UNIVERSIDADE ESTADUAL DE CAMPINAS
INSTITUTO DE BIOLOGIA

DUANE FERNANDES DE SOUZA LIMA

ESTUDOS FILOGENÉTICOS E TAXONÔMICOS EM *MYRCIA* DC. *SENSU LATO* (MYRTACEAE), COM ÊNFASE NO CLADO GUIANENSIS

PHYLOGENETIC AND TAXONOMIC STUDIES IN *MYRCIA* DC. *SENSU LATO* (MYRTACEAE), WITH EMPHASIS ON THE GUIANENSIS CLADE

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Tese apresentada ao Instituto de Biologia da Universidade Estadual de Campinas como parte dos requisitos exigidos para obtenção do título de Doutora em Biologia Vegetal.

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RESUMO

Myrcia s.l. é um grande grupo exclusivamente neotropical (ca. 750 espécies) que inclui em sua circunscrição os tradicionais gêneros *Myrcia*, *Marlierea* e *Calyptranthes*. Estudos filogenéticos recentes baseados em dados moleculares mostram estes três gêneros para- ou polifiléticos em relação uns aos outros e, desta forma, a sinonimização de *Marlierea* e *Calyptranthes* sob *Myrcia* é necessária para o reconhecimento de um grupo monofilético. *Mrycia* s.l. tem sido dividido em nove clados que servem de base para uma futura classificação sub-genérica formal, e um destes clados é o principal foco dos estudos filogenéticos e taxonômicos apresentados nesta tese. Como base para os estudos filogenéticos, uma lista incluindo 36 possíveis espécies pertencentes ao clado Guianensis foi construída. Destas espécies, 26 foram amostradas. Os estudos filogenéticos foram realizados a partir de sequências de cloroplasto e núcleo obtidas através de técnicas modernas de *next-generation sequencing* (sequenciamento de nova geração) e também a partir de sequências específicas (ITS, *psbA-trnH*, *trnL-trnF*, *trnQ-rpl16*, *ndhF*) obtidas por técnicas clássicas de sequenciamento de Sanger, e análises de Máxima Verossimilhança e Bayesiana foram empregadas. As relações específicas dentro do clado Guianensis e as relações entre este e os outros clados de *Myrcia* s.l. são discutidas em relação aos aspectos geográficos e morfológicos. De acordo com os dados moleculares, sete espécies da lista preliminar não pertencem ao clado Guianensis e uma caracterização morfológica precisa do grupo é apresentada. O grupo é composto por 29 espécies, sendo que 3 destas são novas para a ciência. As características diagnósticas mais importantes são a panícula triangular e simétrica, o hipanto glabro elevado acima do ovário, o disco estaminal glabro e o ovário 3-locular. O grupo tem ampla distribuição, desde o Caribe até o sul do Brasil e Paraguai, com centros de distribuição no Cerrado e Mata Atlântica brasileiros. Baseada nesta delimitação do grupo, uma completa revisão taxonômica e nomenclatural das 29 espécies é apresentada, incluindo descrições, ilustrações, comentários sobre morfologia, afinidades taxonômicas, fenologia, distribuição geográfica e status de conservação, e chave de identificação. Trinta e seis novos sinônimos foram propostos e 95 lectotipficações e cinco neotipificações foram feitas. Por último, uma nova espécie e notas taxonômicas em *Myrcia* seção *Aulomyrcia* (clado 9 de *Myrcia* s.l.) são apresentadas com descrições, ilustrações e comentários.

ABSTRACT

Myrcia s.l. is a large exclusively Neotropical group (ca. 750 species) that includes the traditional genera *Myrcia*, *Marlierea* and *Calyptranthes*. Recent phylogenetic studies based on molecular data have shown these three genera para- or poly-phyletic in respect to each other and, consequently, the synonymization of *Marlierea* and *Calyptranthes* under *Myrcia* is necessary to recognize a monophyletic group. *Myrcia* s.l. has been divided in nine clades that are the basis for a future formal sub-generic classification, and one of these clades is the main focus of the phylogenetic and taxonomic studies presented herein. As a basis for the phylogenetic studies, a list of 36 species inferred to belong to the Guianensis clade was built. Twenty-six of which were sampled for molecular purposes. The phylogenetic studies were carried out with plastid and nuclear sequences obtained from modern techniques of next-generation sequencing, and also with target DNA sequences (ITS, *psbA-trnH*, *trnL-trnF*, *trnQ-rpl16*, *ndhF*) obtained from the classical Sanger sequencing. Maximum Likelihood and Bayesian analyses were employed. Specific relationships inside the Guianensis clade and relationships between this and other *Myrcia* s.l. clades are discussed in light of geography and morphology. According to the molecular data, seven species of the preliminary list do not belong to the Guianensis clade and a precise morphological circumscription is presented for the group. The Guianensis clade comprises 29 species, three of which are new to science. The main diagnostic characters are the symmetrical and triangular panicle, the glabrous hypanthium prolonged beyond the ovary, the glabrous staminal ring and the 3-locular ovary. The group has a wide geographic distribution, from Caribbean to southern Brazil and Paraguay, with distribution centers in the Brazilian Cerrado and Atlantic Forest. Based on the phylogenetic results, a complete taxonomic and nomenclatural revision is presented, including descriptions, illustrations, comments regarding morphology, taxonomic affinities, phenology, geographical distribution and conservation status, and identification key. Thirty-six new synonyms are proposed and 95 lectotypifications and five neotypifications are made. Lastly, a new species and taxonomic notes of *Myrcia* section *Aulomyrcia* (clade 9 of *Myrcia* s.l.) are presented.

SUMÁRIO

INTRODUÇÃO GERAL

Myrtaceae é a família mais rica da ordem Myrtales (Judd *et al.* 2009), com aproximadamente 140 gêneros e mais de 5500 espécies (Govaerts *et al.* 2016). A família teve provável origem na Gondwana, durante o Cretáceo (ca. 85 milhões de anos atrás; Berger *et al.* 2015), e atualmente ocorre principalmente nas regiões tropicais e subtropicais do mundo, tendo a Austrália, Sudeste da Ásia e América do Sul como centros de diversidade (Wilson *et al.* 2001). No Brasil, Myrtaceae é a família mais rica no Cerrado (Oliveira-Filho & Fontes 2000) e no estrato arbóreo da Floresta Atlântica (Mori *et al.* 1983). Atualmente o grupo é dividido em duas subfamílias (Wilson *et al.* 2001, 2005): Psiloxyloideae, caracterizada principalmente pelas flores unissexuadas e número cromossômico básico x=12, e Myrtoideae, com flores bissexuadas e número cromossômico básico x=11 (Wilson *et al.* 2005).

As 15 tribos que atualmente compõem Myrtoideae são Xanthostemoneae, Lophostemoneae, Osbornieae, Melaleuceae, Kanieae, Backhousieae, Metrosidereae, Tristanieae, Syzygieae, Myrteae, Eucalypteae, Syncarpieae, Linsdayomyrteae, Leptospermeae e Chamelaucieae (Wilson *et al.* 2005). Destas, a tribo Myrteae é a mais rica tanto em número de gêneros quanto de espécies, com cerca de 50 gêneros e 2500 espécies (Govaerts *et al.* 2016). Todas as mirtáceas que ocorrem no continente americano estão na tribo Myrteae, com exceção de uma espécie de *Metrosideros* Banks ex Gaertn. que habita os Andes (tribo Metrosidereae; Pillon *et al.* 2015).

O grupo que hoje representa a tribo Myrteae já foi dividido por Berg (1857-1859) e outros autores em três subtribos amplamente usadas, e caracterizadas principalmente pela morfologia do embrião: Myrtinae com hipocótilo desenvolvido e cotilédones pequenos ou vestigiais; Eugeniinae com hipocótilo vestigial ou ausente e cotilédones carnosos; e Myrciinae com hipocótilo desenvolvido e cotilédones foliáceos. Entretanto, dados moleculares mostram que estas subtribos assim delineadas não são monofiléticas (Lucas *et al.* 2007), caindo em desuso. Lucas *et al.* (2007) propõem uma classificação baseada em grupos informais que refletem seus resultados filogenéticos, reunindo espécies em torno dos gêneros *Plinia* L., *Myrcia* DC., *Myrceugenia* O.Berg, *Myrteola* O.Berg, *Pimenta* Lindl. e *Eugenia* L., além de um grupo contendo as espécies extra-neotropicais. Mais recentemente, um novo estudo filogenético-molecular incluindo uma amostragem mais ampla de Myrteae resultou na segregação de dois novos grupos informais denominados como grupos de *Psidium* L. e *Blepharocalyx* O.Berg (Vasconcelos *et al.* 2017). Todos estes grupos são reconhecidos por combinações de caracteres morfológicos, como o número médio de óvulos por ovário, o modo de inserção dos óvulos nos ovários, o formato do embrião, textura da testa do embrião, e a presença ou ausência de placas escalariformes (Lucas *et al.* 2007), porém as relações de parentesco entre alguns deles ainda são obscuras. Vasconcelos *et al.* (2015) encontraram padrões na posição dos estames que corroboram a filogenia molecular de Myrteae e ajudam na delimitação morfológica de sub-grupos.

O grupo de *Myrcia* DC., ou *Myrcia* s.l., representa a antiga subtribo Myrciinae com exceção do gênero *Myrceugenia* O.Berg. Apresenta mais de 700 espécies (Govaerts *et al.* 2016) distribuídas nos gêneros *Myrcia*, *Marlierea* Cambess. e *Calyptranthes* Sw. e ocorre desde o México e Caribe até o norte da Argentina e Uruguai (Landrum & Kawasaki 1997). A delimitação entre estes três gêneros se dá somente pela morfologia do cálice, e é muito tênue principalmente em relação aos gêneros *Myrcia* e *Marlierea*. *Myrcia* tem cinco ou raramente quatro lobos do cálice livres no botão floral, *Marlierea* tem lobos fusionados no botão, abrindo-se de forma irregular na antese, e *Calyptranthes* apresenta lobos também fusionados no botão floral, mas abre-se como uma caliptra na antese (Landrum & Kawasaki 1997, McVaugh 1956). A última revisão taxonômica completa para *Myrcia* s.l. foi produzida por Berg para a *Flora Brasiliensis* (1855-1856, 1857-1859) há mais de 150 anos. Neste trabalho, além de *Myrcia*, *Marlierea* e *Calyptranthes*, também são tratados outros gêneros que hoje são sinônimos de *Myrcia*, i.e. *Aulomyrcia* O.Berg, *Calyptromyrcia* O.Berg, *Calycampe* O.Berg e *Gomidesia* O.Berg. As delimitações morfológicas entre estes gêneros nunca foram totalmente claras. Posteriormente, outros autores propuseram diferentes categorizações para *Myrcia* s.l. Grisebach (1860) e Niedenzu (1893) propuseram *Aulomyrcia* como seção e subgênero de *Myrcia*, respectivamente. McVaugh (1968) dividiu *Myrcia* em três seções: *Myrcia* e *Aulomyrcia*, separados como originalmente propostos pela morfologia do fruto e do hipanto, e *Armeriela*, com plantas de características intermediárias entre os gêneros *Myrcia* e *Marlierea*. A separação entre *Gomidesia* e *Myrcia* também já foi amplamente discutida, sendo Bentham (1868) e Kiaerskou (1893) os primeiros autores a proporem a sinonimização de *Gomidesia*. Em partes devido à grande complexidade morfológica, a classificação sub-genérica de *Myrcia* s.l. é historicamente instável.

Recentemente, ferramentas moleculares têm auxiliado no entendimento evolutivo de *Myrcia* s.l. Lucas *et al.* (2011) realizaram o primeiro estudo filogenético molecular sobre o grupo e seus resultados mostraram que o gênero *Myrcia* não é monofilético, uma vez que *Calyptranthes* e *Marlierea* aparecem inseridos no mesmo clado. Este fato foi confirmado por filogenias moleculares com maiores e diferentes amostragens do gênero (Staggemeier *et al.* 2015; Santos *et al.* 2016; Wilson *et al.* 2016). As árvores resultantes destes estudos mostram nove clados bem suportados que são congruentes com combinações de caracteres morfológicos, como por exemplo o tipo de ramificação de ramos vegetativos e inflorescências, morfologia do cálice, simetria das tecas nas anteras, tamanho e pubescência do disco floral e hipanto, número de óvulos por lóculo e formato do fruto. Com este panorama, a sinonimização de *Calyptranthes* e *Marlierea* sob *Myrcia* está ocorrendo gradativamente (veja Lucas & Sobral (2011) para discussão sobre a conservação do gênero *Myrcia*) e uma nova classificação subgenérica para *Myrcia* está sendo produzida (Lucas *et al.* em prep.). Por sua vez, a monografia do gênero está sendo produzida clado a clado, por diferentes pesquisadores (Ana Raquel L. Lourenço – UFPE, Bruno S. Amorim – UFPE, Eve J. Lucas – RBG Kew, Leidiana L. dos Santos – UFRPE e Matheus F. Santos – UFSCar).

Morfologicamente, *Myrcia* s.l. é representado por árvores ou arbustos com ramificações monopodiais ou simpodiais. Os tricomas são simples ou dibraquiados. As folhas são bastante variáveis e geralmente opostas, porém pode-se encontrar folhas alternas ou verticiladas. As inflorescências são geralmente paniculadas, as quais podem ser reduzidas em algumas espécies, com ramos regulares ou irregulares. As flores são (4)5-meras, o cálice é desde completamente fechado, abrindo-se por uma caliptra ou rasgando irregularmente, até aberto com lobos livres, o hipanto pode ser prolongado ou não acima do ovário e pubescente ou glabro internamente, o ovário é (1)2-4-locular, cada lóculo contém 2 óvulos com placentação axilar. Os frutos são em geral globosos ou elipsoides. O embrião é do tipo mircióide (Landrum & Kawasaki 1997; McVaugh 1969; Lucas *et al.* 2011).

Um dos clados reconstruídos por Lucas *et al.* (2011; Figura 1) é o clado Guianensis (clado 4), com alto suporte estatístico. Lucas *et al.* (2011) primeiramente caracterizaram o grupo pelos lobos do cálice regulares e livres, ovários 3-loculares, hipanto prolongado acima do ovário, e panículas simétricas bem desenvolvidas distribuídas em duas ou mais nos ramos axilares superiores. Neste trabalho, o clado foi formado por oito espécies: *M. guianensis, M. vestita* DC., *M. rufipes* DC., *M. variabilis* DC., *M. obtecta* (O.Berg) Kiaersk., *M. subverticillaris* (O.Berg) Kiaersk. e *M. citrifolia* (Aubl.) Urb. Entretanto, estima-se que o grupo contenha cerca de 30 espécies, distribuídas principalmente nos domínios da Mata Atlântica e do Cerrado (sul, sudeste, centro-oeste e nordeste do Brasil), com alguns representantes ocorrendo na Amazônia, e poucos ocorrendo fora do território brasileiro. *Myrcia citrifolia* é a única espécie que ocorre na América Central, nas ilhas do Caribe (Lucas *et al.*, em prep.). O clado Guianensis é o segundo mais recente de *Myrcia* s.l., com idade estimada entre 15.7–6.9 milhões de anos (Santos *et al.* 2017).

