)
Paepalanthus pedunculatus (Bong.) Ruhland	Brazil	L.Echter 1751 (BHCB)
Paepalanthus pilosus (Kunth) Kunth.	Ecuador	H.Balslev 1535 (NY)
Paepalanthus pubescens Körn.	Brazil	L.Echter 1674 (BHCB)
Paepalanthus pubescens Körn.	Brazil	M.Trovó 251 (SPF)
Paepalanthus pubescens Körn.	Brazil	M.Trovó 394 (SPF)
Paepalanthus pungens Griseb.	Cuba	A. Urquiola 322 (NY)
Paepalanthus pungens Griseb.	Cuba	Brother Leon 20149 (NY)
Paepalanthus retusus C.Wright	Brazil	E.L.Ekman 12806 (NY)
Paepalanthus seslerioides Griseb. var. *carabiae* Moldenke	Cuba	J.P.Carabia 3871 (NY)
Syngonanthus arenarius Ruhland var. *heterophyllus (*Körn.*)* Ruhland	Brazil	M.Trovó 349 (SPF)
Syngonanthus vernonioides (Kunth) Ruhland	Brazil	M.Trovó 345 (SPF)
Syngonanthus verticillatus (Bong.) Ruhland	Brazil	J.Lovo 205 (SPF)
Syngonanthus xeranthemoides (Bong.) Ruhland	Brazil	M.Trovó 170 (SPF)
Tonina fluviatilis Aubl.	Brazil	C.O.Andrino 430 (SPF)

Appendix II. Accession numbers used in the phylogenetic analysis downloaded from the GenBank.

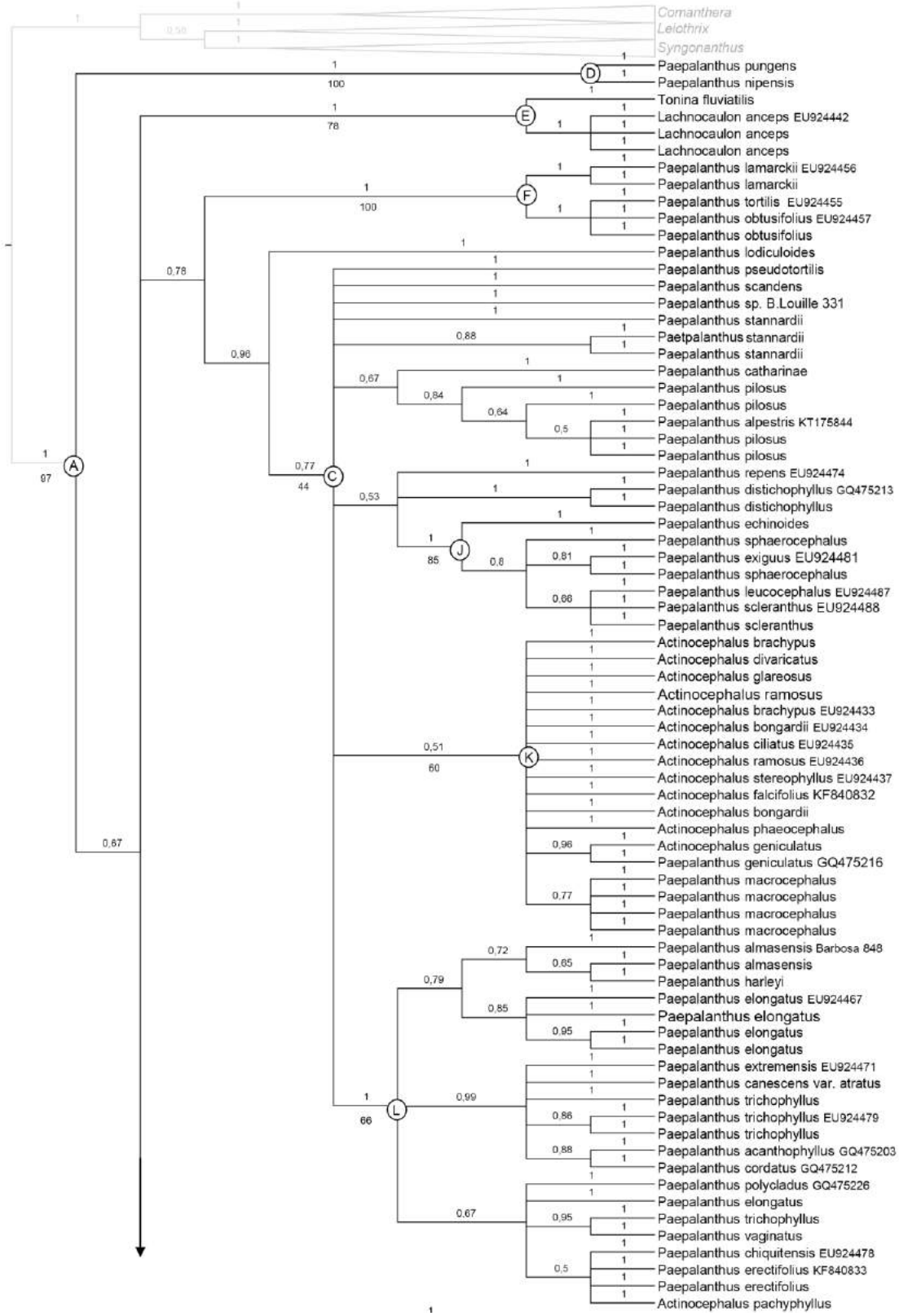
Species	Genbank Accession	
	trnL-F	ITS
Actinocephalus bongardii (A.St.-Hil.) Sano	EU924434	EU924282
Actinocephalus brachypus (Bong.) Sano	EU924433	EU924281
Actinocephalus ciliatus (Bong.) Sano	EU924435	EU924283
Actinocephalus deflexus F.N.*Costa*	–	KT175787
Actinocephalus falcifolius (Körn.) Sano	KF840832	KT175788
Actinocephalus geniculatus (Bong.) F.N.Costa	GQ475216	GQ475248
Actinocephalus glareosus (Bong.) F.N.Costa	–	EU924322
Actinocephalus polyanthus (Bong.) Sano	–	KT175789
Actinocephalus ramosus (Wikstr.) Sano	EU924436	EU924284
Actinocephalus stereophyllus (Ruhland) Sano	EU924437	EU924285
Comanthera aciphylla (Bong.) L.R.Parra & Giul.	EU924491	–
Comanthera bisulcata (Körn.) L.R.Parra & Giul.	EU924496	–
Comanthera curralensis (Moldenke) L.R.Parra & Giul.	EU924492	–
Comanthera harleyi (Moldenke) L.R.Parra & Giul.	EU924497	–
Comanthera hatschbachii (Moldenke) L.R.Parra & Giul.	EU924493	–
Comanthera jenmanii (Gleason) L.R.Parra & Giul.	KT175887	–
Comanthera magnifica (Giul.) L.R.Parra & Giul.	KF840860	–
Comanthera mucugensis (Giul.) L.R.Parra & Giul.	EU924494	–
Comanthera mucugensis (Giul.) L.R.Parra & Giul.	KF840861	–
Comanthera nitida (Bong.) L.R.Parra & Giul.	EU924495	–
Comanthera vernonioides (Kunth) L.R.Parra & Giul.	EU924499	EU924343
Lachnocaulon anceps (Walter) Morong	EU924442	–
Leiothrix angustifolia (Körn.) Ruhland	EU924443	–
Leiothrix arrecta Ruhland	EU924449	–
Leiothrix crassifolia (Bong.) Ruhland	EU924445	EU924292
Leiothrix curvifolia (Bong.) Ruhland	EU924446	EU924293
Leiothrix distichoclada Herzog	EU924447	EU924294
Leiothrix flagellaris (Guill.) Ruhland	EU924450	–
Leiothrix flavescens (Bong.) Ruhland	EU924444	–
Leiothrix gomesii Silveira	KF840839	–
Leiothrix vivipara (Bong.) Ruhland	EU924451	–
Paepalanthus acantholimon Ruhland	GQ475202	GQ475232
Paepalanthus acanthophyllus Ruhland	GQ475203	GQ475233
Paepalanthus acuminatus Ruhland	GQ475204	GQ475234
Paepalanthus acuminatus Ruhland	–	KT175795
Paepalanthus albidus Gardner	–	EU924287
Paepalanthus rupestris Gardner	KT175844	KT175796
Paepalanthus supinus Körn.	KT175845	KT175797
Paepalanthus amoenus (Bong.) Körn.	–	KT175798
Paepalanthus andicola Körn.	–	KT175799
Paepalanthus aretioides Ruhland	GQ475205	GQ475235
Paepalanthus argenteus (Bong.) Körn.	EU924484	EU924331