A complexidade deste grupo é grande e pode ser notada, por exemplo, quando observamos que suas espécies foram distribuídas em nove dos 11 grupos caracterizados pelos ovários 3–4-loculares propostos por Berg na *Flora Brasiliensis* (Berg 1857-1859; como gênero *Aulomyrcia*). Este autor separou estes grupos pela morfologia foliar, floral e indumento, características que são muito variáveis em *Myrcia* s.l., especialmente dentro do clado Guianensis (observ. pessoal). Além disso, algumas espécies do grupo apresentam extensa distribuição geográfica, ampla variação morfológica e grande confusão taxonômica, como o caso de *M. guianensis*, que é encontrada por toda a área de distribuição de *Myrcia* s.l. (Lucas *et al.* 2011) e que também pode ser considerada uma das espécies de Myrteae com maior número de sinônimos propostos (mais de 100, Govaerts *et al.* 2016).

Estudos filogenéticos com marcadores moleculares na tribo Myrteae têm sido realizados a fim de esclarecer as relações internas do grupo (Lucas *et al.* 2005, 2007; Vasconcelos *et al.* 2017). Lucas *et al.* (2011), utilizando sequenciamento das regiões nucleares ITS e ETS, e de regiões plastidiais *psbA-trnH*, *trn-L* e *matK*, propuseram a primeira filogenia de *Myrcia* s.l., baseada em 66 espécies (aproximadamente 10% do grupo inteiro). Em seguida, Staggemeier *et al.* (2015), Wilson *et al.* (2016) e Santos *et al.* (2016) ampliaram os estudos filogenéticos em *Myrcia* s.l., focando respectivamente nos clados 9 (*Aulomyrcia*), 1 (*Calyptranthes*) e 7 (*Sympodiomyrcia*). Mais recentemente Santos *et al.* (2017) apresentaram estudos filogenéticos e biogeográficos com uma amostragem maior de espécies de *Myrcia* s.l. (cerca de 25%). Estes esquemas filogenéticos propostos foram baseados em um máximo de 4264 pares de base. Apesar destes estudos reconstruírem *Myrcia* s.l. e seus nove clados como grupos monofiléticos com suportes estatísticos significativos, tanto as relações entre estes clados como as relações inter-específicas muitas vezes ainda são obscuras. Sob um ponto de vista molecular, uma forma de melhorar o entendimento de relações entre espécies aliadas, seria aumentando a quantidade de dados informativos (Hughes *et al.* 2006), e uma tentativa seria aumentar a quantidade de DNA sequenciado.

No final dos anos 70, a sistemática filogenética teve um impulso com o desenvolvimento da primeira técnica de sequenciamento, capaz de produzir sequências de fragmentos de até cerca de 1000 pares de base (Sanger *et al.* 1977). Já nas últimas duas décadas, o advento do Sequencimanto de Nova Geração (*Next-Generation Sequencing*, NGS) tem revolucionado ainda mais a sistemática filogenética, pois permite o sequenciamento massivo de milhares a milhões de pares de base de uma só vez e com menor custo comparado ao tradicional sequenciamento de Sanger (Deschamps & Campbell 2010, Straub *et al.* 2012). No caso de plantas, genomas completos de cloroplasto podem ser obtidos com relativa facilidade (Carvalho & Silva 2010). Diferentes plataformas foram/são utilizadas para o sequenciamento de nova geração, sendo que a *Illumina* (San Diego, CA, EUA) é hoje em dia a mais usada (Egan *et al.* 2012, Barrett *et al.* 2016). Entre várias técnicas empregadas no NGS, uma das mais fáceis é o *genome skimming*, na qual um sequenciamento "superficial" do DNA genômico fragmentado resulta em alta quantidade de pequenas sequências (*reads*) de regiões abundantes no genoma de plantas, como DNAs plastidial e mitocondrial e sequências repetitivas de DNA nuclear (Straub *et al.* 2012, Dodsworth 2015, Barrett *et al.* 2016). A partir destas *reads*, sequências completas de DNA plastidial podem ser montadas (= plastomas), além de sequências parciais de DNA nuclear e mitocondrial, gerando milhares de caracteres moleculares informativos para reconstruções filogenéticas mais robustas (e.g. Malé *et al.* 2014).

Atualmente são imprescindíveis estudos filogenéticos que englobem todos os clados de *Myrcia* s.l. propostos por Lucas *et al.* (2011), a fim de aumentar a amostragem geral do gênero, melhor esclarecer as relações de parestesco que existem entre os clados e entre as espécies dentro de cada clado, e entender a evolução do grupo. Estudos filogenômicos usando as novas técnicas de NGS hoje disponíveis certamente ajudariam a esclarecer questões ainda não entendidas na evolução de *Myrcia* s.l. Estudos morfológicos e taxonômicos também são indispensáveis, já que não existe uma monografia atualizada de *Myrcia* s.l. Neste sentido, a tese aqui apresentada engloba dois pontos principais: (I) estudos filogenéticos que usam técnicas clássicas de sequenciamento de Sanger e técnicas atuais de NGS, e (II) estudos morfológicos e taxonômicos em *Myrcia* s.l., ambos com enfoque no clado Guianensis. Os assuntos específicos abordados por cada capítulo são:

1. Estudos filogenéticos sobre o clado Guianensis;
2. Tipificação e novidades taxonômicas no clado Guianensis;
3. Revisão taxonômica das espécies do clado Guianensis, incluindo espécies novas;
4. Espécie nova e notas taxonômicas em *Myrcia* sect. *Aulomyrcia*.

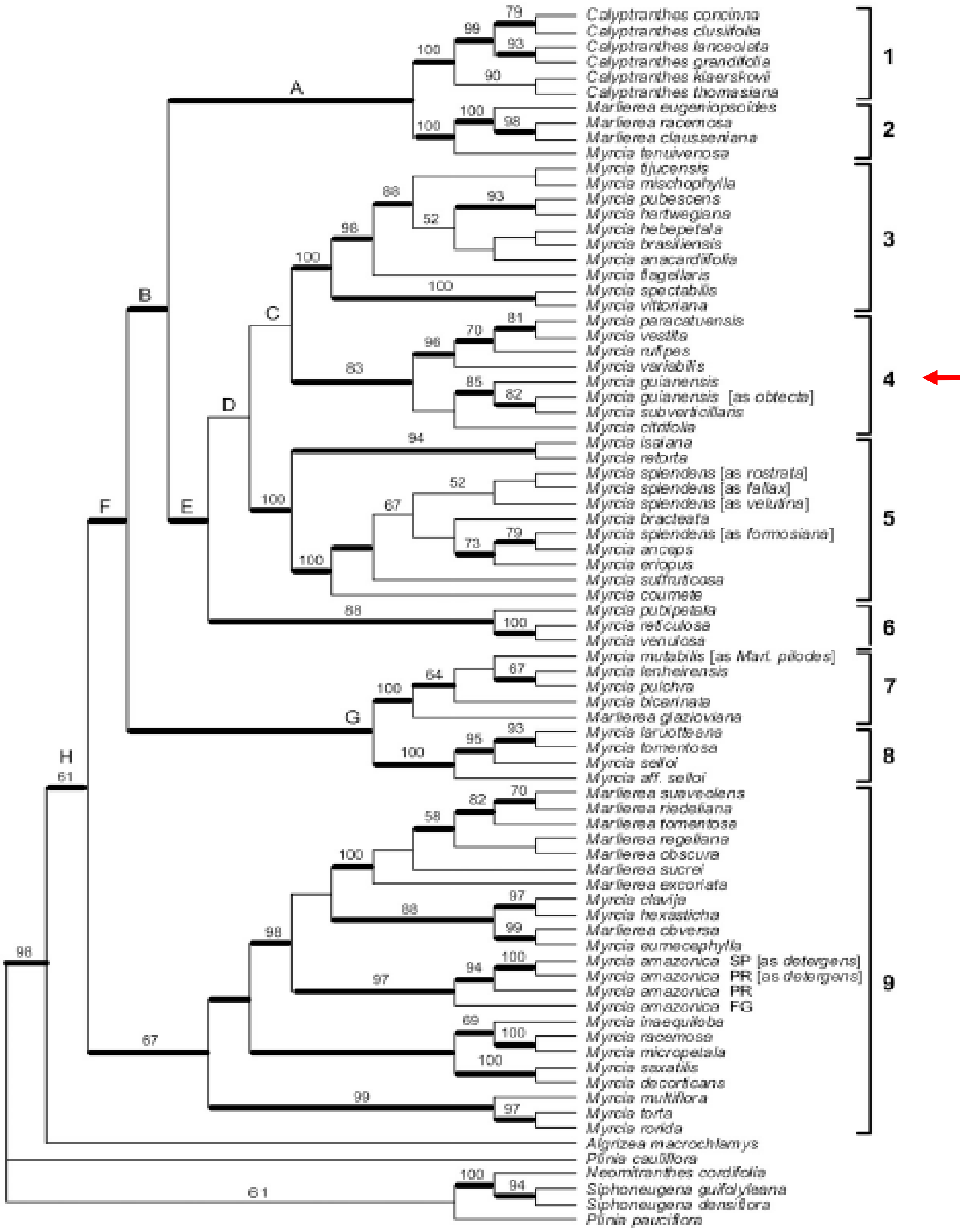

Figura 1. Árvore de consenso da análise Bayesiana com dados nucleares e plastidiais combinados reconstruída por Lucas *et al.* (2011). *Bootstraps* maiores que 50% são mostrados acima dos ramos; clados que receberam suportes da análise Bayesiana maior que 0,95 são indicados pelos ramos em negrito. O clado Guianensis (clado 4) está destacado pela flecha vermelha.

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CAPÍTULO 1

Relações filogenéticas em *Myrcia* clado Guianensis (Myrtaceae, Myrteae) usando *genome skimming* e sequenciamento de Sanger

Phylogenetic relationships in *Myrcia* clade Guianensis (Myrtaceae, Myrteae) using genome skimming and Sanger sequencing *

* Manuscrito formatado para ser submetido ao periódico *Molecular Phylogenetics and Evolution*.

Phylogenetic relationships in *Myrcia* clade *Guianensis* (Myrtaceae, Myrteae) using genome skimming and Sanger sequencing *

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ABSTRACT

Myrcia s.l. is a large Neotropical genus including more than 700 species. The first comprehensive phylogeny of *Myrcia* s.l. recovered nine clades that are consistent with combination of characters. One of these, the Guianensis clade, is focus of phylogenetic studies presented herein. Due to the low resolution frequently found in apical branches of *Myrcia* s.l., more DNA characters were generated through genome skimming approach. High quality complete plastid sequences and nuclear ribosomal units were assembled for 45 samples. In addition, an expanded analysis employing five target DNA markers (ITS, *psbA-trnH*, *trnL-trnF*, *trnQ-rps16*, *ndhF*) for 123 terminals were carried out using Sanger sequencing. Phylogenetic analyses were performed through Maximum Likelihood and Bayesian inference. *Myrcia* clade Guianensis comprises 29 species characterized mainly by monopodial branching, usually symmetrical and triangular panicles, flowers with five free lobes, glabrous hypathium prolonged above the ovary, glabrous staminal ring, and consistently trilocular ovaries. Within the Guianensis clade, three subclades that correspond to geographical distribuition were reconstructed, following the same outline of previous works with reduced sampling. There are no evident morphological synapomorphies to delineate these subclades, and morphological patterns inside the Guianensis clade are still unclear. The tree obtained with genome skimming data presented better topology and higher supports than those resulted from Sanger sequencing data.

Keywords: Chloroplast, locularity, Neotropics, Systematics, Taxonomy.

1. Introduction

Myrcia s.l. is a monophyletic group with ca. 750 species placed in the traditional genera *Calyptranthes* Sw., *Marlierea* Cambess. and *Myrcia* DC. (Lucas et al., 2007; 2011; Govaerts et al., 2017). This group is one of the richest exclusively Neotropical genera and plays an important ecological function in the Atlantic Forest and Cerrado biomes (Mori et al., 1983; Murray-Smith et al., 2009; Lucas and Bünger 2015). Molecular phylogenies of *Myrcia* s.l. based on plastid and nuclear markers have shown the three first genera embedded in *Myrcia*, and have recovered nine strongly supported clades that are characterized by a combination of morphological characters, such as monopodial or sympodial branching, inflorescence morphology, calyx morphology and mode of opening at anthesis, thecae symmetry in the anthers, floral disk and hypanthium size and pubescence, locularity and fruit shape (Lucas et al., 2011; Santos et al., 2017). In this context, *Calyptranthes* and *Marlierea* are being progressively synonymized under *Myrcia* (BFG, 2015; Lucas et al., 2016; Govaerts et al., 2017; Flora do Brasil 2020), and a new sub-generic classification of the large *Myrcia* s.l. based on the nine clades is underway (Lucas et al., in prep.).

The clade 4 (sensu Lucas et al. 2011), here called 'Guianensis clade', is characterized mainly by the monopodial branching, usually symmetrical, regularly or cymosely branching panicles, glabrous hypanthium prolonged above the ovary, five free calyx-lobes, and trilocular ovaries (Lucas et al., 2011). This group is the second most recent of *Myrcia* s.l. with 15.9–6.9 My (Santos et al., 2017). Some of the Guianensis clade species are extremely complex with many intermediate morphotypes, but genetic relationships within the clade were never discussed. *Myrcia guianensis* is the most enigmatic species in the group, with a wide range of morphological and geographical variation (Chapter 3). This species commonly presents morphological overlapping with other species (Chapter 3) and problems with its delimitation is frequently reported in the literature (e.g. McVaugh, 1969). No studies concerning reproductive biology, ecology or genetics of *Myrcia guianensis* and its allied species are available so far.

Morphologically, the Guianensis clade can resemble clade 6 (sensu Lucas et al. 2011) mainly due to the monopodial branching, inflorescence, hypanthium and calyx morphology and trilocular ovaries (Lucas et al., 2011). The Guianensis clade can also be similar to some species of clade 9 (sensu Lucas et al. 2011) due to the monopodial branching, developed panicles, five free calyx lobes pubescent within, and glabrous hypanthium and staminal ring (Lucas et al., 2011; 2016). More recently, Santos et al. (2016) found an additional clade formed by two species (*Myrcia robusta* and *M.* aff. *maximiliana*) that has no apparent association with any other group. These species also present monopodial branching, five free calyx-lobes and trilocular ovaries (pers. observ.). In addition to the clear molecular differentiation among these clades, some other morphological traits can help in their delimitations, such as the trichomes on the staminal ring, leaf venation and texture, and shape and size of buds (Lucas et al., 2011; Vasconcelos et al., 2017a; see also the discussion in this paper). The relationships among the clades of *Myrcia* s.l. are still unclear (Lucas et al., 2011; Santos et al., 2017).

Resolving phylogenetic relationships in large genera is challenging and a common strategy is to focus on particular taxonomic groups inside the genus. In *Myrcia* s.l., there are published studies for clades 1 (Wilson et al., 2016), 7 (Santos et al., 2016) and 9 (Staggemeier et al., 2015). These studies relied on target nuclear (ITS) and chloroplast markers (*psbA-trnH*, *ndhF*, *trnL-trnF* and *trnQ-rps16*), totalizing between 3006 and 4225 base pairs. Although the nine major groups are often recovered in all these analyses, relationships between species or even between sub-groups inside the clades are frequently weakly supported. A likely explanation for this scenario is the lack of sufficient molecular distinction in the selected markers among closely allied taxa (Hughes et al., 2006), and larger amounts of variable characters can overcome this issue.

In the last years, Next-Generation Sequencing (NGS) has made it possible to produce much larger genomic data than those obtained through the classical Sanger sequencing (Deschamps and Campbell, 2010; Straub et al., 2012). Several NGS techniques have been applied in plant systematics, e.g. to develop molecular markers, to address questions about hybridization, introgression and polyploidy, and to obtain phylogenetic trees (Egan et al., 2012). Genome skimming is one of the easiest NGS methods, in which a shallow sequencing of genomic DNA consequently results in a deeper sequencing of the high-copy fraction of the genome, resulting in vast amounts of reads from plastid, nuclear and mitochondrial genomes (Straub et al., 2012; Dodsworth, 2015; Barret et al., 2016). As a result, genome skimming can provide sufficient quantity of informative sites to improve phylogenetic hypothesis of angiosperms and gymnosperms, from higher taxonomic ranks to species-level (e.g. Straub et al., 2012; Besnard et al., 2013; Malé et al., 2014; Ripma et al., 2014; Hou et al., 2016; Reginato et al., 2016). In Myrtaceae, phylogenomic studies were carried out in the tribes Eucalypteae (Bayly et al., 2013) and Myrteae (Machado et al., 2017).

Our study firstly aimed to test the monophyly of the Guianensis clade and to inspect relationships inside the group. For that, genome skimming was used in an attempt to produce more phylogenetic informative data from complete plastid and partial nuclear sequences. It was the first time that genome skimming was carried out in Myrtaceae. Additionally, expanded analyses combined with previously published data were lead using five DNA markers commonly used in *Myrcia* s.l. (ITS, *psbA-trnH*, *ndhF*, *trnF-trnL* and *trnQ-rps16*). These results were then used to clearly delimit the morphology of the Guianensis clade, to examine relationships of this group with other clades of *Myrcia* s.l., and to discuss intern relationships in the light of morphology and geography.

2. Materials and methods

2.1. Taxon sampling and DNA extraction

A preliminary list of species of the Guianensis clade was built based on the diagnostic characters proposed by Lucas et al. (2011). Given that some bilocular species have been synonymized under *Myrcia guianensis* (BFG, 2015), our list was extended to include species with bilocular ovaries that present all other characters described by Lucas et al. (2011). These species were inferred as 'possibly' belonging to the group, as the Guianensis clade shares many morphological features with clades 6 and 9. Thirty-six putative species were added in such list and 26 of which were sampled for molecular analysis (72.2%; Table 1). Eleven species had two or more individuals sampled to maximize morphological and geographical variation.

Two different strategies were applied in our work. In the first one, we carried out genome skimming for 48 samples including 22 taxa of our preliminary list (Table 1), five taxa representing the clades 5, 6 and 9 of *Myrcia* s.l. and three outgroups (*Eugenia uniflora*, *Myrceugenia alpigena* and *Myrtus communis*). Genome skimming was used to generate complete plastid and partial nuclear sequences. In the second strategy, we used sequences of five target DNA regions obtained through Sanger sequencing or GenBank in an expanded sampling of 123 specimens, including 26 taxa of our preliminary list (Table 1), 60 taxa of all other clades of *Myrcia* s.l. and five outgroups (*E. uniflora*, *Luma apiculata*, *Myrceugenia alpigena*, *Myrtus communis* and *Siphoneugena densiflora*). Voucher information and GenBank accessions are presented in Appendix A.

Total genomic DNA was isolated from approximately 20 mg of silica-dried leaf tissue or herbarium specimen using the Qiagen DNeasy Plant mini-kit (Qiagen, Valencia, CA, USA) following the manufacturer's protocol. Some specimens with low quality DNA were submitted to the extraction process twice and manually merged, in order to increase the amount of DNA for genome skimming. Total DNA samples were quantified using NanoDrop Spectrophotometer (Thermo Scientific, Wilmington, DE, USA) and Quantus Fluorometer (Promega, Madison, WI, USA).

2.2. Sequencing and assembly

2.2.1. Genome skimming

Total genomic paired-end libraries were prepared from fragmented DNA using TruSeq DNA Sample Preparation Kit following manufacturer's guide. A separated library was constructed for each sample. Indices were added in the libraries to allow for multiplexing 24 samples in a single run. Libraries were run on an Illumina MiSeq platform (Illumina, San Diego, CA, USA) at Jodrell Laboratory of the Royal Botanic Gardens, Kew (London, UK).

Raw data were filtered by removing adapters, too short and low-quality sequences using Trimmomatic 0.3 (Bolger et al., 2014) with default parameters. Post-quality paired-end reads were then imported into Geneious 9.1 (http://www.geneious.com, Kearse et al., 2012) and de novo assembled. Resulting contigs were blasted against the plastome of *Eucalyptus grandis* (NC014570) and the nuclear ribosomal unit (18S, ITS1, 5.8S, ITS2 and 26S) of *Chrysobalanus icaco* (KJ414477), in order to identify those ones originated either from ptDNA or nrDNA. Contigs from each compartment were used to assembly single contigs.

For the ptDNA assembly in a single contig, the identified plastid reads were reference assembled against the plastome of *Eucalyptus grandis* using Geneious 9.1 with "low-sensitivity" option and default parameters. As many Myrtaceae complete plastomes are available on GenBank, we preferred to perform a mapping on a reference, instead of a *de novo* assembly (Ripma et al., 2014). For the nrDNA, a *de novo* assembly was performed using Geneious 9.1 with default options.

2.2.2. Sanger sequencing

Four plastid (*psbA*-*trnH*, *ndhF*, *trnL*-*trnF* and *trnQ*-*rps16*) and one nuclear (ITS) regions were used, totalizing 600 sequence accessions (Appendix A). Of which, 49% were newly produced in this study, and 51% were obtained from other studies (Lucas et al., 2011; Staggemeier et al., 2015; Santos et al., 2016; 2017; Wilson et al., 2016; B.S. Amorim, UFPE, Recife, Brazil, unpubl. res.). Amplification was performed on a GeneAmp PCR System 9700 (Applied Biosystems, Foster City, CA, USA). PCR conditions and primers follow Santos et al. (2016). Internal primers were used for *trnL*-*trnF* and *trnQ*-*rps16* markers when necessary (Taberlet et al, 1991; Murillo et al., 2012). Purification of PCR products was carried out using QIAquick Spin Columns (Qiagen, Valencia, CA, USA), according to manufacturer's protocol. Sequencing reaction was conducted on a Mastercycler nexus (Eppendorf, Hamburg, Germany), with the same protocols of Santos et al. (2016). Sequences were read on a 3730 DNA Analyzer (Thermo Scientific, Wilmington, DE, USA) at Jodrell Laboratory of the Royal Botanic Gardens, Kew (London, UK), and then assembled and inspected using Geneious 9.1. For those specimens previously sequenced through Illumina platform, ITS and the four plastid regions were manually extracted from the nuclear ribosomal units and plastomes using Geneious 9.1.

2.3. Phylogenetic analyses

2.3.1. Genome skimming data

Three matrices were created for phylogenetic inference. The first included only the ptDNA, the second included only the nrDNA and the third included both compartments concatenated (total matrix). These matrices were analyzed independently. For each cellular compartment, sequences were aligned using MAFFT 7 online server (Katoh, 2013). Genome alignments were manually checked and refined using Geneious 9.1, in order to minimize the quantity and size of gaps.

A single partition was applied to the ptDNA matrix and five partitions were applied to the nrDNA matrix (18S, ITS1, 5.8S, ITS2 and 26S). Maximum likelihood (ML) analysis was carried out on RAxML 8.2 (Stamatakis, 2014) via CIPRES (Miller et al., 2010), using the rapid bootstrap algorithm with 1000 replicates, combined with a search of the best-scoring ML tree and other default parameters. The GTR+G model was employed for all matrices. *Myrtus communis* was set as outgroup. The final tree and supports were visualized using FigTree 1.4.2 (http://tree.bio.ed.ac.uk/software/figtree).

2.3.2. Sanger sequencing data

Again, three matrices were built and analyzed independently and simultaneously. The first included only ITS data (nuclear matrix), the second included the four plastid regions concatenated (plastid matrix) and the third included all five regions combined (total matrix). Alignments were carried out through MAFFT 7.2 implemented in Geneious 9.1 and subsequently manually adjusted to minimize the quantity and size of gaps.

Phylogenetic analyses using ML and Bayesian inference were performed on all datasets. For the plastid and total matrices, respectively four and five partitions were applied, corresponding to each DNA region. ML analysis was carried out on RAxML 8.2 via CIPRES, with the same parameters as described above for the genome skimming data. The best nucleotide substitution model for each partition was estimated using jModelTest 2 via CIPRES. Selected models under the Akaike information criterion (AIC) were GTR+G (*ndhF* e *trnQ-rps16*) and GTR+I+G (ITS, *psbA-trnH* e *trnL-trnF*). Bayesian inference was carried out on MrBayes 3.2 (Ronquist et al., 2011) via CIPRES. Two independent analyses were performed, each with four Monte Carlo Markov chains (MCMC), 10,000,000 generations, sampling frequency of 1000 and burn-in of 10%. Results were checked on Tracer 1.6 (Rambaut et al., 2014) to ensure convergence and sufficient effective sample size greater than 200. Consensus tree and supports were visualized using FigTree 1.4.2.

3. Results

3.1. Phylogenetic relationships

3.1.1. Data from genome skimming

Complete plastid genomes were reconstructed for all samples but Santos 613 (*Myrcia* sp.), which completely failed in the sequencing process. Two other samples, Lima 511 (*M. littoralis*) and Santos 840 (*M. antonia*) had many ambiguous characters generating long branches and reducing statistical supports in all phylogenetic analyses. These samples were therefore excluded from the analyses. The nuclear ribosomal unit comprising the complete sequence of the internal transcribed spacers ITS1 and ITS2 and the genes 26S, 18S and 5.8S were also assembled for all samples but Santos 613. Alignments length, number of variable sites, number of potentially parsimony-informative characters (PICs) and other statistics for each genomic compartment are summarized in Table 2.

No disagreements in topology was found between the trees obtained in the ML analyses with ptDNA and nrDNA (Figs. S1 and S2, Supplementary material). The phylogenetic tree based only on the nrDNA was poorly resolved, with many weakly supported nodes, the same situation found by Malé et al. (2014). The tree obtained from the ptDNA alone presented the same topology as the one resulted from the total matrix, but several nodes had lower statistical supports (see below). Detailed results and discussion is hereafter based on the tree obtained with the total matrix (Fig. 1).

Most of the nodes received bootstrap supports higher than 85%, and only six nodes were not supported at all (BP lower than 50%). *Myrcia* s.l. was recovered as monophyletic (BP 100%). All the inferred species of the Guianensis clade were placed in a monophyletic group (BP 100%), except for *Myrcia littoralis*, *M. myrtillifolia*, *M. pinifolia*, *M. ramuliflora* and *M. thomasii*. The first four species joined *M. amazonica* and *M. blanchetiana* in a strongly supported clade 9 (BP 100%), and the latter species grouped with *M. maximiliana* (BP 100%) in a separate clade. Two species representing the clade 5, *M. splendens* and *M. linearifolia,* also appeared as monophyletic (BP 100%). Two major clades were reconstructed within *Myrcia* s.l.: the first one grouping clades 5 and 9 (BP 100%) and the second one including *M. antonia* (clade 6), *M. maximiliana* + *M. thomasii*, and the Guianensis clade (BP 100%). Clade 6 emerged as sister of the group containing *M. maximiliana* + *M. thomasii* and the Guianensis clade (BP 100%). The sister-relationship between these last two groups are also well supported (BP 100%).

Regarding relationships within the Guianensis clade, *Myrcia obovata* appeared as sister to the rest of the group, hereafter called the 'core Guianensis clade' (BP 100%). Three subclades that correspond to geographical distribution can be recognized within the core group. Subclade 4A (BP 100%) included specimens from Atlantic Forest (AF) and Cerrado from northeastern, southeastern and central Brazil. Subclade 4B (BP 99%) grouped the two accessions of *M. citrifolia* from Caribbean and a gathering of *M. guianensis* from Amazon. Subclade 4C (BP 100%) was composed exclusively by specimens from the Brazilian Cerrado. Subclades 4B and 4C emerged as sister-groups (BP 100%). The sister-relationship between 4A and 4B + 4C was also well-supported (100%). Different morphotypes of the widespread *Myrcia guianensis* emerged in each subclade according to the collection localities: two gatherings from AF and Cerrado from Bahia (Lima 512 and Harley 50707) emerged in subclade 4A, a single specimen from Amazonas (Staggemeier 845) appeared in subclade 4B, and four remaining morphotypes from Brazilian Cerrado (Lima 530, Lima 517, Lima 468 and Vasconcelos 491) were included in subclade 4C. Multiple accessions of *M. citrifolia*, *M. guianensis*, *M. rufipes*, *M. subalpestris* and *M. variabilis* emerged as non-monophyletic.

3.1.2 Data from Sanger sequencing

Alignment length and character information are summarized in Table 2. The ITS partition had higher proportion of potentially informative characters than the four combined plastid regions (respectively 19.3% and 8.7%). The resulting trees of the independent analyses conducted for each partition (nuclear and plastid matrices) were inspected visually and no disagreements in topology were found. The total matrix provided better resolution and higher supports in both ML and Bayesian analyses; our discussion is based therefore on the trees obtained with this dataset. The phylogenetic tree from ML was in general better resolved than the tree from the Bayesian inference (Figs. 2 and 3).