Paepalanthus argenteus (Bong.) Körn.	KT175848	KT175800
Paepalanthus augustus Silveira	–	GQ475236
Paepalanthus bifidus (Schrad.) Kunth	EU924300	EU924300
Paepalanthus bonsai Trovó & Sano	GQ475206	–
Paepalanthus bromelioides Silveira	GQ475207	GQ475238
Paepalanthus bromelioides Silveira	KT175850	KT175802
Paepalanthus bryoides (Bong.) Kunth	EU924452	EU924299
Paepalanthus bryoides (Bong.) Kunth	KF840834	–
Paepalanthus calvoides Ruhland	GQ475208	–
Paepalanthus calvulus (Ruhland) Hensold	KF840835	–
Paepalanthus canescens (Bong.) Körn.	EU924477	EU924324
Paepalanthus canescens (Bong.) Körn.	GQ475209	GQ475240
Paepalanthus canescens (Bong.) Körn.	–	KT175805
Paepalanthus caparoensis Ruhland	GQ475210	GQ475241
Paepalanthus celsus Tissot-Sq.	KT175854	KT175806
Paepalanthus chiquitensis Herzog	EU924478	EU924325
Paepalanthus chrysophorus Silveira	GQ475211	GQ475242
Paepalanthus cinereus Giul. & L.R.Parra	EU924469	–
Paepalanthus comans Silveira	EU924482	EU924329
Paepalanthus cordatus Ruhland	GQ475212	GQ475243
Paepalanthus crassicaulis Körn.	KT175858	KT175811
Paepalanthus crinitus Tissot-Sq.	KT175859	KT175812
Paepalanthus dendroides (Kunth) Kunth	–	KT175807
Paepalanthus distichophyllus Mart.	GQ475213	KT175813
Paepalanthus elongatus (Bong.) Körn.	EU924467	EU924314
Paepalanthus obtusifolius (Steud.) Körn.	KT175855	KT175814
Paepalanthus erectifolius Silveira	KF840833	–
Paepalanthus eriophaeus Ruhland	EU924459	–
Paepalanthus exiguus (Bong.) Körn.	EU924481	EU924328
Paepalanthus extremensis Silveira	EU924471	EU924318
Paepalanthus pedunculatus (Bong.) Ruhland	GQ475225	GQ475255
Paepalanthus fraternus N.E.Br.	GQ475214	GQ475246
Paepalanthus fulgidus Moldenke	GQ475215	GQ475247
Paepalanthus glaziovii Ruhland	GQ475217	GQ475249
Paepalanthus globulifer Silveira	KT175863	KT175816
Paepalanthus henriquei Silveira & Ruhland	GQ475218	–
Paepalanthus hydra Ruhland	KT175864	KT175817
Paepalanthus implicatus Silveira	EU924472	EU924319
Paepalanthus itatiaiensis Ruhland	KT175865	KT175818
Paepalanthus karstenii Ruhland	–	KT175808
Paepalanthus klotzschianus Körn.	GQ475219	GQ475250
Paepalanthus lamarckii Kunth	EU924456	–
Paepalanthus latipes Silveira	KT175867	KT175819
Paepalanthus leucocephalus Ruhland	EU924487	EU924334
Paepalanthus lindenii Ruhland	–	KT175820
Paepalanthus longivaginatus Tissot-Sq.	–	KT175822
Paepalanthus macrocaulon Silveira	EU924470	EU924317
Paepalanthus macropodus Ruhland	GQ475220	GQ475251

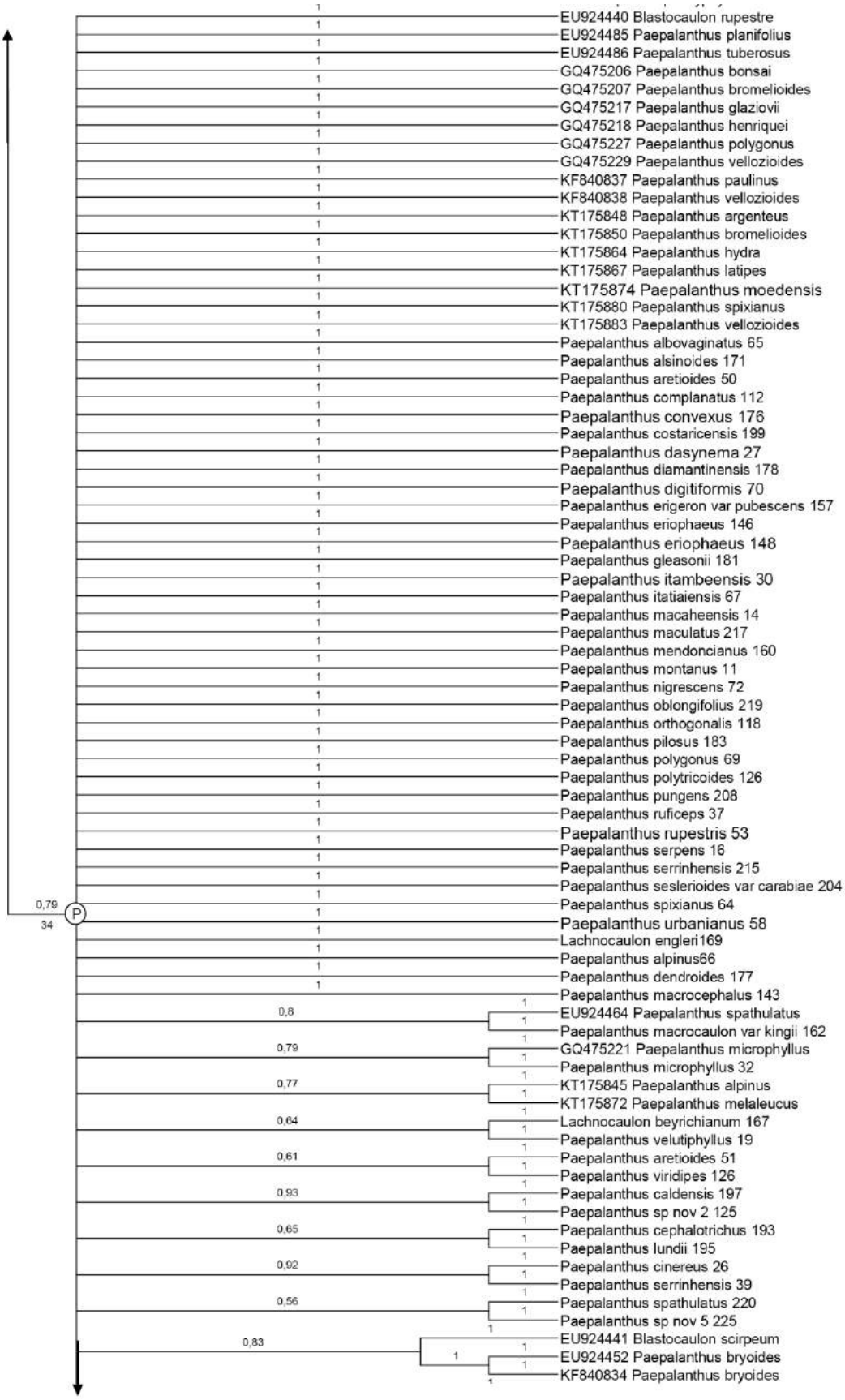
Paepalanthus macropodus Ruhland	KT175871	KT175823
Paepalanthus melaleucus (Bong.) Kunth	KT175872	KT175824
Paepalanthus meridensis Klotzsch ex Körn.	–	KT175825
Paepalanthus microphyllus (Guill.) Kunth	GQ475221	GQ475252
Paepalanthus moedensis Silveira	KT175874	KT175826
Paepalanthus mollis Kunth	GQ475222	–
Paepalanthus neglectus Körn.	EU924460	EU924308
Paepalanthus nigrescens Silveira	GQ475223	GQ475254
Paepalanthus nigrescens Silveira	KT175875	–
Paepalanthus obtusifolius (Steud.) Körn.	EU924457	–
Paepalanthus paramensis Moldenke	–	KT175827
Paepalanthus parviflorus (Hensold) Hensold	GQ475224	–
Paepalanthus paulinus Ruhland	KF840837	–
Paepalanthus petraeus Körn.	–	KT175828
Paepalanthus planifolius (Bong.) Körn.	KT175878	KT175829
Paepalanthus polycladus Silveira	GQ475226	GQ475256
Paepalanthus polygonus Körn.	GQ475227	–
Paepalanthus prostratus Körn.	–	KT175791
Paepalanthus pulvinatus N.E.Br.	–	EU924313
Paepalanthus regalis Mart.	EU924462	–
Paepalanthus serpens Echtern. & Trovó	EU924474	–
Paepalanthus rupestris Gardner	EU924440	–
Paepalanthus rupestris Gardner	–	EU924288
Paepalanthus rupestris Gardner	–	KT175792
Paepalanthus schlimii Körn.	–	KT175830
Paepalanthus schomburgkii Klotzsch ex Körn.	KT175879	–
Paepalanthus scirpeus Mart. ex Körn.	EU924441	–
Paepalanthus scirpeus Mart. ex Körn.	–	EU924289
Paepalanthus scleranthus Ruhland	EU924488	–
Paepalanthus sessiliflorus Mart. ex Körn.	EU924458	–
Paepalanthus silveirae Ruhland	–	EU924311
Paepalanthus spathulatus Körn.	EU924464	–
Paepalanthus spixianus Mart.	KT175880	KT175831
Paepalanthus stannardii Giul. & L.R.Parra	EU924473	–
Paepalanthus stegolepoides Moldenke	KT175881	KT175832
Paepalanthus subcaulescens N.E.Br.	GQ475228	GQ475258
Paepalanthus superbus Ruhland	EU924483	EU924330
Paepalanthus tortilis (Bong.) Mart.	EU924455	–
Paepalanthus trichopetalus Körn.	KT175882	KT175833
Paepalanthus trichophyllus (Bong.) Körn.	EU924479	EU924326
Paepalanthus tuberosus (Bong.) Kunth	EU924486	EU924333
Paepalanthus urbanianus Ruhland	–	GQ475259
Paepalanthus vaginatus Körn.	–	GQ475260
Paepalanthus vellozioides Körn.	GQ475229	GQ475261
Paepalanthus vellozioides Körn.	KT175883	KT175834
Paepalanthus vellozioides Körn.	–	KT175834
Paepalanthus venustus Moldenke	KT175884	–
Paepalanthus villosulus Mart. ex Körn.	KT175885	KT175835