Myrcia s.l. emerged as monophyletic with high supports in both analyses (BP 94%, PP 1.0). Some inferred Guianensis clade species (*Myrcia littoralis*, *M. myrtillifolia*, *M. pinifolia*, *M. ramuliflora* and *M. thomasii*) fell out of the group also in both analyses, following the same scheme as described above. Additionally, *M. coelosepala* also emerged within clade 9. The Guianensis clade was reconstructed as monophyletic with weak support in the ML analysis (BP 52%), with the three accessions of *M. obovata* in a group (BP 100%) sister to the strongly supported core Guianensis clade (BP 99%). In the Bayesian analysis however, the Guianensis clade appeared as non-monophyletic, with the group of *M. obovata* (PP 1.0) nested in polytomy with the core Guianensis clade (PP 1.0) and the clades 2, 3 and 8 (each with PP 1.0). Within the core Guianensis clade, subclades 4A (BP 95%, PP 1.0), 4B (BP 84%, PP 0.6) and 4C (BP 93%, PP 0.9) were also reconstructed in both analyses, with 4A sister to 4B + 4C (BP 100%, PP 1.0). These three subclades correspond to the geographical pattern described with the genome skimming data, with the exception of *M. cuprea*, a species from Amazonic *campinaranas* and *restingas* from northern Brazil (Chapter 3), that joined species from Cerrado in subclade 4C. *Myrcia laricina*, the unique species of the group occurring in Caatinga vegetation, also emerged within subclade 4C. Internal relationships within these subclades had generally low supports, but three small groups are moderately to strongly supported in both analyses: the first one with *M. laxiflora*, *M. cordiformis*, *M. ovina*, *M. guianensis* (Lima 512) and *M.* sp1 (BP 66%, PP 0.98), the second one with *M. tumida*, *M. guianensis* (Harley 50707), *M. subalpestris*, *M. nivea* and *M. stricta* (BP 78%, PP 1.0), and the third one with *Myrcia* sp. [= *M. depauperata*], *M. vestita* and *Myrcia* sp. [= *M. siriacoana*] (BP 73%, PP 1.0). Multiple samples of *M. citrifolia*, *Myrcia* sp. [= *M. depauperata*], *M. guianensis*, *M. rufipes* and *M. subalpestris* appeared as non-monophyletic, while accessions of *M. laxiflora* and *M. stricta* emerged together in the Bayesian inference, but with no support (PP 0.5 and 0.64, respectively).

The other clades of *Myrcia* s.l. diagnosed by Lucas et al. (2011) were reconstructed as monophyletic with high supports in both analyses, except for clade 9 that was separated in two groups (9A with BP 98%, PP 1.0 and 9B with BP 73, PP 0.6), the same topology as found by Santos et al. (2017). Relationship between these two groups are poorly supported. *Myrcia almasensis*, *M. pulvinata*, *M. thomasii* and *M.* aff. *unana* joined with *M. maximiliana* and *M. robusta* in a monophyletic group here called 'clade 10' (BP 84%, PP 0.9) with no apparent association with any other clade of *Myrcia* s.l. Some other non-Guianensis clade species were included in a phylogenetic framework for the first time in our studies: *Myrcia lignosa* and *M. linearifolia* emerged in clade 5, *M. tetraloba* in clade 9, *M. aethusa* in clade 6 and *M. anomala* in clade 8. Relationships among the ten clades of *Myrcia* s.l. is normally not supported. Also due to the low resolution, relationships among the morphologically close Guianensis clade, clade 6 and clade 10 are unclear.

4. Discussion

4.1. The Guianensis clade – circumscription, morphology, distribution and internal relationships

Lucas et al. (2011) recognized the Guianensis clade as a cohesive group of *Myrcia* s.l. for the first time and proposed a combination of morphological characters to identify it: monopodial branching, leaves with flat venation and indistinct glands, usually symmetrical, regularly or cymosely branching triangular panicles, calyx with five free lobes, tetralocular anthers with symmetrical thecae, glabrous floral disc, thin staminal ring, hypanthium prolonged above the ovary, trilocular ovaries with two ovules per locule, and globose fruits with persistent calyx lobes at apex (p. 930). Seven species of the Guianensis clade were sampled in this first study: *Myrcia citrifolia*, *Myrcia* sp. [= *M. depauperata*] (as *M. paracatuensis*), *M. guianensis, M. rufipes*, *M. subalpestris* (as *M. subverticillaris*), *M. variabilis* and *M. vestita* (names updated following Chapter 2 and Chapter 3). Subsequent phylogenetic analyses also retrieved four additional species, *M. cordiformis* (as *M.* sp12), *M. cuprea*, *M. laxiflora* and *M. stricta*, nested a well-supported Guianensis clade (Staggemeier et al., 2015; Santos et al., 2016). Our data corroborate all previous studies and also included nine other species (*M. camapuanensis*, *M. laricina*, *M. nivea*, *M. obovata*, *M. ovina*, *Myrcia* sp1, *Myrcia* sp. [= *M. siriacoana*], *M. tortuosa* and *M. tumida*).

Based on the morphology described above, but also accepting species with bilocular ovaries (see Materials and methods), 36 taxa were inferred to belong to the Guianensis clade (Table 1). All our results evidenced the exclusion of all bilocular species assumed to be related to the Guianensis group (*Myrcia coelosepala*, *M. littoralis*, *M. myrtillifolia*, *M. pinifolia* and *M. ramuliflora*), as they consistently emerged within clade 9 (*Myrcia* sect. *Aulomyrcia* sensu Lucas et al., 2016); the Guianensis clade therefore, comprises solely trilocular species. *Myrcia myrtillifolia* (and other synonyms, see Lucas et al., 2016) was until recently considered as synonym of the trilocular *M. guianensis* (BFG, 2015), but our results corroborate the separation of these species. Besides, a single trilocular species of our preliminary list, *M. thomasii*, also fell out of the Guianensis clade and joined other taxa in a new clade 10 (see section 4.2). *Myrcia proencana* is a recently described species (Villarroel and Gomes-Bezerra, 2015) that unfortunately was not sampled in the present study. According to its description, the morphology suggests its inclusion in the Guianensis clade. However, we did not have access to the type-material to confirm the placement of *M. proencana* inside the Guianensis clade, and a doubtful condition is preferred at this moment (see Chapter 3).

The inclusion of *Myrcia obovata* within the Guianensis clade is well-supported in our analysis with genome skimming data, but it is weakly supported in the expanded ML analyses with Sanger sequencing data. The Bayesian inference showed this species out of the Guianensis clade. Unfortunately, some clades of *Myrcia* s.l. were not sampled in our genome skimming strategy and this fact can obscure the true relationship between *M. obovata* and the core Guianensis clade. On the other hand, the expanded matrix with Sanger sequencing data comprised much less informative characters than the genome skimming data (435 vs. 3,023 PICs). The ambiguous placement of *M. obovata* in the trees generated with Sanger sequencing matrix could be clarified by adding more informative characters. More studies are needed to elucidate this relationship. In a morphological perspective, *M. obovata* presents all diagnostic features of the Guianensis clade and there are no sufficient evidences to treat it as a separated lineage of *Myrcia* s.l.

According to our results, all characters proposed by Lucas et al. (2011; cited above) are indeed diagnostic of the Guianensis clade, but updates are required. Regarding the inflorescences, the triangular panicles as cited by those authors seems to be the usual in the group, but reduced inflorescences as racemes (e.g. *M. laricina, M. nivea* and *M. tumida*), dichasia (e.g. *M. nivea* and *M. stricta*), triads (*M. retusa*), glomeruliforms (*M. camapuanensis*) or single flowers (e.g. *Myrcia* sp. [= *M. depauperata*] and *M. laricina*) can also be found. The five calyx lobes are free (Lucas et al., 2011) and usually easily distinguishable from each other, with two larger and three smaller. Nevertheless, very short calyx lobes nearly indistinguishable from each other that can partially tear at anthesis also occur in some species of the group (*Myrcia cordiformis*, *M. laxiflora*, and some individuals of *M. gigas* and *M. guianensis*). This feature is characteristic of the genus *Calyptromyrcia* (Berg 1855–1856, 1857–1859), which has the type-species *Calyptromyrcia cymosa* (=*Myrcia laxiflora*) placed inside the Guianensis clade. In addition, another important character to recognize this group is the glabrous staminal ring, not mentioned by Lucas et al. (2011), but demonstrated by Vasconcelos et al. (2017a). Diagnostic features of the Guianensis clade are available in Table 3 and Fig. 4.

Morphologically, relationships inside the Guianensis clade are still obscure. The Guianensis clade is the second most recent group of *Myrcia* s.l. (15.7–6.9 My; Santos et al., 2017) and this can be a likely explanation for the lack of morphological patterns. Very short branches are seen inside the core Guianensis clade (in both trees from genome skimming and Sanger sequencing data), a fact that indicates few and likely recent molecular variation between terminals (Degnan and Roseberg, 2009), as already reported for other Neotropical plants (e.g. Kay et al., 2005; Antonelli et al., 2010; Moonlight et al., 2015; Iles et al. 2016). At least partially, the lack of molecular variation could be extrapolated to the external morphology, i.e. few molecular divergences correspond to few morphological divergences, culminating in poorly delimited and misidentified taxa. This fact demonstrates the urgent need for an accurate taxonomic revision of the group. Results from genome skimming showed higher resolution and supports for inter-specific relationships in all three subclades but, although some morphologically allied species emerged together (e.g. *Myrcia vestita* and *Myrcia* sp. [= *M. siriacoana*]), a general morphological scenario cannot be clarified too. Moreover, many species were reconstructed as non-monophyletic in all our results (Figs. 1, 2 and 3).

Both results from genome skimming and Sanger sequencing data recorded a geographical pattern among the three well-supported subclades within the Guianensis clade. The exception is *Myrcia cuprea* that occurs in Amazonic *campinaranas* and emerged together with species from Cerrado (Figs. 1, 2 and 3). Subclade 4A has intermixed specimens from Cerrado and AF, subclade 4B has specimens from Caribbean and Amazon and subclade 4C presents accessions from Cerrado and Caatinga (*Myrcia laricina*; included only in the Sanger sequencing scheme). Additionally, the three accessions of *M. obovata* that emerged in a single clade are from Minas Gerais. As indicated by Lucas et al. (2011), the Guianensis clade has a wide geographical distribution, from Caribbean to southern

Brazil and Paraguay (Fig. 5), but does not occur in Central America. Brazilian Cerrado and AF biomes are centers of diversity of the group. Caribbean, the Amazon and the Guayana region have only few representatives (Table 1), but seem to be an important area in the diversification of the Guianensis clade. Inclusion of other Guianensis clade species from the Amazon and Guayana region in a phylogenetic framework is necessary for further assumptions on this subject. In a detailed biogeographical study of *Myrcia* s.l., Santos et al. (2017) found the Cerrado and/or Montane AF as the most likely areas of origin of the Guianensis clade. We did not carry out any biogeographical analysis, but our trees suggest the same origin as described by those authors, with posterior northwards dispersal. Geographical separation between subclades was also found in clade 1 of *Myrcia* s.l. (Wilson et al., 2016).

Myrcia guianensis is widely known as a challenging species composed by numerous morphotypes that have morphological overlapping throughout an extensive area of distribution. Not surprisingly, this species appeared as non-monophyletic, with different accessions emerging even in different subclades accordingly to the collection locality (reinforcing the geographical pattern found within the clade). Other less complex species as *M. rufipes*, *M. citrifolia*, *M. subalpestris* and *Myrcia* sp. [= *M. depauperata*] also emerged as non-monophyletic. This subject has vastly been documented in literature (e.g. Rieseberg and Brouillet, 1994; Naciri and Linder, 2015) and verified in specific groups of plants (e.g. Ripma et al., 2014; Gargiulo et al., 2015). Several possible explanations for problems in species relationships have been debated (see Naciri and Linder, 2015 and references therein), but a more general knowledge about the group's biology is needed to precisely discuss this question. *Myrcia* s.l. and specially the Guianensis clade are poorly known in respect to their ecological, cytological, and reproductive aspects, fact that prevents further comments on the behavior of these non-monophyletic entities. Studies at populational level, for example those carried out by Lima et al. (2015) in the *Myrcia laruotteana* complex, are encouraged to address questions about specific delimitation.

4.2. Morphological aspects of the 3-locular clades of Myrcia *s.l.*

Although the tree obtained from the genome skimming data presented high supports between clades of *Myrcia* s.l., these results cannot be extrapolated for the whole genus, as clades 1, 2, 3, 7 and 8 were not included in this analysis. Our discussion on this subject is therefore based fully on the expanded analysis with Sanger sequencing data.

Both ML and Bayesian analyses recovered the Guianensis clade with a close relationship with clades 2, 3 and 8, but with no significant support (Figs. 2 and 3). There are no clear morphological features that corroborate this arrangement (see Lucas et al. 2011 for more morphological details). The phylogenetic placement and relationships of the Guianensis clade with the other clades of *Myrcia* s.l. remain inconclusive due to the low resolution of deeper nodes, the same issue found in previous *Myrcia* s.l. phylogenies (Lucas et al., 2011; Staggemeier et al., 2015; Santos et al, 2016; 2017; Wilson et al; 2016).

In the morphological context, the number of locules in the ovaries have been recently demonstrated as a relevant characteristic in separating lineages of *Myrcia* s.l. Surprisingly, this feature was neglected by previous taxonomic treatments (e.g. De Candolle, 1828; Cambessèdes, 1832; Kiearskou, 1893), except by Berg's work for *Flora Brasiliensis* (Berg, 1857–1859), who created two major artificial groups under the genus *Aulomyrcia* (nowadays synonym of *Myrcia*): the first one including species with '*germen bi-loculare*' and the second one with '*germen tri-quadriloculare*'. Our results corroborate the separation of *Myrcia* s.l. based on the locularity, reinforcing the significance of this trait in the classification of the genus. Clades 1, 2, 3, 5, 7, 8, and 9 are characterized by bi-locular ovaries, with very few exceptions in clades 3 and 5 (M.F. Santos, pers. comm.), while clades 4 (Guianensis clade), 6 and 10 have plants with trilocular ovaries (see also section 4.1). Vasconcelos et al. (2017a) also reported the same distinctive pattern of locularity in *Myrcia* s.l. and found it to be a character with strong phylogenetic signal within the genus. Relationships among the trilocular clades and the evolution of this character in *Myrcia* s.l. remain unknown.

Clade 6 is the most highly similar group to the Guianensis clade. Lucas et al. (2011) distinguished clade 6 from the Guianensis clade by its leaves with reticulate venation and one large gland per areole. More recently, Vasconcelos et al. (2017a) found that species of clade 6 constantly present hairs on the staminal ring and style base, unlike the Guianensis clade that has completely glabrous staminal ring and style base. Our results also found these traits to be important in distinguishing the Guianensis clade and the clade 6, as all sampled species of both clades match the morphology described above. Clade 10 firstly appeared as a small clade formed by *M. robusta* and *M. maximiliana* in the phylogenetic hypothesis of Santos et al. (2016), but no further discussion was provided. Our study supports the recognition of this lineage. Four further species joined this group, *M. almasensis*, *M. thomasii*, *M. pulvinata* and *M.* aff. *unana*. All these species have 3-locular ovaries. Excluding *M. almasensis*, this group is restricted to the AF from northern Espírito Santo and southern Bahia and in general has larger flowers, shallower hypanthia and more robust leaves compared to the Guianensis clade. *Myrcia almasensis* has small leaves, delicate inflorescences and flowers, and occurs in *campo* *rupestre* from the interior of Bahia (Nic Lughadha, 1994). This species better matches the morphology and distribution of clade 6 and its position in clade 10 is somewhat controversial. Deeper morphological investigations on clades 6 and 10 are appreciated.

4.3. Utility of phylogenomics in Myrcia *s.l.* and *Myrtaceae systematics – future perspectives*

In this paper, genome skimming was employed in Myrtaceae for the first time and proved to be useful in generating wholly plastid DNA sequences and partial nuclear sequences of *Myrcia* s.l. and three outgroups of other genera (*Eugenia*, *Myrceugenia* and *Myrtus*), with relative ease. As reported previously (Malé et al., 2014), this methodology is not based on PCR, nor requires DNA purification before sequencing, reducing greatly the lab work. Also, this technique allows for multiplexing of samples in a single run on the Ilumina platform. In our case, two runs of 24 samples each recovered good quality sequences of 45 specimens (93,7% of success). A single sample completely failed in sequencing (Santos 613) and two other specimens (Lima 511 and Santos 840) had poor sequences with many ambiguous sites. DNA of all 48 samples used herein were obtained from fresh material stored in silica-gel. In our case, DNA obtained from herbarium specimens did not have enough quality to execute genome skimming, unlike other studies that successfully applied this technique for degraded DNA from herbarium specimens (e.g., Ripma et al., 2014).

Our main aim using phylogenomic studies was to elucidate relationships inside *Myrcia* clade Guianensis. As recent demonstrated in other groups of *Myrcia* s.l., limited plastid and nuclear regions were insufficient to reconstruct a comprehensive evolutionary history of close species (Santos et al., 2016), likely due to the lack of informative sites available in such regions. The same problem of low statistical supports has frequently been found in the deeper nodes of *Myrcia* s.l. phylogeny, culminating in unresolved relationships among major well-supported clades (Lucas et al., 2011; Santos et al., 2017). This situation has also been detected in other Myrtaceae large genera such as *Syzygium* (Biffin et al., 2006) and *Eugenia* (Mazine et al., 2014), and even at higher taxonomic levels within Myrteae (Vasconcelos et al., 2017b). The genome skimming strategy applied in the present work did not aim to clarify relationships among *Myrcia* s.l. clades, as many of the nine major clades of this genus were not sampled. Our results however, provided more phylogenetic informative sites and consequently exhibited high statistical supports in the deeper nodes (Fig. 1), highlighting the robustness of the analysis. Genome skimming may certainly help improving the systematics of *Myrcia* s.l. and future studies including a more comprehensive sampling of the genus will be carry out. The application of this methodology in other Myrtaceae genera are encouraged.

Despite all positive points of NGS techniques, the use of full plastome sequences in large-scale phylogenies of mega-diverse families (i.e. with hundreds of terminals) would be painful mostly due to the computational complexity and limited budget (Reginato et al. 2016). In these cases, a search for highly variable markers in the ptDNA sequences is feasible. Hybrid phylogenetic-phylogenomic approaches can be lead, where few complete plastomes are generated and used to search for highly potentially informative markers that are subsequently sequenced with Sanger sequencing for more samples (Särkinen and George 2013). This would be a feasible methodology to resolve the backbone of the family Myrtaceae and its tribes. Other fields can also be explored from genome skimming data in order to improve the general knowledge about plant systematics, as the development of microsatellites (e.g. Zalapa et al., 2012) and phylogenies based on repetitive elements that are often discarded (Dodsworth et al., 2016).

5. Conclusions

In this study, we corroborated the monophyly of *Myrcia* clade Guianensis (clade 4 of Lucas et al. (2011)) with ML phylogenetic analyses using DNA data from new and traditional techniques (genome skimming and PCR+Sanger sequencing, respectively). The Bayesian inference however, showed a non-monophyletic group, as *Myrcia obovata* appeared as a distinct lineage in a polytomy with the core Guianensis clade and other clades of *Myrcia* s.l. According to our results, the morphological circumscription of the Guianensis clade was updated and a final list of species belonging to the group was provided. Based on the data available herein, a complete taxonomic revision of the group is being prepared (Chapter 3). Within the Guianensis clade, a geographical separation can be noted, with two subclades containing species from Cerrado and AF and another one with plants from Amazon and Caribbean. No morphological pattern inside the Guianensis clade was found so far. This scenario draws attention to the complexity of this group and the necessity of further studies at populational level and of other areas of science (e.g. anatomy).

Our study also confirms that NGS techniques have much to offer to plant systematics. We endorse genome skimming as an efficient tool to generate large-scale DNA sequence data to build robust phylogenies from higher to lower taxonomic ranks in plants. In the case of *Myrcia* s.l., supports were considerably higher in the tree obtained from genome skimming data than those trees resulted from only five target DNA regions. As a rule, large genera have complex evolutionary histories (e.g. *Miconia* and *Leandra* (Goldenberg et al., 2008; Reginato and Michelangeli 2016), *Solanum* (Weese and Bohs, 2007), *Mimosa* (Simon et al., 2011)) and more informative genetic data is worthy to elucidate internal patterns. Undoubtedly, better resolved phylogenies has a positive impact in other studies such as character evolution, biogeography and diversification.

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Tables

Table 1: Inferred and confirmed *Myrcia* clade Guianensis species with their respective number of locules in the ovaries and geographic distribution (according to Chapter 3). Species sampled for molecular analyses are indicated.

Inferred species	Sampled for molecular analysis	Included in the Genome Skimming	Included in the expanded sampling	Number of locules in the ovaries	*Myrcia* clade Guianensis	Geographic distribution				
						Atlantic Forest	Cerrado	Caatinga	Amazon/ Guayana Region	Caribbean
Myrcia camapuanensis N.Silveira	x	x	x	3	yes		x			
Myrcia citrifolia (Aubl.) Urb.	x	x	x	3	yes				x	x
Myrcia clavata Sobral				3	yes	x				
Myrcia coelosepala Kiaersk.	x		x	2	no	x				
Myrcia cordiformis Mattos	x		x	3	yes	x				
Myrcia cuprea (O.Berg) Kiaersk.	x		x	3	yes				x	
Myrcia gigas McVaugh				3	yes				x	
Myrcia glabra (O.Berg) D.Legrand				3	yes	x				
Myrcia guianensis (Aubl.) DC.	x	x	x	3	yes	x	x		x	
Myrcia hypericoides Cambess.				3	yes					
Myrcia laricina (O.Berg) Burret ex Luetzelb.	x		x	3	yes		x	x		
Myrcia laxiflora Cambess.	x		x	3	yes	x				
Myrcia littoralis DC.	x	x	x	2	no	x				
Myrcia macaca Sobral & M.A.D.Souza				3	yes				x	
Myrcia monoclada Sobral				3	yes	x				
Myrcia myrtillifolia DC.	x	x	x	2	no		x			
Myrcia nivea Cambess.	x	x	x	3	yes		x			
Myrcia obovata (O.Berg) Nied.	x	x	x	3	yes		x			
Myrcia ovina Proença & Landim	x	x	x	3	yes	x				
Myrcia pinifolia Cambess.	x	x	x	2	no		x			
Myrcia pistrinalis McVaugh				3	yes				x	
Myrcia proencana Villarroel & Gomes-Bezerra				3	unknown		x			
Myrcia ramuliflora (O.Berg) N.Silveira	x	x	x	2	no	x				
Myrcia retusa (O.Berg) Nied.				3	yes	x				
Myrcia rufipes DC.	x	x	x	3	yes	x	x			
Myrcia salicifolia DC.				3	yes				x	
Myrcia sp. [= *M. depauperata* Glaz.]	x	x	x	3	yes		x			
Myrcia sp. [= *M. siriacoana* Glaz.]	x	x	x	3	yes		x			
Myrcia sp. 1	x	x	x	3	yes	x				
Myrcia stricta (O.Berg) Kiaersk.	x	x	x	3	yes	x	x			
Myrcia subalpestris DC.	x	x	x	3	yes		x			
Myrcia thomasii B.S.Amorim & A.R.Lourenço	x	x	x	3	no	x				
Myrcia tortuosa (O.Berg) N.Silveira	x	x	x	3	yes		x			
Myrcia tumida Sobral	x	x	x	3	yes	x				
Myrcia variabilis DC.	x	x	x	3	yes		x			
Myrcia vestita DC.	x	x	x	3	yes		x			

Table 2. Details summary of sequences obtained through genome skimming and Sanger sequencing used to infer phylogenetic relationships in *Myrcia* clade Guianensis. Information of combined datasets are also indicated. ptDNA: plastid genome, nrDNA: nuclear ribosomal region.

	Number of samples	Aligned lenght (bp)	Number of variable sites	Number of PICs (%)	Mean GC content (%)
Genome skimming data					
ptDNA	45	160,097	8,289	2,940 (1.8)	37.0
nrDNA	45	5,825	218	83 (1.4)	53.3
total matrix (raw)	45	165,922	8,507	3,023 (1.8)	37.6
Sanger Sequencing data					
ITS	122	719	246	139 (19.3)	55.9
psbA-trnH	124	597	157	82 (13.7)	27.4
trnL-trnF	120	732	103	46 (6.3)	34.8
trnQ-rpl16	120	1,300	305	122 (9.4)	26.0
ndhF	119	680	110	50 (7.3)	28.2
combined plastid matrix	123	3,309	654	289 (8.7)	28.6
total matrix	123	4,028	908	435 (10.8)	33.7

Table 3. Diagnostic morphological characters of *Myrcia* clade Guianensis (partially obtained from Lucas et al. (2011) and updated according to the present study).

Characters	**Guianensis clade**
Branching	Monopodial
Indumentum	Usually simples trichomes, but dibrachiate ones can be found
Leaf venation	Primary veins usually raised, secondary veins raised or flat
Leaf glands	Small and indistinct
Inflorescences	Symmetrical triangular panicles, racemes, dichasia, triads, single flower or glomeruliform
Calyx	5 free lobes, rarely very short lobes almost indistinguishable from each other
Anthers	Tetralocular with symmetrical thecae
Hypanthium	Glabrous; prolonged above the ovary
Staminal ring	Somewhat thickened, comprising 30-40% of total disc width, glabrous
Ovary	Consistently 3-locular
Fruits	Globose, crowned by the hypanthium and lobes or remnants of them