Paepalanthus viridulus Ruhland	GQ475230	–
Rondonanthus capillaceus (Körn.) Hensold & Giul.	–	EU924338
Rondonanthus roraimae (Oliv.) Herzog	GQ475231	–
Syngonanthus androgynus M.T.C.Watan.	KT724342	–
Syngonanthus arenarius (Gardner) Ruhland	EU924498	EU924342
Syngonanthus caulescens (Poir.) Ruhland	EU924500	EU924344
Syngonanthus cuyabensis (Bong.) Giul., Hensold & L.R. Parra	EU924489	–
Syngonanthus cuyabensis (Bong.) Giul., Hensold & L.R. Parra	EU924490	–
Syngonanthus longipes Gleason	KT175888	–
Syngonanthus trichophyllus Moldenke	KT724343	–
Syngonanthus wahlbergii (Wikstr. ex Körn.) Ruhland	KF880747	–
Syngonanthus weddellii Moldenke	KT724344	–

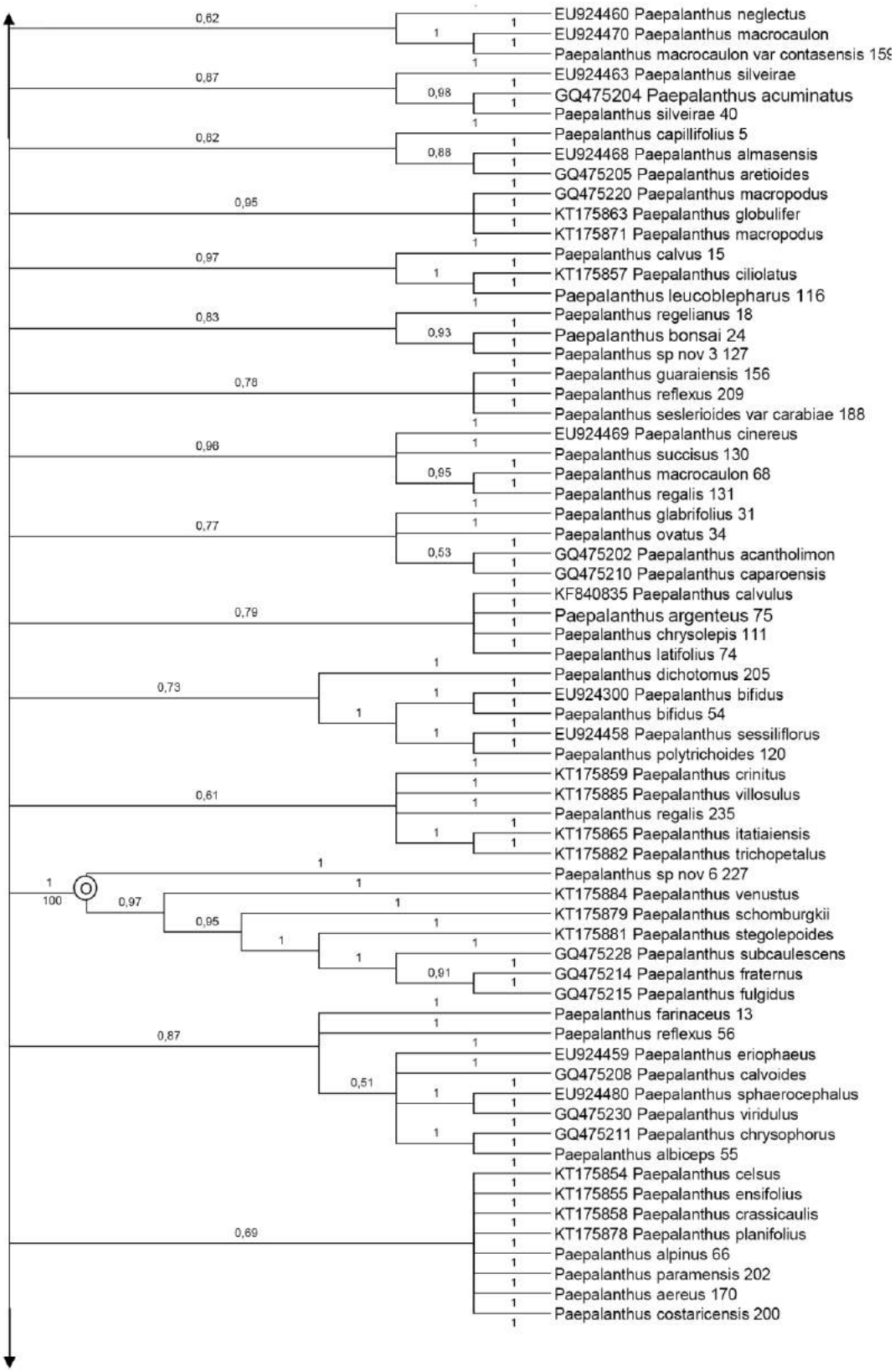
Supplementary Data



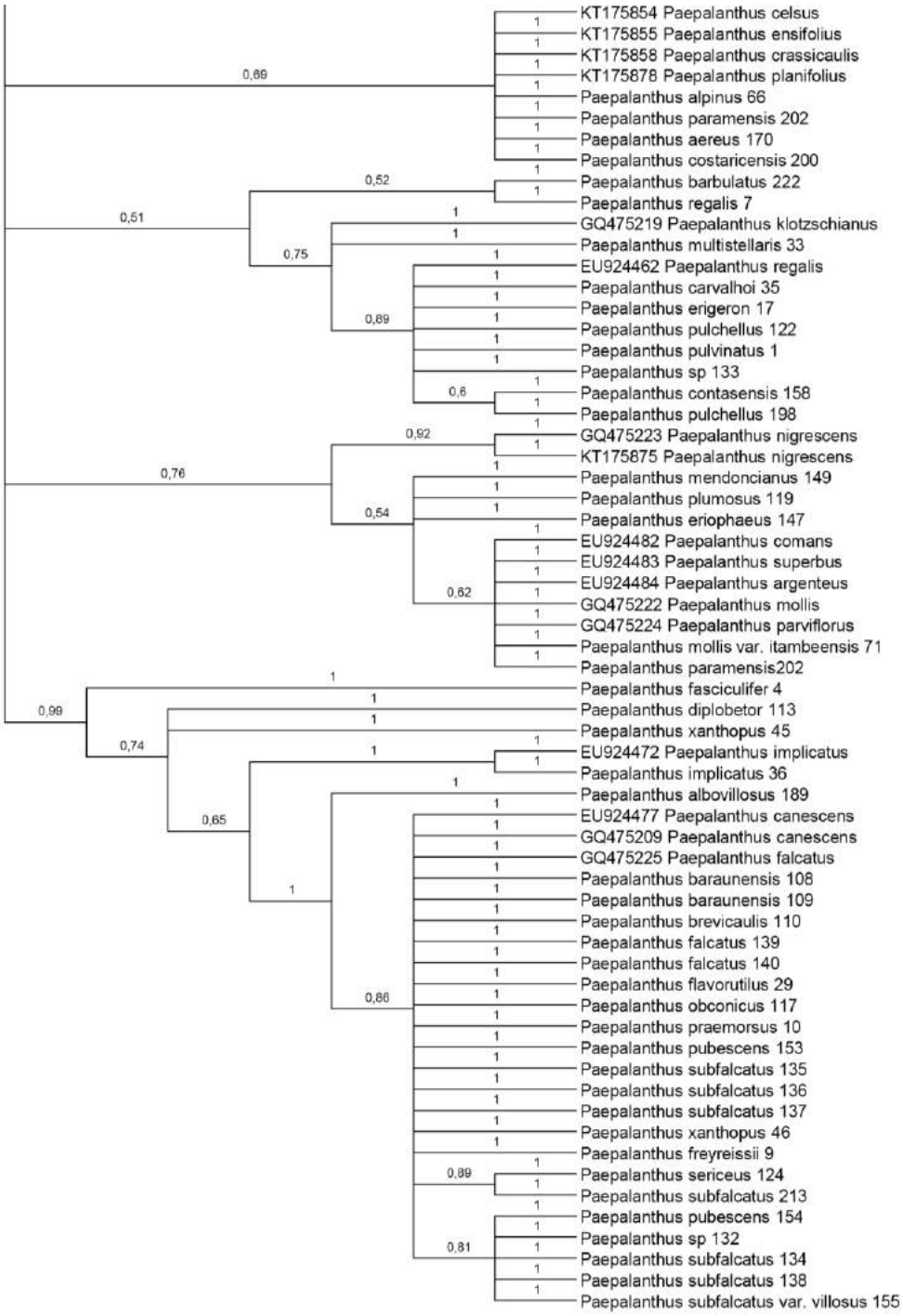
S1. Majority-rule consensus tree based on Bayesian analysis of the *trnL-F* intergenic spacer showing the main clades (A-Z) discussed in the thext. Values indicated above the branches are Posterior probabilities (PP) and those below Bootstrap (BS) percentages resulting from the ML analysis.



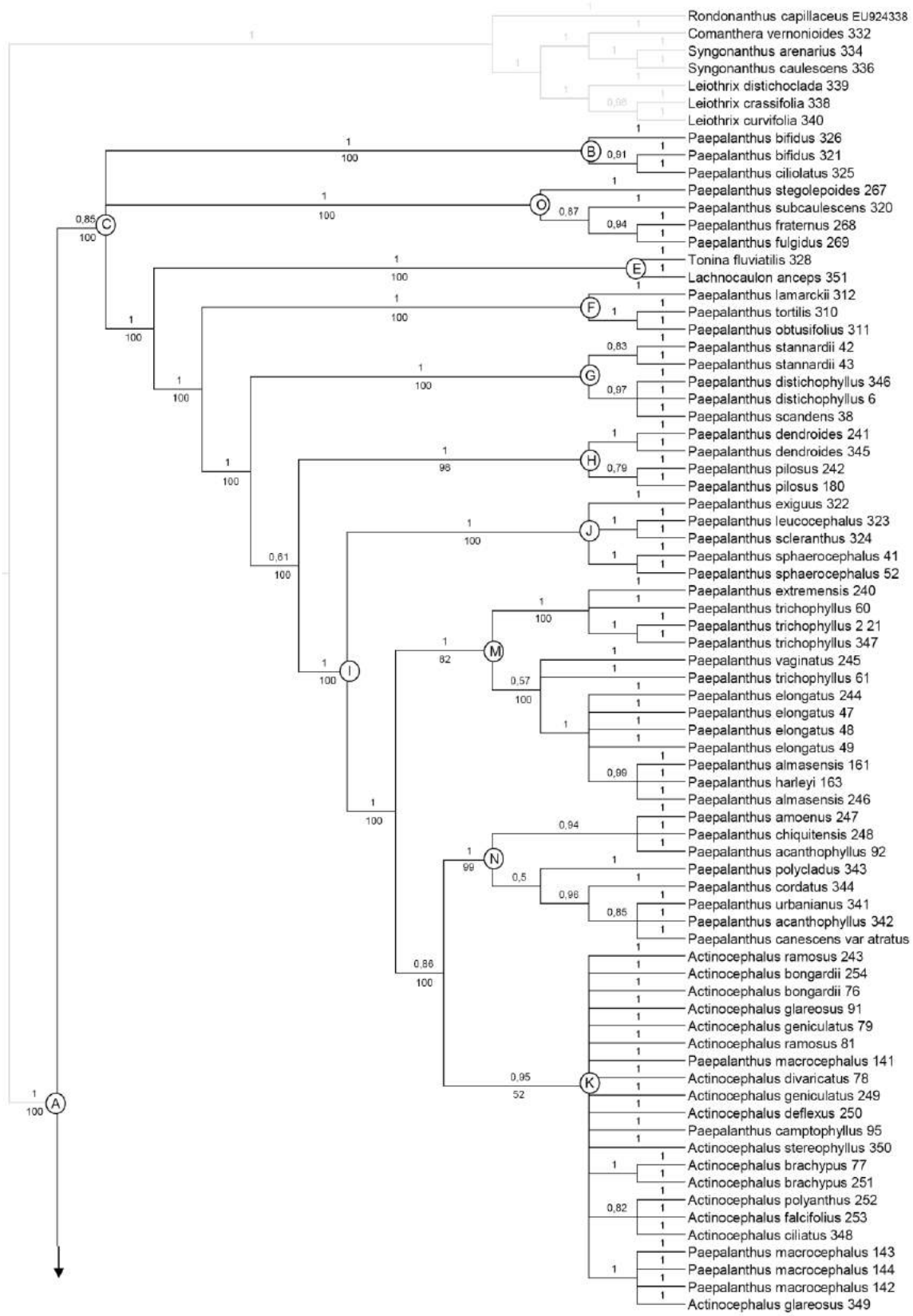
S1. Continued.



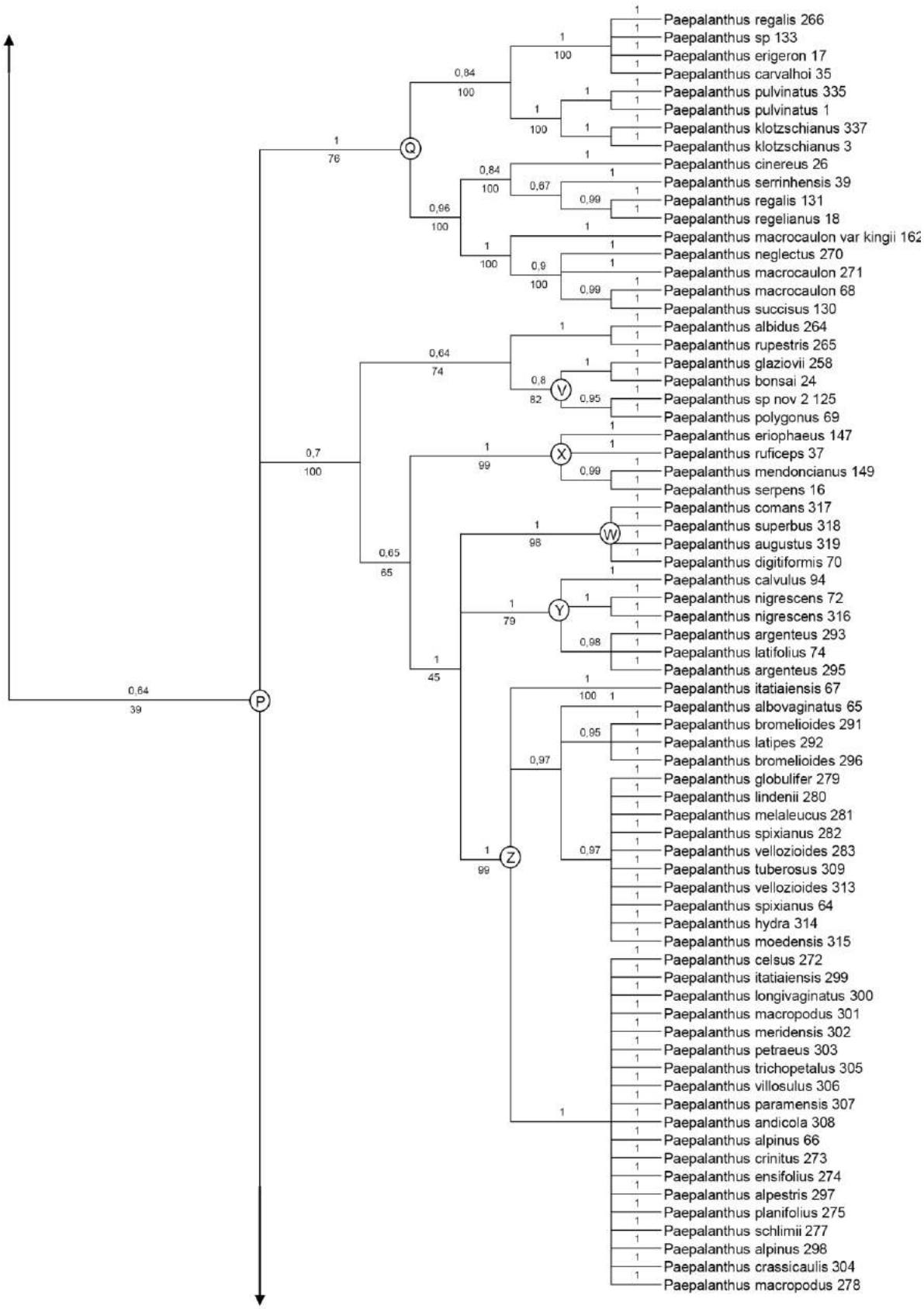
S1. Continued.