Figures

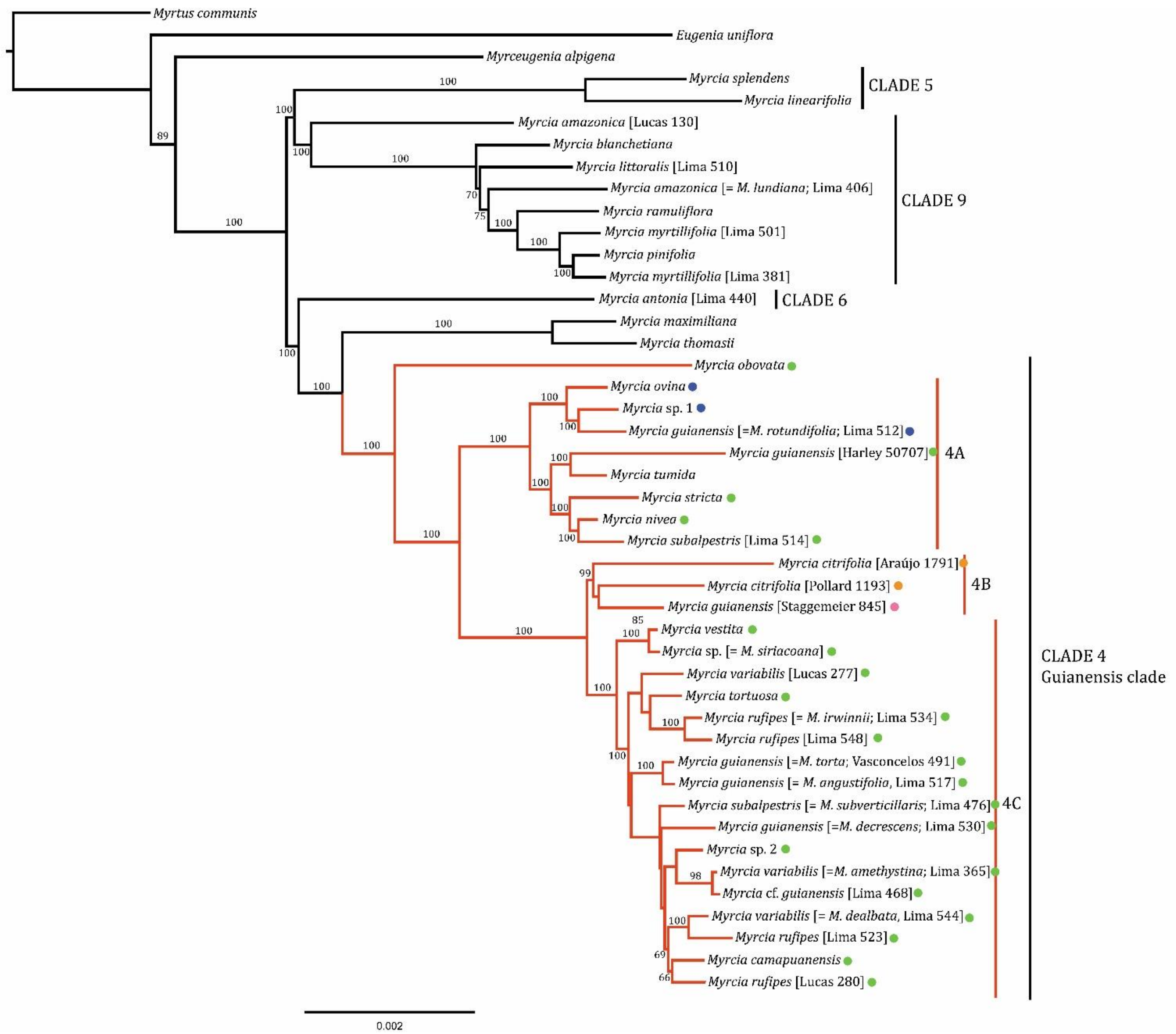
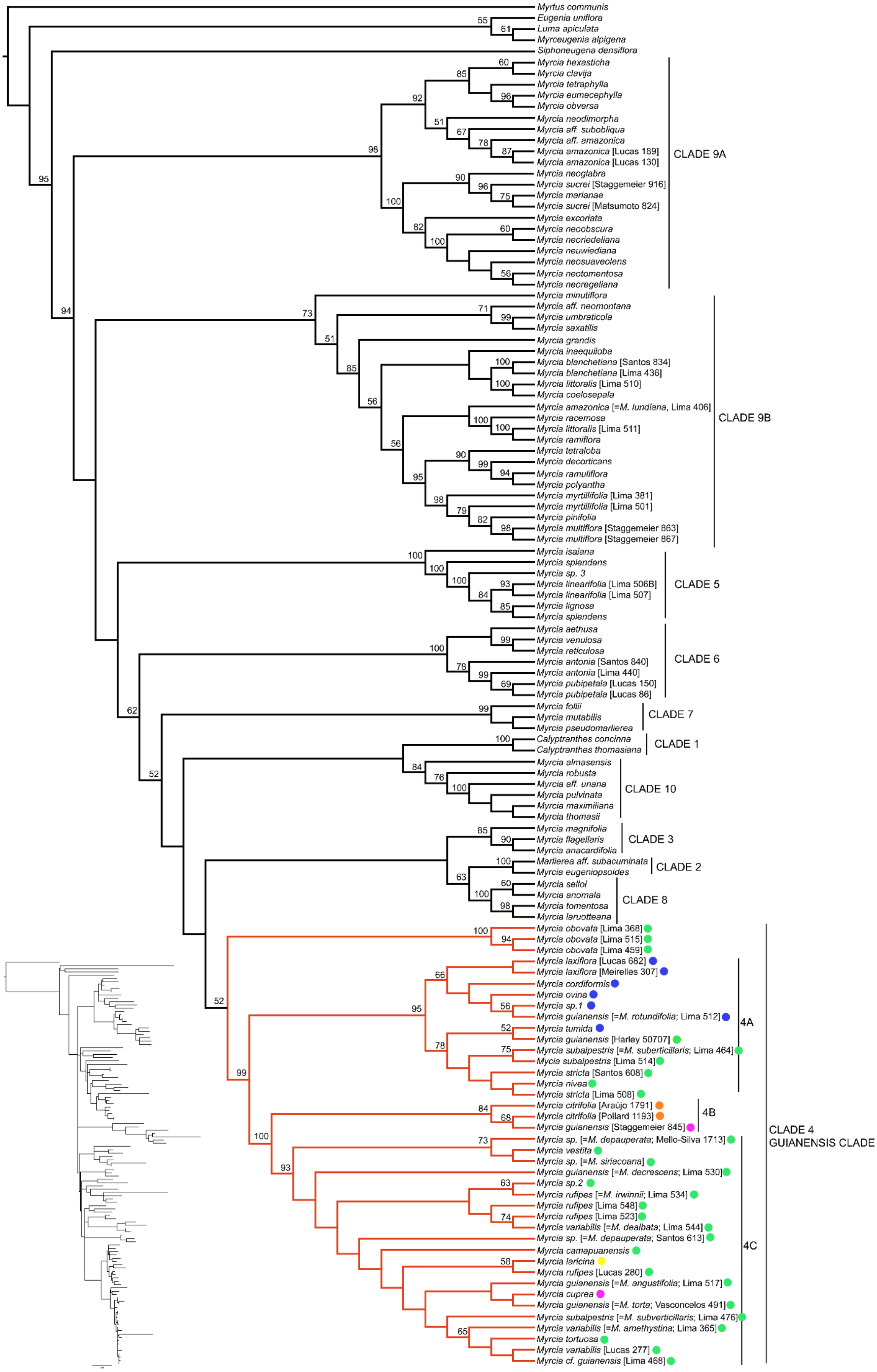
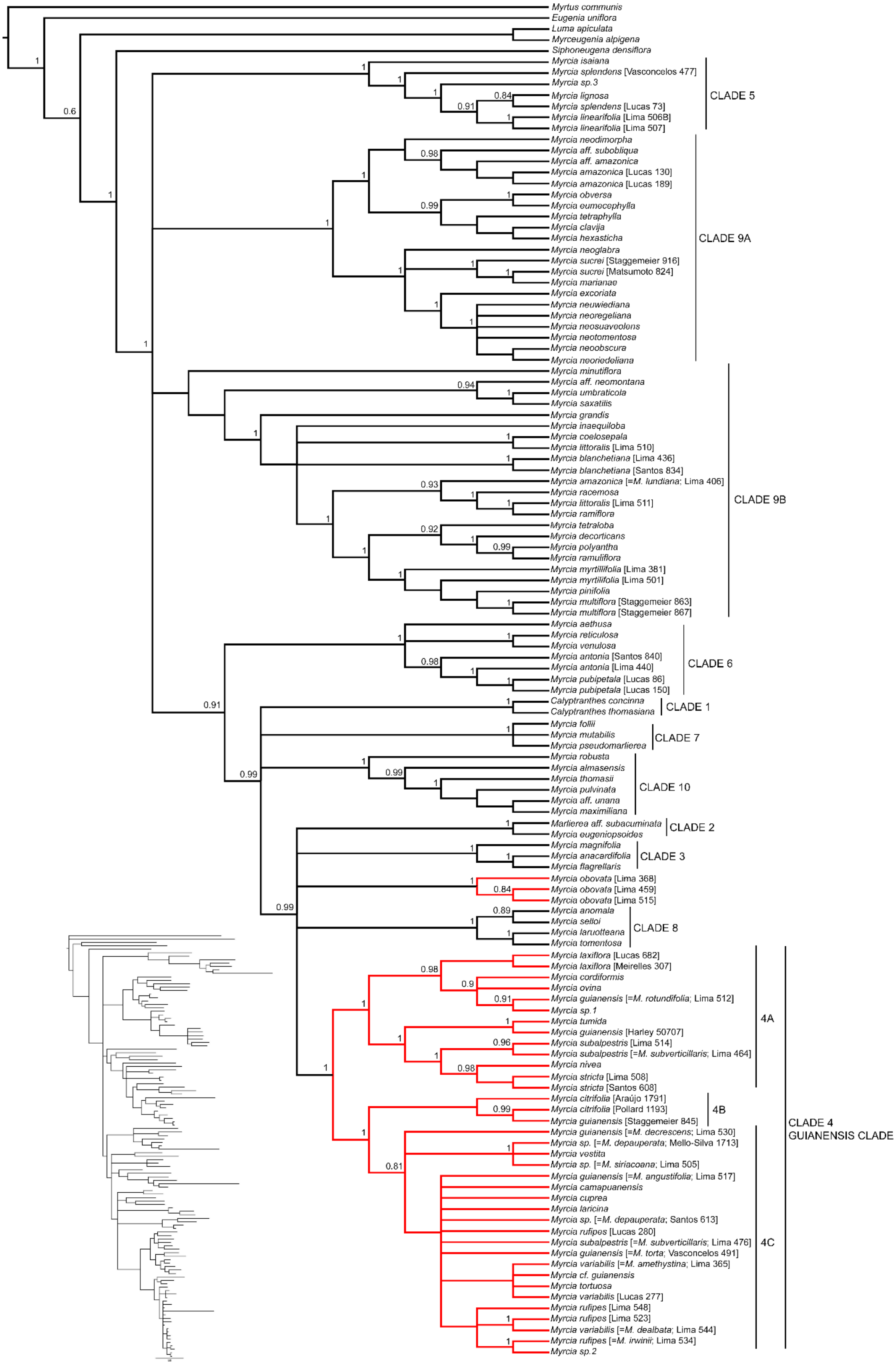


Figure 1. Phylogram obtained from Maximum Likelihood analysis of complete plastid sequences and nuclear ribosomal unit concatenated for 45 terminals. Bootstrap percentages ≥ 50 are shown at nodes. Clades are numbered following Lucas et al. (2011). The Guianensis clade is in red and its subclades are indicated. Coloured circles correspond to geographical distribution (Cerrado: green; Atlantic Forest: blue; Amazon: pink; Caribbean: orange).


Myrtus communis
Eugenia uniflora
Luma apiculata
Myrceugenia alpigena
Siphoneugena densiflora
Myrcia hexasticha
Myrcia clavija
Myrcia tetraphylla
Myrcia eumecephylla
Myrcia obversa
Myrcia neodimorpha
Myrcia aff. subobliqua
Myrcia aff. amazonica
Myrcia amazonica [Lucas 189]
Myrcia amazonica [Lucas 130]
Myrcia neoglabra
Myrcia sucrei [Staggemeier 916]
Myrcia marianae
Myrcia sucrei [Matsumoto 824]
Myrcia excoriata
Myrcia neoobscura
Myrcia neoriedeliana
Myrcia neuwiediana
Myrcia neosuaveolens
Myrcia neotomentosa
Myrcia neoregeliana
CLADE 9A
Myrcia minutiflora
Myrcia aff. neomontana
Myrcia umbraticola
Myrcia saxatilis
Myrcia grandis
Myrcia inaequiloba
Myrcia blanchetiana [Santos 834]
Myrcia blanchetiana [Lima 436]
Myrcia littoralis [Lima 510]
Myrcia coelosepala
Myrcia amazonica [=M. lundiana, Lima 406]
Myrcia racemosa
Myrcia littoralis [Lima 511]
Myrcia ramiflora
Myrcia tetraloba
Myrcia decorticans
Myrcia ramuliflora
Myrcia polyantha
Myrcia myrtillifolia [Lima 381]
Myrcia myrtillifolia [Lima 501]
Myrcia pinifolia
Myrcia multiflora [Staggemeier 863]
Myrcia multiflora [Staggemeier 867]
CLADE 9B
Myrcia isaiana
Myrcia splendens
Myrcia sp. 3
Myrcia linearifolia [Lima 506B]
Myrcia linearifolia [Lima 507]
Myrcia lignosa
Myrcia splendens
CLADE 5
Myrcia aethusa
Myrcia venulosa
Myrcia reticulosa
Myrcia antonia [Santos 840]
Myrcia antonia [Lima 440]
Myrcia pubipetala [Lucas 150]
Myrcia pubipetala [Lucas 86]
CLADE 6
Myrcia follii
Myrcia mutabilis
Myrcia pseudomarlierea
CLADE 7
Calyptranthes concinna
Calyptranthes thomasiana
CLADE 1
Myrcia almasensis
Myrcia robusta
Myrcia aff. unana
Myrcia pulvinata
Myrcia maximiliana
Myrcia thomasii
CLADE 10
Myrcia magnifolia
Myrcia flagellaris
Myrcia anacardifolia
CLADE 3
Marlierea aff. subacuminata
Myrcia eugeniopsoides
CLADE 2
Myrcia selloi
Myrcia anomala
Myrcia tomentosa
Myrcia laruotteana
CLADE 8
Myrcia obovata [Lima 368]
Myrcia obovata [Lima 515]
Myrcia obovata [Lima 459]
Myrcia laxiflora [Lucas 682]
Myrcia laxiflora [Meirelles 307]
Myrcia cordiformis
Myrcia ovina
Myrcia sp.1
Myrcia guianensis [=M. rotundifolia; Lima 512]
Myrcia tumida
Myrcia guianensis [Harley 50707]
Myrcia subalpestris [=M. superticillaris; Lima 464]
Mycia subalpestris [Lima 514]
Myrcia stricta [Santos 608]
Myrcia nivea
Myrcia stricta [Lima 508]
4A
Myrcia citrifolia [Araújo 1791]
Myrcia citrifolia [Pollard 1193]
Myrcia guianensis [Staggemeier 845]
4B
Myrcia sp. [=M. depauperata; Mello-Silva 1713]
Myrcia vestita
Myrcia sp. [=M. siriacoana]
Myrcia guianensis [=M. decrescens; Lima 530]
Myrcia sp.2
Myrcia rufipes [=M. irwinnii; Lima 534]
Myrcia rufipes [Lima 548]
Myrcia rufipes [Lima 523]
Myrcia variabilis [=M. dealbata; Lima 544]
Myrcia sp. [=M. depauperata; Santos 613]
Myrcia camapuanensis
Myrcia laricina
Myrcia rufipes [Lucas 280]
Myrcia guianensis [=M. angustifolia; Lima 517]
Myrcia cuprea
Myrcia guianensis [=M. torta; Vasconcelos 491]
Myrcia subalpestris [=M. subverticillaris; Lima 476]
Myrcia variabilis [=M. amethystina; Lima 365]
Myrcia tortuosa
Myrcia variabilis [Lucas 277]
Myrcia cf. guianensis [Lima 468]
4C
CLADE 4
GUIANENSIS CLADE

(previous page) Figure 2. Cladogram obtained from Maximum Likelihood analysis of five target DNA regions (ITS, *psbA-trnH*, *trnL-trnF*, *trnQ-rpl16* and *ndhF*) for 123 terminals. Bootstrap percentages ≥ 50 are shown at nodes. Clades are numbered following Lucas et al. (2011). The Guianensis clade is in red and its subclades are indicated. Coloured circles correspond to geographical distribution (Cerrado: green; Atlantic Forest: blue; Amazon: pink; Caatinga: yellow; Caribbean: orange). Corresponding phylogram is presented.

(next page) Figure 3. Cladogram obtained from Bayesian inference of five target DNA regions (ITS, *psbA-trnH*, *trnL-trnF*, *trnQ-rpl16* and *ndhF*) for 123 terminals. Posterior probabilities ≥ 0.8 are shown at nodes. Clades are numbered following Lucas et al. (2011). The Guianensis clade is in red and its subclades are indicated. Corresponding phylogram is presented.


Myrtus communis
Eugenia uniflora
Luma apiculata
Myrceugenia alpigena
Siphoneugena densiflora
Myrcia isaiana
Myrcia splendens [Vasconcelos 477]
Myrcia sp.3
Myrcia lignosa
Myrcia splendens [Lucas 73]
Myrcia linearifolia [Lima 506B]
Myrcia linearifolia [Lima 507]
CLADE 5
Myrcia neodimorpha
Myrcia aff. subobliqua
Myrcia aff. amazonica
Myrcia amazonica [Lucas 130]
Myrcia amazonica [Lucas 189]
Myrcia obversa
Myrcia eumecophylla
Myrcia tetraphylla
Myrcia clavija
Myrcia hexasticha
Myrcia neoglabra
Myrcia sucrei [Staggemeier 916]
Myrcia sucrei [Matsumoto 824]
Myrcia marianae
Myrcia excoriata
Myrcia neuwiediana
Myrcia neoregeliana
Myrcia neosuaveolens
Myrcia neotomentosa
Myrcia neoobscura
Myrcia neoriedeliana
CLADE 9A
Myrcia minutiflora
Myrcia aff. neomontana
Myrcia umbraticola
Myrcia saxatilis
Myrcia grandis
Myrcia inaequiloba
Myrcia coelosepala
Myrcia littoralis [Lima 510]
Myrcia blanchetiana [Lima 436]
Myrcia blanchetiana [Santos 834]
Myrcia amazonica [=M. lundiana; Lima 406]
Myrcia racemosa
Myrcia littoralis [Lima 511]
Myrcia ramiflora
Myrcia tetraloba
Myrcia decorticans
Myrcia polyantha
Myrcia ramuliflora
Myrcia myrtillifolia [Lima 381]
Myrcia myrtillifolia [Lima 501]
Myrcia pinifolia
Myrcia multiflora [Staggemeier 863]
Myrcia multiflora [Staggemeier 867]
CLADE 9B
Myrcia aethusa
Myrcia reticulosa
Myrcia venulosa
Myrcia antonia [Santos 840]
Myrcia antonia [Lima 440]
Myrcia pubipetala [Lucas 86]
Myrcia pubipetala [Lucas 150]
CLADE 6
Calyptranthes concinna
Calyptranthes thomasiana
CLADE 1
Myrcia follii
Myrcia mutabilis
Myrcia pseudomarlierea
CLADE 7
Myrcia robusta
Myrcia almasensis
Myrcia thomasii
Myrcia pulvinata
Myrcia aff. urana
Myrcia maximiliana
CLADE 10
Marlierea aff. subacuminata
Myrcia eugeniopsoides
CLADE 2
Myrcia magnifolia
Myrcia anacardifolia
Myrcia flagrellaris
CLADE 3
Myrcia obovata [Lima 368]
Myrcia obovata [Lima 459]
Myrcia obovata [Lima 515]
Myrcia anomala
Myrcia selloi
Myrcia laruotteana
Myrcia tomentosa
CLADE 8
Myrcia laxiflora [Lucas 682]
Myrcia laxiflora [Meirelles 307]
Myrcia cordiformis
Myrcia ovina
Myrcia guianensis [=M. rotundifolia; Lima 512]
Myrcia sp.1
Myrcia tumida
Myrcia guianensis [Harley 50707]
Myrcia subalpestris [Lima 514]
Myrcia subalpestris [=M. subverticillaris; Lima 464]
Myrcia nivea
Myrcia stricta [Lima 508]
Myrcia stricta [Santos 608]
4A
Myrcia citrifolia [Araújo 1791]
Myrcia citrifolia [Pollard 1193]
Myrcia guianensis [Staggemeier 845]
4B
Myrcia guianensis [=M. decrescens; Lima 530]
Myrcia sp. [=M. depauperata; Mello-Silva 1713]
Myrcia vestita
Myrcia sp. [=M. siriacoana; Lima 505]
Myrcia guianensis [=M. angustifolia; Lima 517]
Myrcia camapuanensis
Myrcia cuprea
Myrcia laricina
Myrcia sp. [=M. depauperata; Santos 613]
Myrcia rufipes [Lucas 280]
Myrcia subalpestris [=M. subverticillaris; Lima 476]
Myrcia guianensis [=M. torta; Vasconcelos 491]
Myrcia variabilis [=M. amethystina; Lima 365]
Myrcia cf. guianensis
Myrcia tortuosa
Myrcia variabilis [Lucas 277]
Myrcia rufipes [Lima 548]
Myrcia rufipes [Lima 523]
Myrcia variabilis [=M. dealbata; Lima 544]
Myrcia rufipes [=M. irwinii; Lima 534]
Myrcia sp.2
4C
CLADE 4
GUIANENSIS CLADE