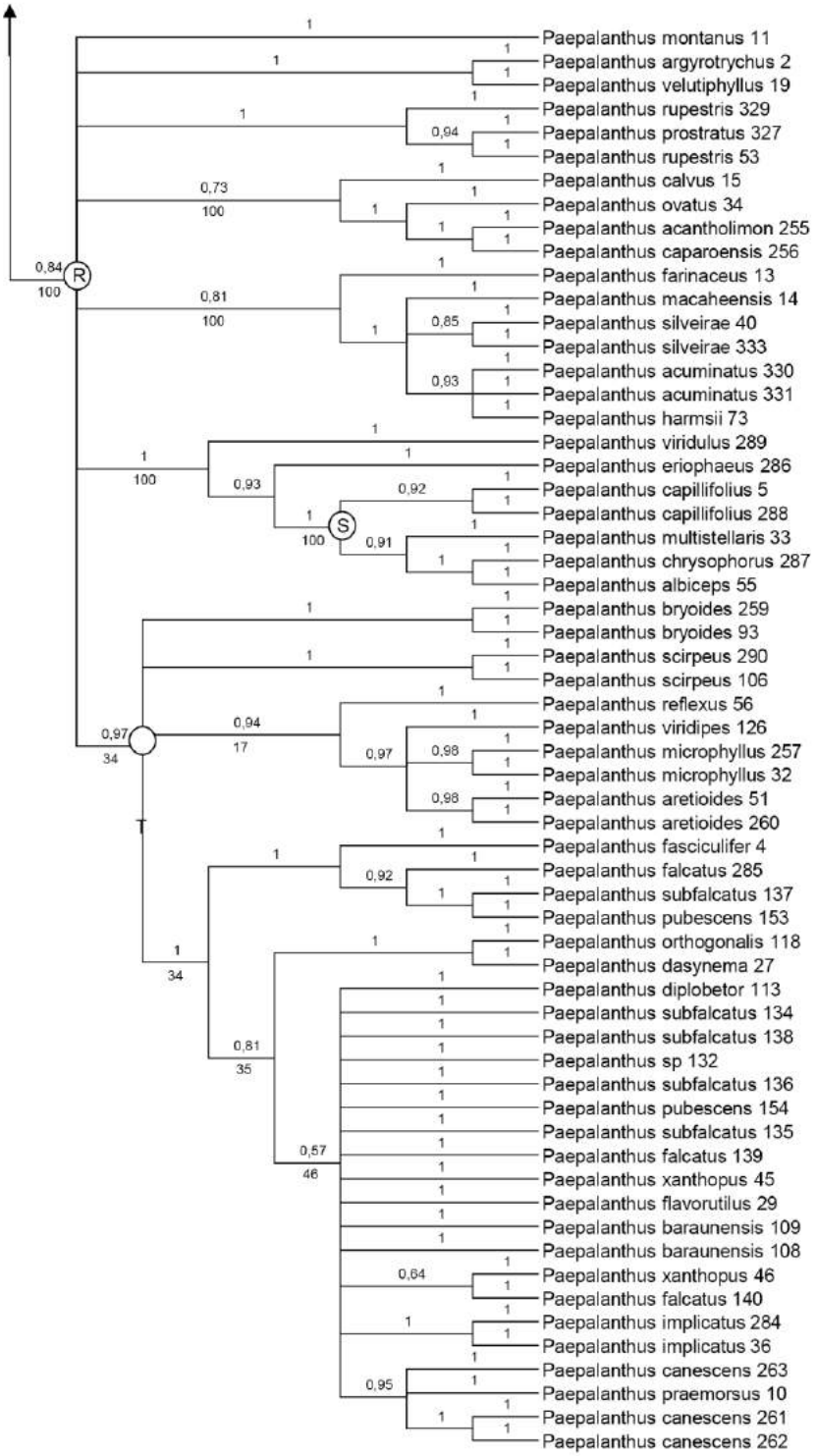
S1. Continued.



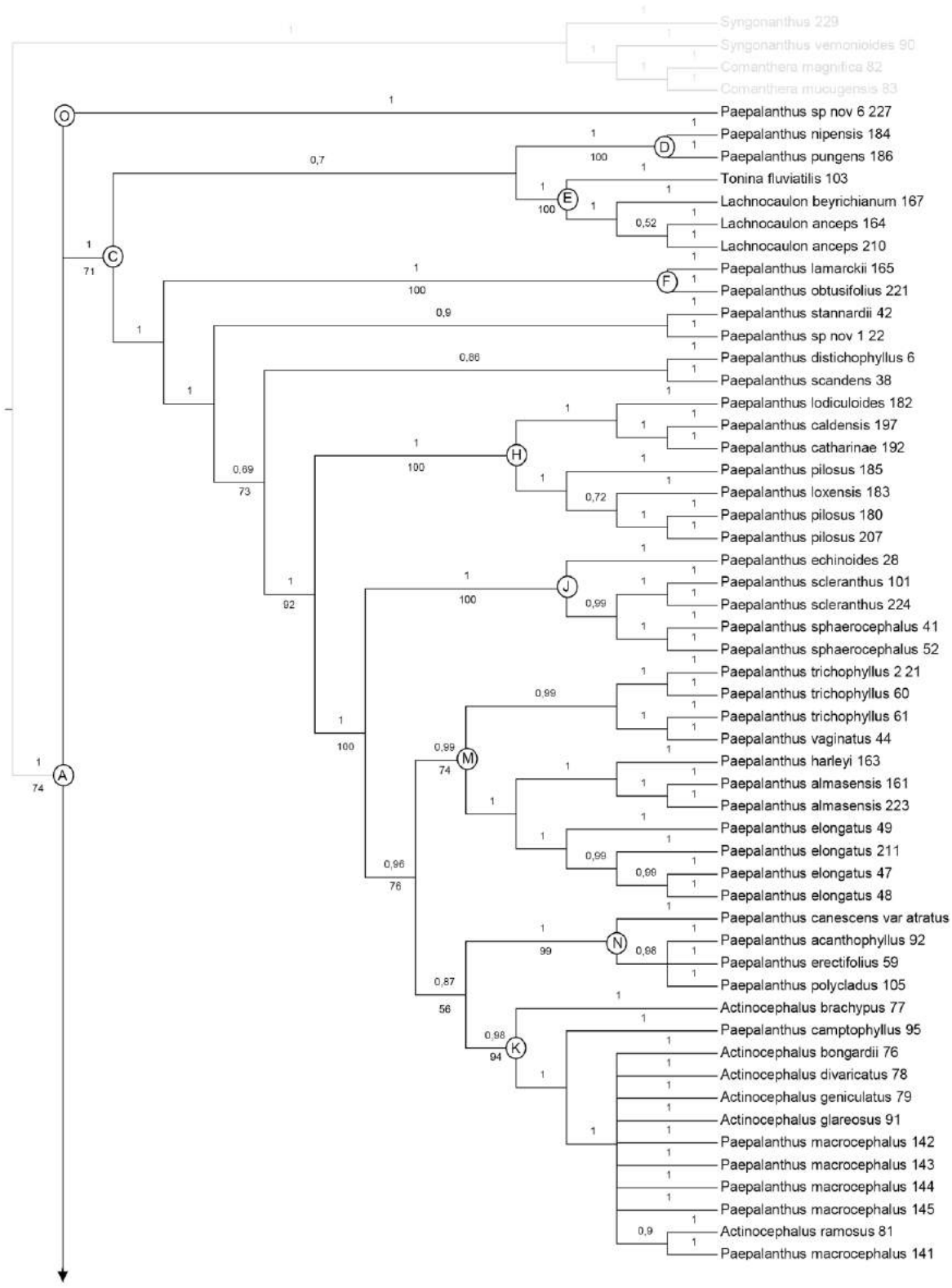
S2. Majority-rule consensus tree based on Bayesian analysis of the ITS showing the main clades (A-Z) discussed in the thext. Values indicated above the branches are Posterior probabilities (PP) and those below Bootstrap (BS) percentages resulting from the ML analysis.



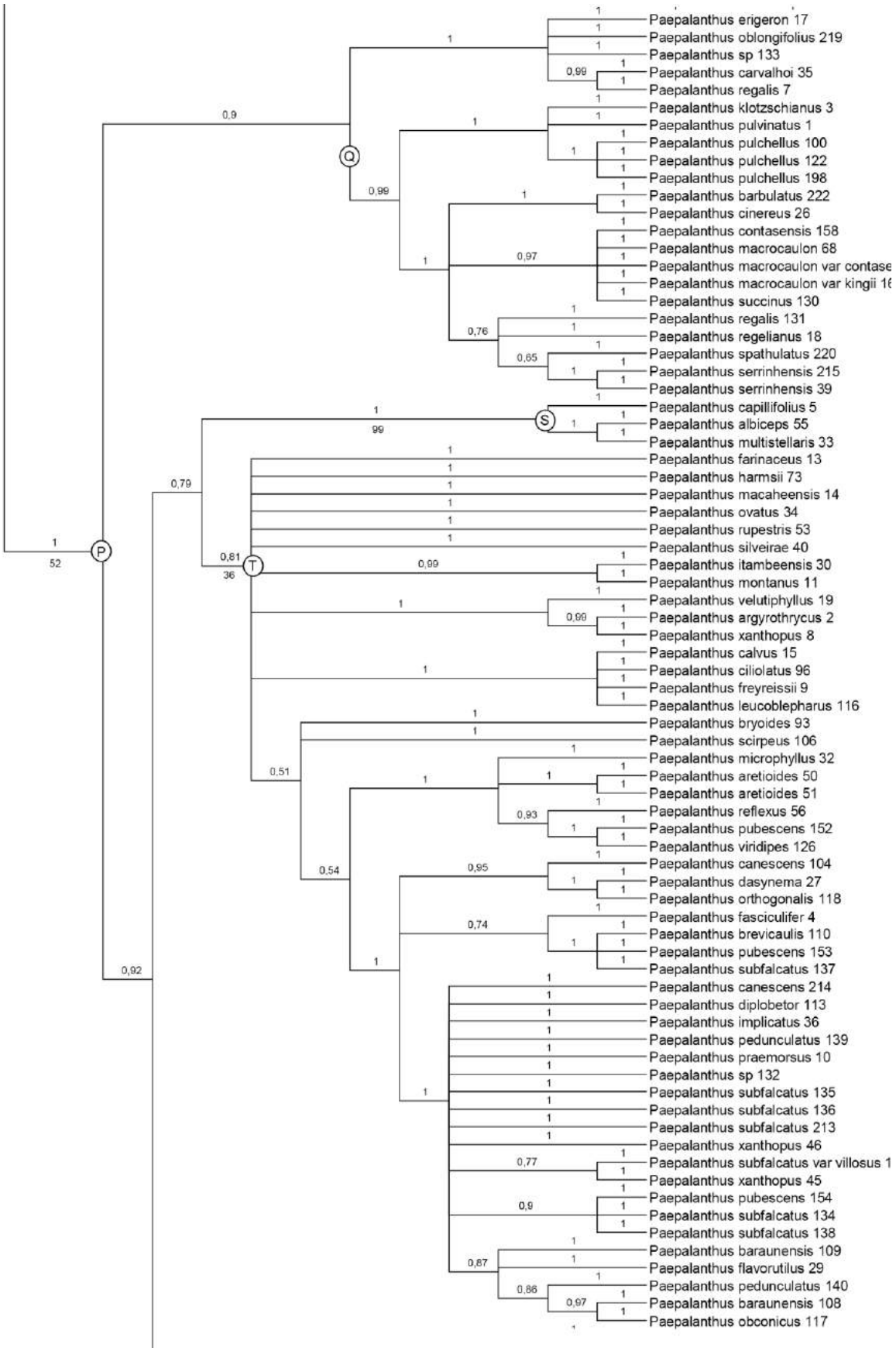
S2. Continued.



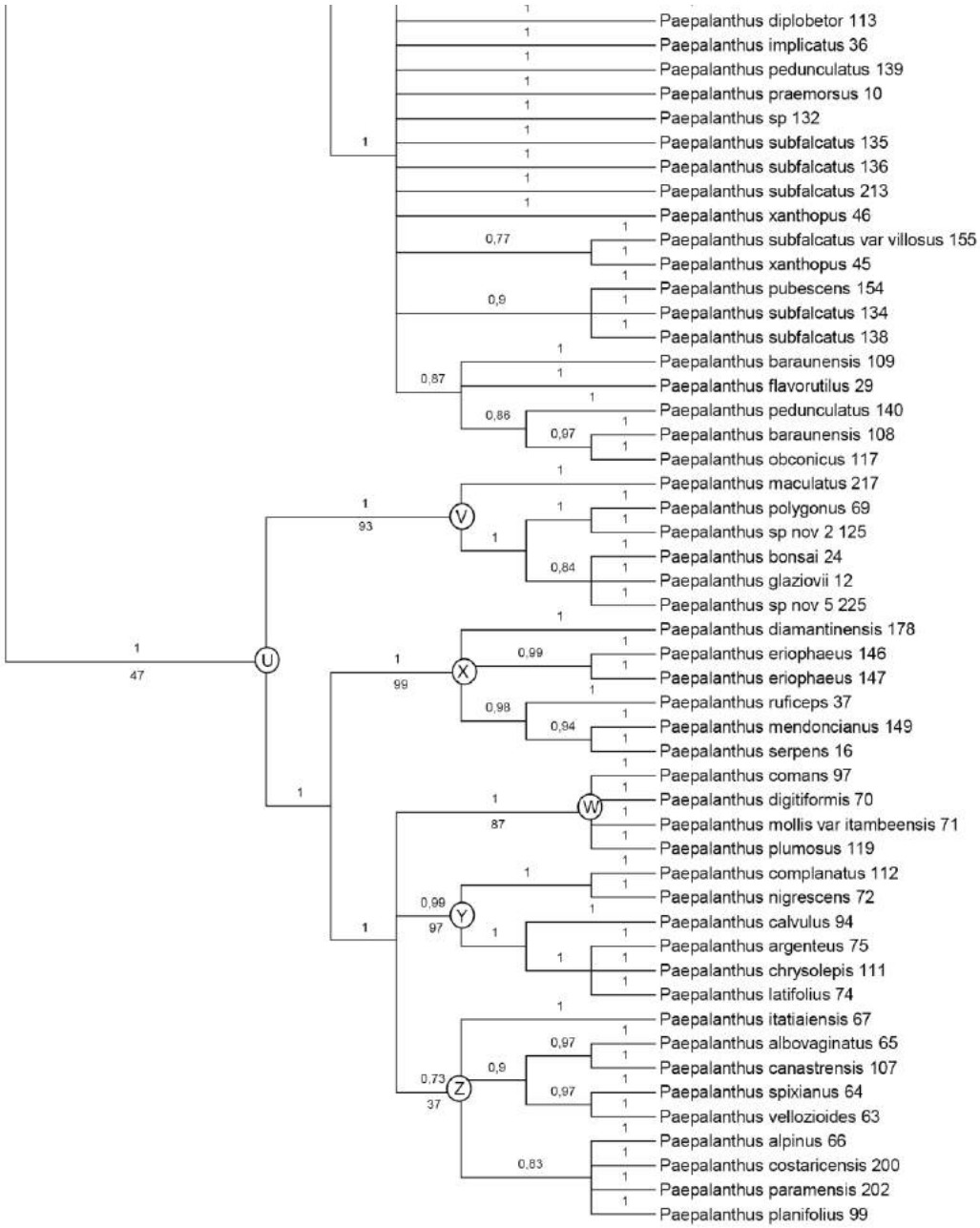
S2. Continued.