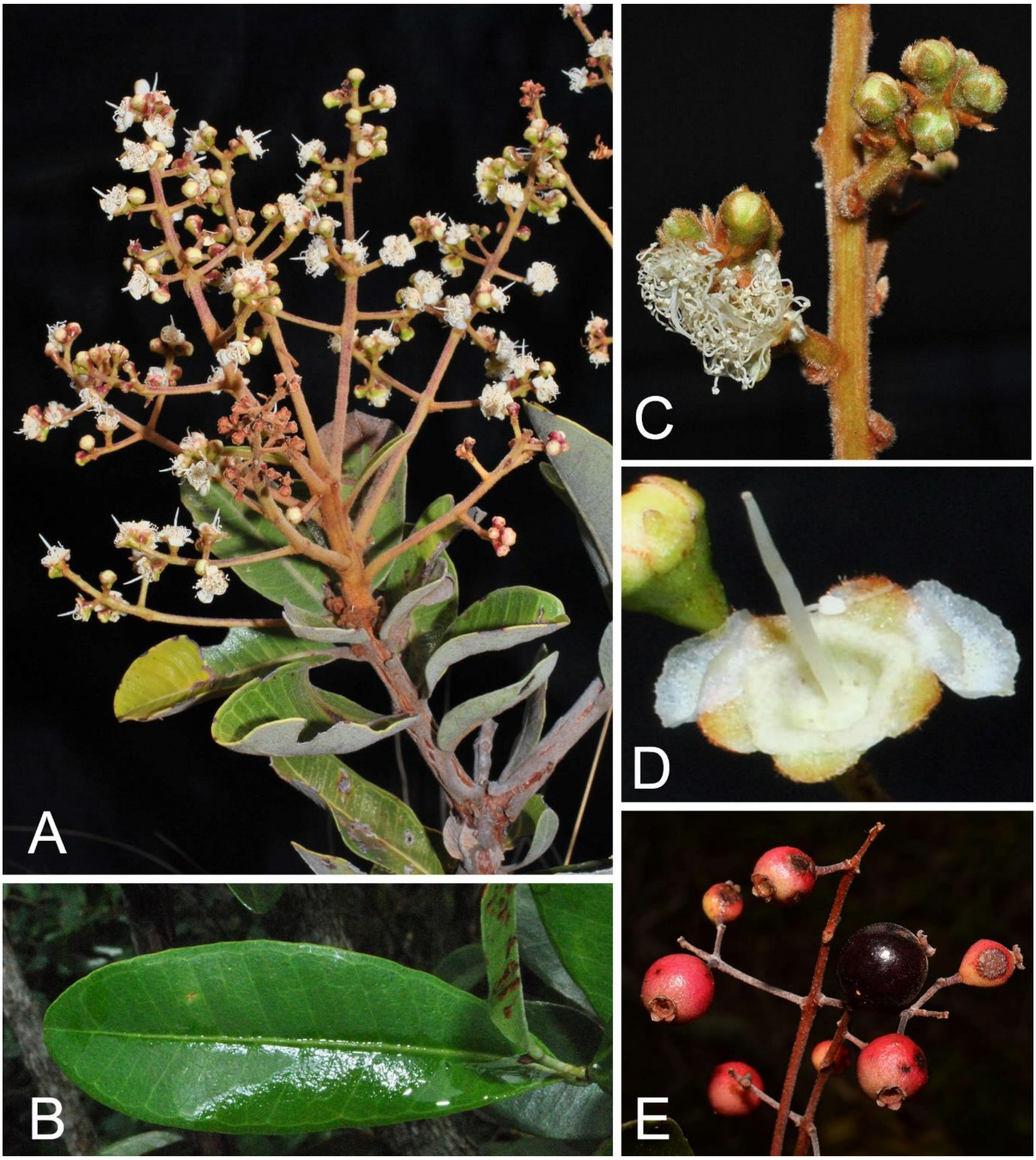


Figure 4. General morphology of *Myrcia* clade Guianensis. A: branch with symmetrical and developed panicles (*M. subalpestris*); B: Leaf with raised midvein adaxially (*M. variabilis*); C: buds with five free calyx lobes (*M. vestita*); D: open flower with glabrous hypanthium prolonged above the ovary and glabrous staminal ring (*M. guianensis*); E: globose fruits crowned by persistent calyx lobes (*M. cuprea*).

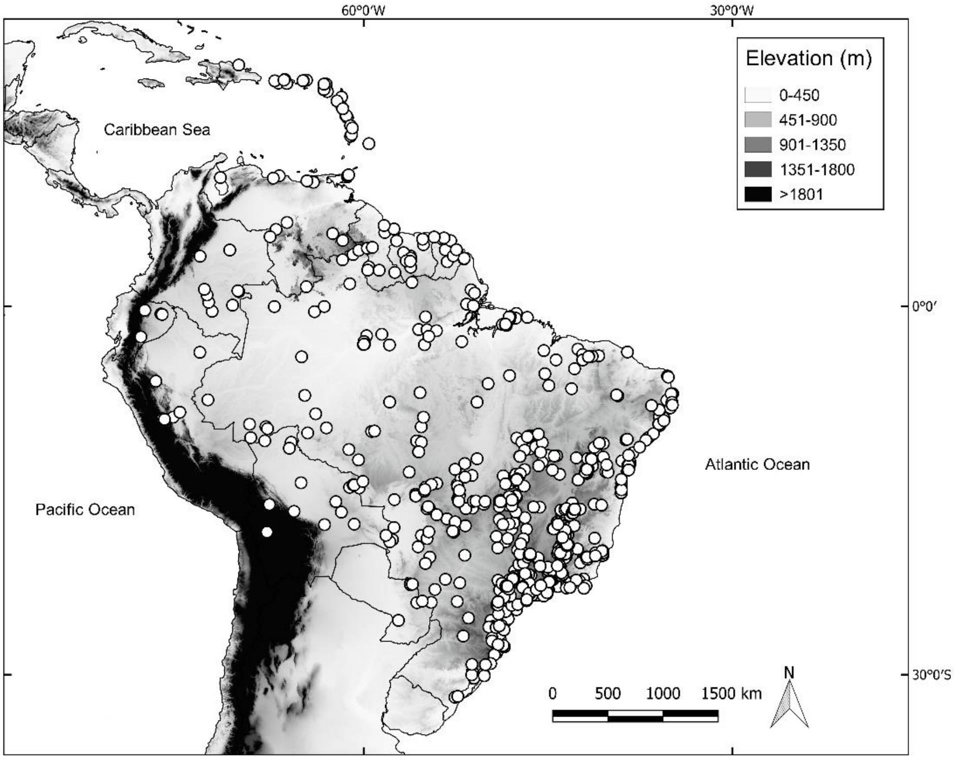


Figure 5. Geographic distribution of the Guianensis clade species (map built with QGIS 2.14; www.qgis.org).

Appendix A. Voucher information and GenBank accessions of all sampled specimens used in the phylogenetic studies. ‘x’ are sequences generated in the present work, still not submitted to GenBank. * represent partial sequences. Synonyms are indicated within square brackets.

Species	**Voucher**	**Herbaria**	**Source of the sequences**	**ITS**	***psbA-trnH***	***trnL-trnF***	***trnQ-rpS16***	***ndhF***
Calyptranthes concinna DC.	Lucas, E. 74	K, ESA	Lucas et al. (2011); Staggemeier et al. (2015)	KP722378	AM489817	KP722334	KP722231	KP722454
Calyptranthes thomasiana O.Berg	Pollard, B.J. 1195	K	Lucas et al. (2011); Staggemeier et al. (2015)	AM234106	AM489820	JN091325	KP722211	KP722434
Eugenia uniflora L.	Lucas, E. 207 (Cult Kew)	K	Lucas et al. (2011); Staggemeier et al. (2015) + NGS	AM234088	AM489828	KP722326	KP722202	KP722418
Luma apiculata (DC.) Burret	Lucas, E. 208	K	Lucas et al. (2011); Staggemeier et al. (2015)	AM234101	AM489843	KP722331	KP722209	KP722433
Marlierea aff. *subacuminata* Kiaersk.	Staggemeier, V.G. 742	K, UB	Staggemeier et al. (2015)	KP722397	KP722305	KP722355	KP722252	KP722475
Myrceugenia alpigena (DC.) Landrum	Lucas, E. 167	K	Lucas et al. (2011); Staggemeier et al. (2015) + NGS	AM234098	AM489854	KP722376	JN661090	KP722441
Myrcia aethusa (O.Berg) N.Silveira	Lima, D.F. 447	K, UEC, UPCB	Sanger	x	x	x	x*	x
Myrcia aethusa (O.Berg) N.Silveira	Neto, L.A. 3007	INPA	Staggemeier et al. (2015)	KP722417	KP722325	KP722375	KP722272	KP722495
Myrcia aff. *neomontana* E.Lucas & C.E.Wilson	Holst, B. 9384		Staggemeier et al. (2015)	KP722377	KP722285	KP722333	KP722229	KP722453
Myrcia aff. *subobliqua* (Benth.) Nied.	Staggemeier, V.G. 839	K, UB, UFG, RB, IAN, INPA	Staggemeier et al. (2015)	KP722396	KP722304	KP722354	KP722251	KP722474
Myrcia aff. *unana* Sobral, Faria & Villaroel	Amorim, B.S. 2024		Sanger	x	x		x	
Myrcia almasensis Nic Lughadha	Faria, J.E.Q. 1908	UB, HUEFS	Sanger	x	x	x	x*	x
Myrcia amazonica DC.	Lucas, E. 130	K	NGS	x	x	x	x	x
Myrcia amazonica DC. [= *M. detergens* Miq.]	Lucas, E. 189	K	Lucas et al. (2011); Staggemeier et al. (2015)	JN091212	JN091403	JN091337	KP722213	KP722437
Myrcia amazonica DC. [= *M. lundiana* Kiaersk.]	Lima, D.F. 406	K, UEC, RB, UPCB	NGS	x	x	x	x	x
Myrcia anacardiifolia Gardner	Nadruz, M. 999	K, RB	Lucas et al. (2011); Staggemeier et al. (2015)	JN091212	JN091407	JN091341	KP722210	KP722419

Myrcia anomala Cambess.	Faria, J.E.Q. 1015	UB	Sanger	x	x		x*	x
Myrcia antonia (O.Berg) Mazine	Lima, D.F. 440	K, UPCB	NGS	x	x	x	x	x
Myrcia antonia (O.Berg) Mazine	Santos, M.F. 840	SPF, K	Santos et al. (2016) + NGS	KU898301	KU898405	KU898460	KP722277	KU898358
Myrcia blanchetiana (O.Berg) Mattos	Lima, D.F. 436	K, UEC, UPCB	NGS	x	x	x	x	x
Myrcia blanchetiana (O.Berg) Mattos	Santos, M.F. 834	K, SPF	Santos et al. (2016)	KU898321	KU898428	KU898483	KU898538	KU898379
Myrcia camapuanensis N.Silveira	Staggemeier, V.G. 327	K, UB	NGS	x	x	x	x	x
Myrcia cf. *guianensis* (Aubl.) DC.	Lima, D.F. 468	K, UEC, UPCB, RB	NGS	x	x	x	x	x
Myrcia citrifolia (Aubl). Urb.	Araújo, A.C. 1791	K	NGS	x	x	x	x	x
Myrcia citrifolia (Aubl). Urb.	Pollard B.J. 1193	K	Lucas et al. (2011) + NGS	JN091219	JN091410	x	x	x
Myrcia clavija Sobral	Lucas, E. 244	K	Lucas et al. (2011); Staggemeier et al. (2015)	JN091220	JN091411	KP722332	KP722217	KP722442
Myrcia coelosepala Kiaersk.	Lucas, E. 267	K	Sanger	x	x	x	x*	x
Myrcia cordiformis Mattos	Staggemeier 762	K, UB, UFG	Staggemeier et al. (2015)	KP722393	KP722301	KP722351	KP722247	KP722471
Myrcia cuprea (O.Berg) Kiaersk.	Staggemeier, V.G. 862	K, UB	Staggemeier et al. (2015)	KP722394	KP722302	KP722352	KP722248	KP722472
Myrcia decorticans DC.	Staggemeier, V.G. 799	UB,K	Staggemeier et al. (2015)	KP722383	KP722290	KP722339	KP722237	KP722460
Myrcia eugeniopsoides (Legrand & Kausel) Mazine	Lucas, E. 61	K	Lucas et al. (2011); Staggemeier et al. (2015)	AM234107	AM489845	JN091327	KP722205	KP722429
Myrcia eumecephylla (O.Berg) Nied.	Matsumoto, K. 803	UEC, MBML	Lucas et al. (2011); Staggemeier et al. (2015)	JN091223	JN091414	JN091349	KP722223	KP722446
Myrcia excoriata (Mart.) E.Lucas	Matsumoto, K. 825	UEC, CVRD	Lucas et al. (2011); Staggemeier et al. (2015)	JN091203	JN091394	JN091328	KP722226	KP722449
Myrcia flagellaris (D.Legrand) Sobral	Lucas, E. 83	K	Lucas et al. (2011); Staggemeier et al. (2015)	AM234113	AM489836	JN091350	KP722206	KP722430
Myrcia follii G.M.Barroso & Peixoto	Staggemeier, V.G. 907	UB, K, RB	Staggemeier et al. (2015)	KP722384	KP722291	KP722340	KP722238	KP722461