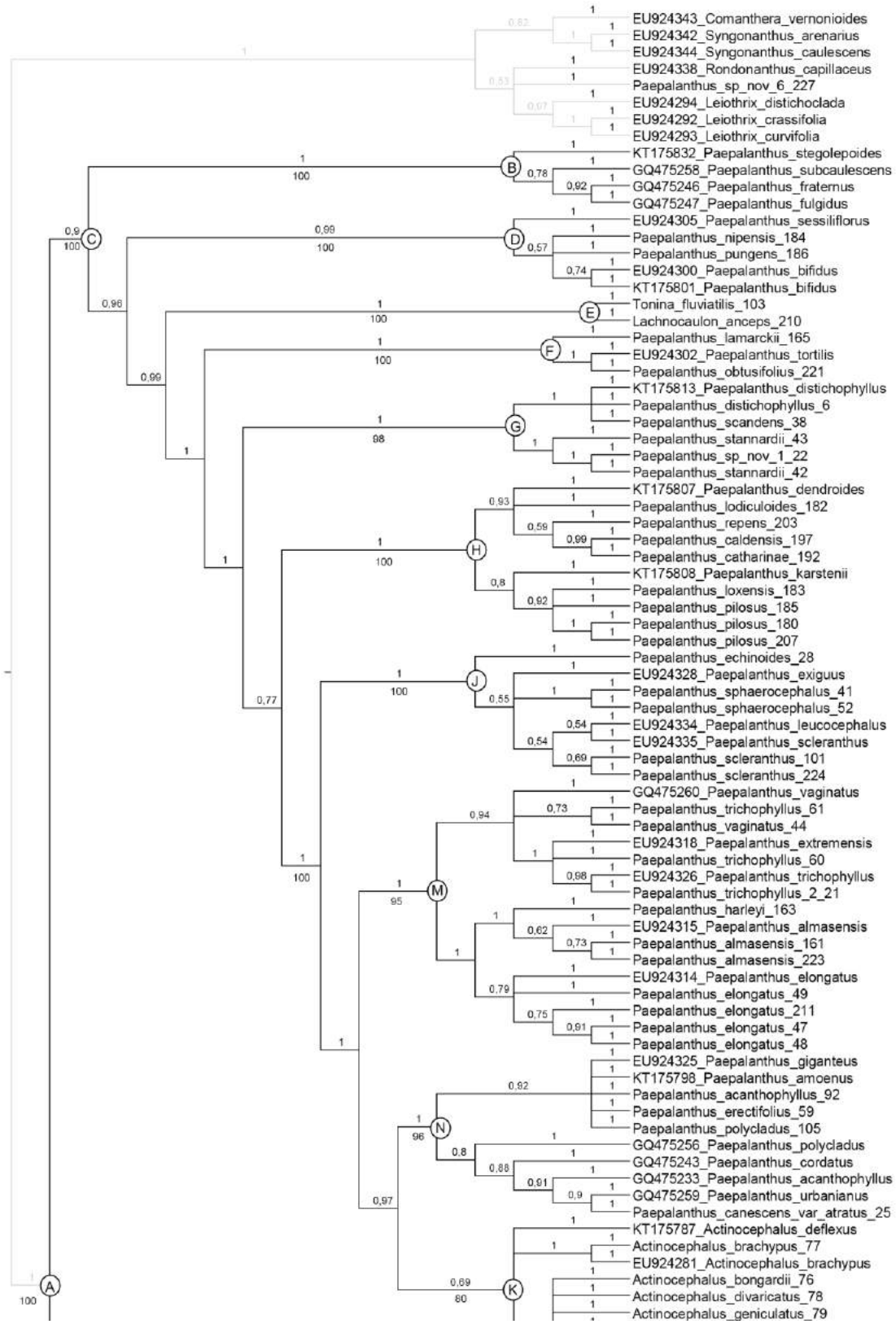
S3. Majority-rule consensus tree based on Bayesian analysis of the combined dataset ETS showing the main clades (A-Z) discussed in the thext. Values indicated above the branches are Posterior probabilities (PP) and those below Bootstrap (BS) percentages resulting from the ML analysis.



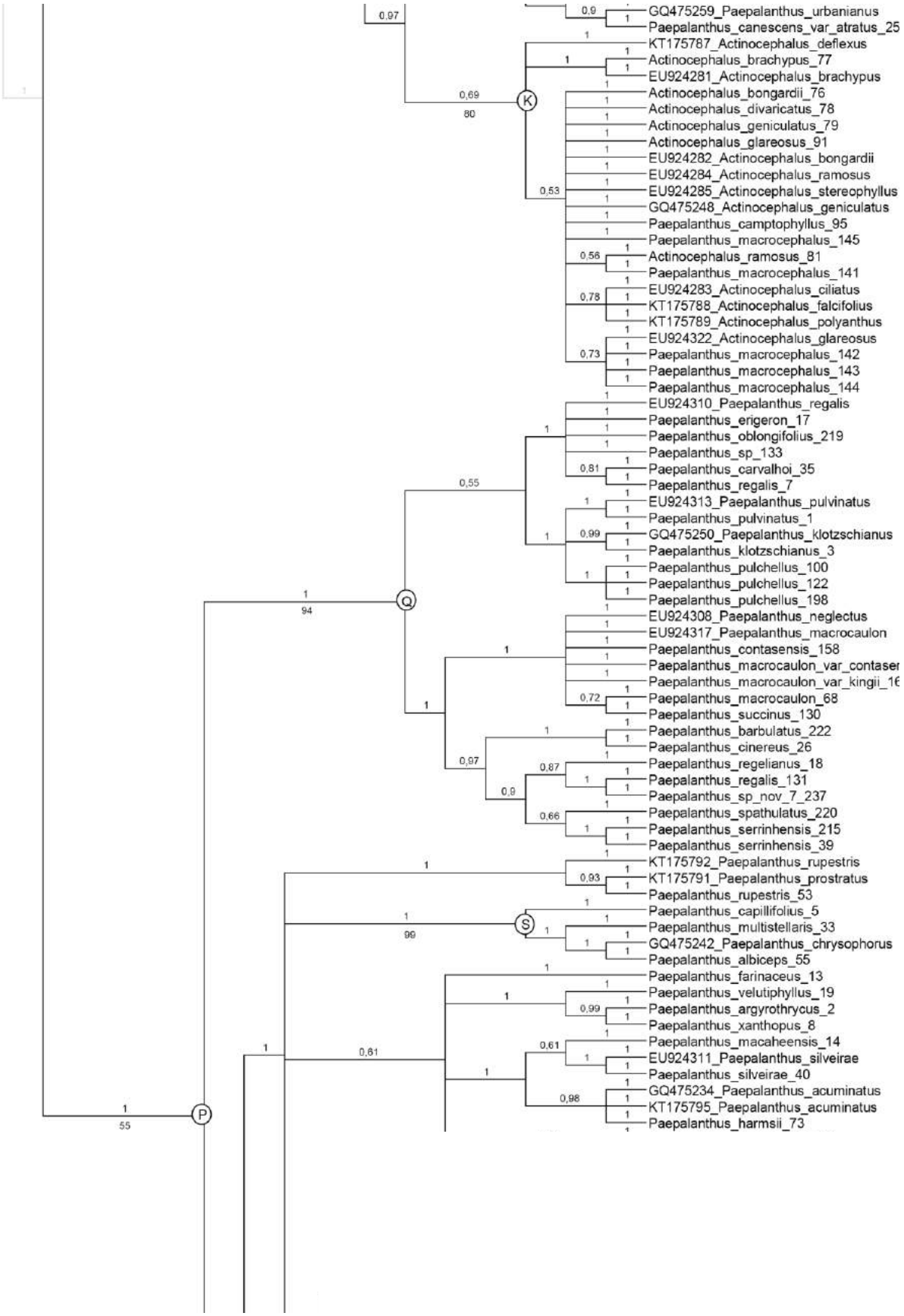
S3. Continued.



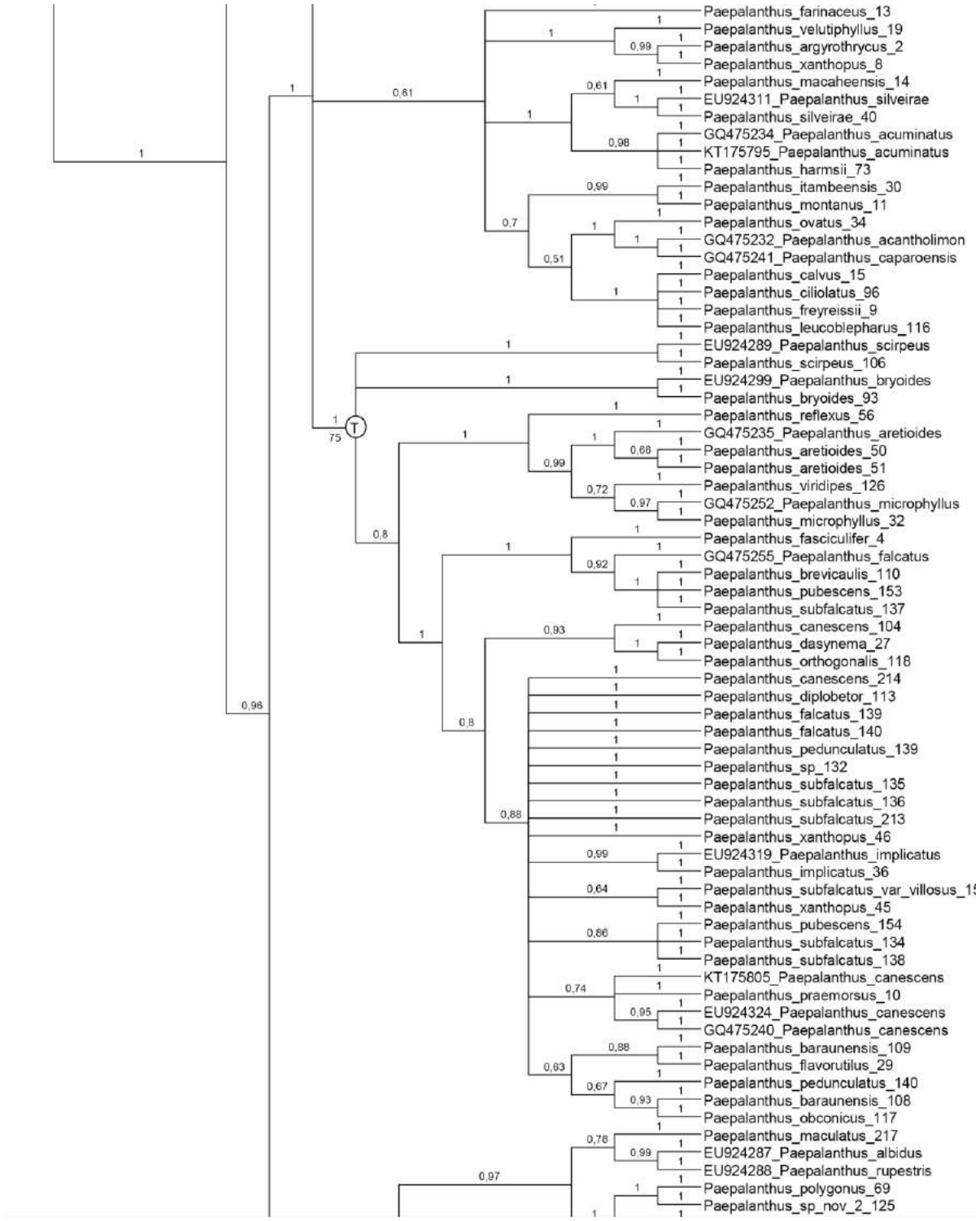
S3. Continued.



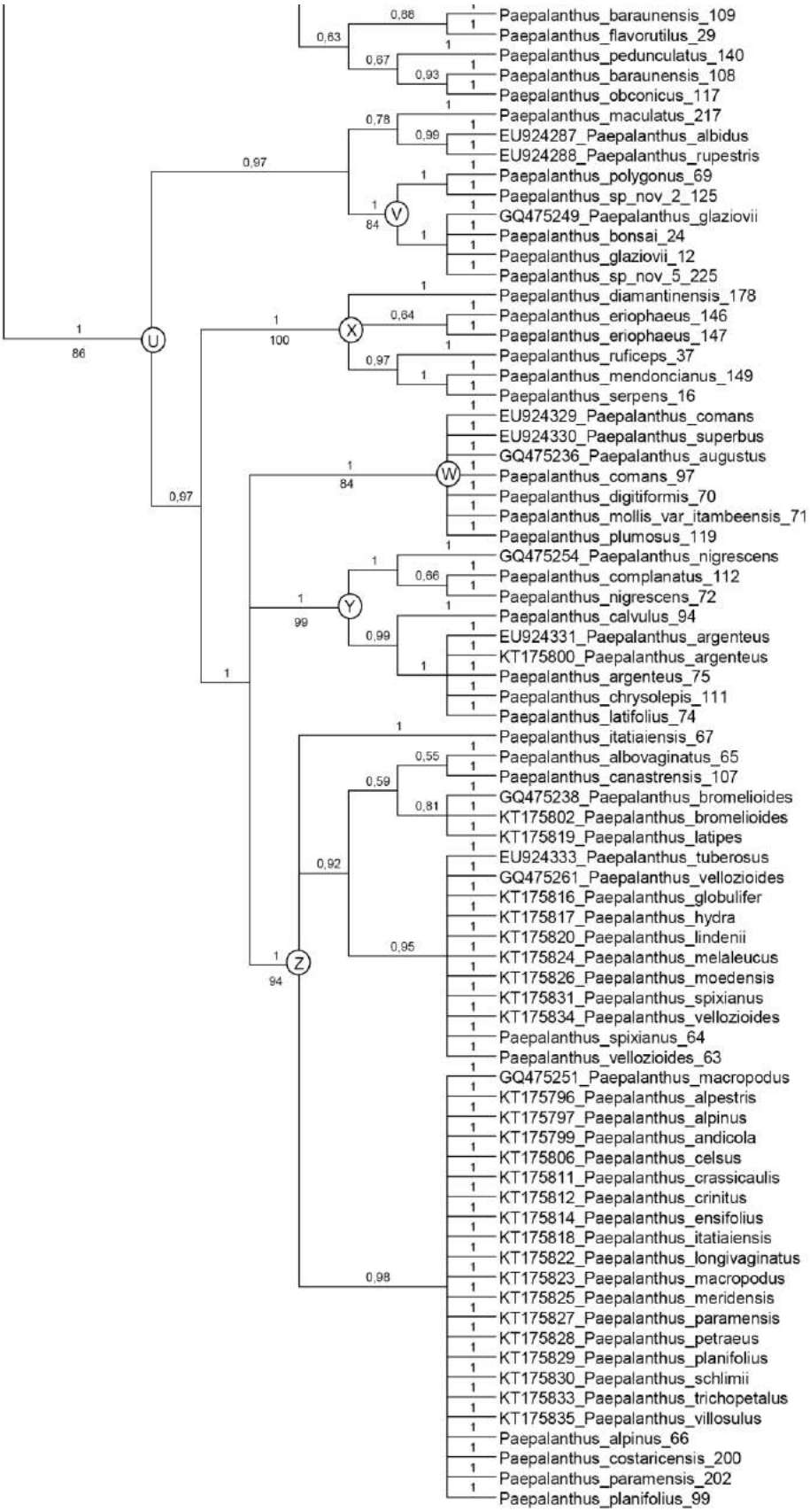
S4. Majority-rule consensus tree based on Bayesian analysis of the nuclear combined dataset (ITS and ETS) showing the main clades (A-Z) discussed in the thext. Values indicated above the branches are Posterior probabilities (PP) and those below Bootstrap (BS) percentages resulting from the ML analysis.



S4. Continued.



S4. Continued.



S4. Continued.

General Conclusions

To discover and describe are the first steps in any study in Systematics. To comprehend the object of study, firstly one has to designate what is that object. Chapter 1 synthesizes the taxonomic history of Paepalanthus, exposing the complexity behind designating what is indeed Paepalanthus and what it comprehends. Four hundred and four species were recognized for the genus and this was an important starting point to begin resolving its greatest taxonomic issues. The first, related to Paepalanthus ser. Paepalanthus, a broadly circumscribed series comprising over a third of the species of the genus, but very poorly circumscribed, making it a hodgepodge requiring urgent solution. The second, related to the artificial nature of the genus as a whole, hampering the understanding of its morphology and taxonomy.

Elucidating the first issue was the aim of Chapter 2. Paepalanthus ser. Paepalanthus is found to include 161 names, of which 111 species were accepted. Nomenclatural changes are made, including synonyms and lectotypifications.

Finally, Chapter 3 brings the most comprehensive phylogenetic study ever performed for Paepalanthus. Based on the results obtained in the phylogeny, adjustments in the classification of the genus are made necessary and are proposed in this work.

Notwithstanding this being the most comprehensive study about the genus, further work will be necessary to understand Paepalanthus. Nevertheless, the goal to generate data to promote new studies and give directions in the research on the largest genus of monocotyledons from Brazil has been reached.