Myrcia grandis McVaugh	Staggemeier, V.G. 850	UB, K, UFG, RB, INPA	Staggemeier et al. (2015)	KP722385	KP722292	KP722341	KP698772	KP722462
Myrcia guianensis (Aubl.) DC.	Harley, R. 50707	K	Lucas et al. (2011) + NGS	JN091225	JN091416	JN091351	x	x
Myrcia guianensis (Aubl.) DC.	Staggemeier 845	UB, K, UFG, IAN	Staggemeier et al. (2015) + NGS	KP722398	KP722306	KP722356	KP722253	KP722476
Myrcia guianensis (Aubl.) DC. [= *M. angustifolia* (O.Berg) Nied.]	Lima, D.F. 517	K, UEC, UPCB	NGS	x	x	x	x	x
Myrcia guianensis (Aubl.) DC. [= *M. decrescens* (O.Berg) Mattos]	Lima, D.F. 530	K, UEC, RB, UPCB	NGS	x	x	x	x	x
Myrcia guianensis (Aubl.) DC. [= *M. rotundifolia* (O.Berg) Kiaersk.]	Lima, D.F. 512	K, UPCB	NGS	x	x	x	x	x
Myrcia guianensis (Aubl.) DC. [= *M. torta* DC.]	Vasconcelos, T.N.C. 491	K	NGS	x	x	x	x	x
Myrcia hexasticha Kiaersk.	Lucas, E. 194	K	Lucas et al. (2011); Staggemeier et al. (2015)	JN091227	JN091418	JN091354	KP722214	KP722438
Myrcia inaequiloba (DC.) Lemée	Lucas, E. 105	K	Lucas et al. (2011); Staggemeier et al. (2015)	JN091228	JN091419	JN091355	KP722204	KP722428
Myrcia isaiana G.M.Barroso & Peixoto	Lucas, E. 60	K	Lucas et al. (2011); Staggemeier et al. (2015)	JN091229	JN091420	JN091356	KP722249	KP722423
Myrcia laricina (O.Berg) Burret ex Luetzelb.	Caxambu, M.G. 3217	MBM	Sanger	x	x	x	x	
Myrcia laruotteana Cambess.	Mello-Silva, R. 1705	SPF, HUFU	Lucas et al. (2011)	AM234115	AM489856	JN091357		
Myrcia laxiflora Cambess.	Lucas, E. 682	K	Sanger	x	x	x	x	x
Myrcia laxiflora Cambess.	Meirelles, J. 307	RB, UPCB	Staggemeier et al. (2015)	KP722403	KP722311	KP722361*	KP722257	KP722481
Myrcia lignosa D.Villarroel & Proença	Wood 26462	K	Sanger	x	x	x	x	x
Myrcia linearifolia Cambess.	Lima, D.F. 506B	K, UEC, RB, UPCB	NGS	x	x	x	x	x
Myrcia linearifolia Cambess.	Lima, D.F. 507	K, UEC, RB, UPCB	Sanger	x	x	x	x	x
Myrcia littoralis DC.	Lima, D.F. 510	K, UEC, RB, UPCB	NGS	x	x	x	x	x
Myrcia littoralis DC.	Lima, D.F. 511	K, UPCB	NGS	x	x	x	x	x

Myrcia magnifolia (O.Berg) Kiaersk.	Lucas, E. 1182	HURB	Staggemeier et al. (2015)	KP722411	KP722319	KP722369	KP722266	KP722489
Myrcia marianae Staggemeier & Lucas	Staggemeier, V.G. 764	UB, K, UFG, RB, SPF, IAN, HRCB	Staggemeier et al. (2015)	KP722381	KP722288	KP722337	KP722235	KP722458
Myrcia maximiliana O.Berg	Santos, M.F. 750	K, SPF	Santos et al. (2016) + NGS	KU898318	KU898425	KU898480	KU898535	KU898376
Myrcia minutiflora Sagot	Sasaki, D. 2394	K, SPF	Staggemeier et al. (2015)	KP722399	KP722307	KP722357	KP722254	KP722477
Myrcia multiflora (Lam.) DC.	Staggemeier, V.G. 863	UB, K	Staggemeier et al. (2015)	KP722386	KP722293	KP722342	KP722239	KP722463
Myrcia multiflora (Lam.) DC.	Staggemeier, V.G. 867	UB	Staggemeier et al. (2015)	KP722387	KP722294	KP722343	KP698771	KP722464
Myrcia mutabilis (O.Berg) N.Silveira	Mazine, F.F. 1052	ESA, SPF, MBM	Lucas et al. (2011); Staggemeier et al. (2015)	JN091233	JN091424	KP722344	KP722241	KP722435
Myrcia myrtillifolia DC.	Lima, D.F. 381	K, UPCB, UEC	NGS	x	x	x	x	x
Myrcia myrtillifolia DC.	Lima, D.F. 501	K, UEC	NGS	x	x	x	x	x
Myrcia neodimorpha E.Lucas & C.E.Wilson	Folli, D. 6649	K, CVRD	Staggemeier et al. (2015)	KP722416	KP722324	KP722374	KP722271	KP722494
Myrcia neoglabra E.Lucas & C.E.Wilson	Staggemeier, V.G. 935	UB, K, RB, IAN, UFG, HUFSJ	Staggemeier et al. (2011)	KP722391	KP722299	KP722349	KP722245	KP722469
Myrcia neoobscura E.Lucas & C.E.Wilson	Matsumoto, K. 836	UEC	Lucas et al. (2011); Staggemeier et al. (2015)	JN091205	JN091396	JN091330	KP722228	KP722452
Myrcia neoregeliana E.Lucas & C.E.Wilson	Matsumoto, K. 814	UEC, CVRD, HUEFS	Lucas et al. (2011); Staggemeier et al. (2015)	JN091208	JN091399	JN091333	KP722225	KP722448
Myrcia neosuaveolens E.Lucas & C.E.Wilson	Lucas, E. 85	K	Lucas et al. (2011); Staggemeier et al. (2015)	AM234108	AM489846	KP722329	KP722207	KP722431
Myrcia neotomentosa E.Lucas & C.E.Wilson	Matsumoto, K. 798	UEC	Lucas et al. (2011); Staggemeier et al. (2015)	JN091210	JN091401	JN091336	KP722224	KP722447
Myrcia nivea Cambess.	Lima, D.F. 538	K, UEC, RB, UPCB	NGS	x	x	x	x	x
Myrcia obovata (O.Berg) Nied.	Lima, D.F. 515	K, UEC, UPCB, RB	Sanger	x	x	x	x*	x
Myrcia obovata (O.Berg) Nied.	Lima, D.F. 459	K, UEC, UPCB	Sanger	x	x	x	x	x
Myrcia obovata (O.Berg) Nied.	Lima, D.F. 368	K, UEC, RB, UPCB	NGS	x	x	x	x	x

Myrcia obversa (D.Legrand) E.Lucas & C.E.Wilson	Matsumoto, K. 820	UEC, CVRD	Lucas et al. (2011); Staggemeier et al. (2015)	JN091206	JN091397	JN091331	KP722227	KP722450
Myrcia ovina Proença & Landim	M.Ibrahim 277	UPCB	NGS	x	x	x	x	x
Myrcia pinifolia Cambess.	Vasconcelos, T.N.C. 505	K	NGS	x	x	x	x	x
Myrcia polyantha DC.	Staggemeier, V.G. 797	UB, K	Staggemeier et al. (2015)	KP722400	KP722308	KP722358	KP722255	KP722478
Myrcia pseudomarlierea Sobral	Souza, M.C. 1139	RB	Staggemeier et al. (2015)	KP722404	KP722312	KP722362	KP722258	KP722482
Myrcia pubipetala Miq.	Lucas, E. 150	K	Sanger		x	x	x	x
Myrcia pubipetala Miq.	Lucas, E. 86	K	Lucas et al. (2011); Staggemeier et al. (2015)	AM234114	AM489855	JN091364	KP722273	KP722426
Myrcia pulvinata B.S.Amorim	Amorim, B.S. 1901	UFP	Sanger	x	x		x	
Myrcia racemosa (O.Berg) Kiaersk.	Lucas, E. 63	K	Lucas et al. (2011); Staggemeier et al. (2015)	AM234120	AM489861	JN091366	KP722259	KP722424
Myrcia ramiflora Sobral	Lucas, E. 1181	K	Staggemeier et al. (2015)	KP722409	KP722317	KP722367	KP722264	KP722487
Myrcia ramuliflora (O.Berg) N.Silveira	Lima, D.F. 412	K, UEC, RB, UPCB	NGS	x	x	x	x	x
Myrcia reticulosa Miq.	Harley, R. 50309	K	Lucas et al. (2011) + Sanger	JN091236	JN091427	JN091367	x*	x
Myrcia robusta Sobral	Lucas, E. 727	K	Santos et al. (2016)	KU898289	KU898393	KU898448		KU898346
Myrcia rufipes DC.	Lima, D.F. 523	K, UPCB	NGS	x	x	x	x	x
Myrcia rufipes DC.	Lima, D.F. 548	K, UEC, RB, UPCB	NGS	x	x	x	x	x
Myrcia rufipes DC.	Lucas, E. 280	K	Lucas et al. (2011) + NGS	JN091239	JN091430	JN091369	x	x
Myrcia rufipes DC. [= *M. irwinii* Mattos & D.Legrand]	Lima, D.F. 534	K, UEC, RB, UPCB	NGS	x	x	x	x	x
Myrcia saxatilis (Amshoff) McVaugh	Lucas, E. 98	K	Lucas et al. (2011); Staggemeier et al. (2015)	AM234119	AM489860	JN091370	KP722203	KP722427
Myrcia selloi (Spreng.) N.Silveira	Lucas, E. 110	K	Lucas et al. (2011); Staggemeier et al. (2015)	JN091240	JN091431	JN091371	KP722212	KP722436

Myrcia sp. [= *M. depauperata* Glaz.]	Mello-Silva, R. 1713	SPF, K	Lucas et al. (2011); Staggemeier et al. (2015)	AM234118	AM489859	KP722328	KP722230	KP722421
Myrcia sp. [= *M. depauperata* Glaz.]	Santos, M.F. 613	K, SPF	Santos et al. (2016)		KU898421	KU898476	KU898531	KU898372
Myrcia sp. [= *M. siriacoana* Glaz.]	Lima, D.F. 505	K, UEC, UPCB	NGS	x	x	x	x	x
Myrcia sp.1	Trad, R.J. 579	UEC, K	NGS	x	x	x	x	x
Myrcia sp.2	Lima, D.F. 550	K	NGS	x	x	x	x	x
Myrcia sp.3	Staggemeier 266	UB, K	Sanger	x	x	x	x	x
Myrcia splendens (Sw.) DC.	Lucas, E. 73	K	Lucas et al. (2011); Staggemeier et al. (2015); Wilson et al. (2016)	AM234122	AM489863	JN091374	KP722274	KP722425
Myrcia splendens (Sw.) DC.	Vasconcelos, T.C.N. 477	K	NGS	x	x	x	x	x
Myrcia stricta (O.Berg) Kiaersk.	Lima, D.F. 508	K, UPCB	NGS	x	x	x	x	x
Myrcia stricta (O.Berg) Kiaersk.	Santos, M.F. 608	SPF, UB	Santos et al. (2016)	KU898314	KU898420	KU898475	KU898530	KU898371
Myrcia subalpestris DC.	Lima, D.F. 514	K, UEC, RB, UPCB	NGS	x	x	x	x	x
Myrcia subalpestris DC. [= *M. subverticillaris* (O.Berg) Kiaersk.]	Lima, D.F. 464	K, UEC, RB, UPCB	Sanger	x	x	x		x
Myrcia subalpestris DC. [= *M. subverticillaris* (O.Berg) Kiaersk.]	Lima, D.F. 476	K, UEC, RB, UPCB	NGS	x	x	x	x	x
Myrcia sucrei (G.M.Barroso & Peixoto) E.Lucas & C.E.Wilson	Matsumoto, K. 824	UEC, CVRD	Lucas et al. (2011); Staggemeier et al. (2015)	JN091209	JN091400	JN091335	KP722222	KP722445
Myrcia sucrei (G.M.Barroso & Peixoto) E.Lucas & C.E.Wilson	Staggemeier, V.G. 916	UB, K	Lucas et al. (2011); Staggemeier et al. (2015)	KP722388	KP722295	KP722345	KP722242	KP722465
Myrcia tetraloba D.F.Lima & E.Lucas	Lima, D.F. 415	K, UEC, UPCB	Sanger	x	x		x	x
Myrcia tetraphylla Sobral	Staggemeier, V.G. 926	UB, K, UFG, HUFSJ, RB, R, CVRD	Staggemeier et al. (2015)	KP722389	KP722297	KP722347	KP698773	KP722467
Myrcia thomasii B.S.Amorim & A.R.Lourenço	B.S.Amorim 1020	UFP	NGS	x	x	x	x	x
Myrcia tomentosa (Aubl.) DC.	Soares-Silva, L.H. 752	UB	Lucas et al. (2011)	AM234116	AM489857	JN091380		

Myrcia tortuosa (O.Berg) N.Silveira [= *M. pachyclada* (O.Berg) N.Silveira]	Lima, D.F. 486	K, UEC, UPCB	NGS	x	x	x	x	x
Myrcia tumida Sobral	Lima, D.F. 387	K, UEC, UPCB	NGS	x	x	x	x	x
Myrcia umbraticola (Kunth) E.Lucas & C.E.Wilson	Souza, M.A.D. sn	INPA	Staggemeier et al. (2015)	KP722392	KP722300	KP722350	KP722246	KP722470
Myrcia variabilis DC.	Lucas, E. 277		Lucas et al. (2011) + NGS	JN091248	JN091439	JN091382	x	x
Myrcia variabilis DC. [= *M. amethystina* (O.Berg) Kiaersk.]	Lima, D.F. 365	K, UEC, RB, UPCB	NGS	x	x	x	x	x
Myrcia variabilis DC. [= M. *dealbata* DC.]	Lima, D.F. 544	K, UPCB	NGS	x	x	x	x	x
Myrcia venulosa DC.	Cruz, J.M. 195	ALCB, MBM, ESA, SP	Lucas et al. (2011) + Sanger	AM234125	AM489866	JN091383	x*	x
Myrcia vestita DC.	Lima, D.F. 455	K, UEC, UPCB	NGS	x	x	x	x	x
Myrcia neoriedeliana (O.Berg) E.Lucas & C.E.Wilson	Lucas, E. 88	K	Lucas et al. (2011); Staggemeier et al. (2015)	AM234109	AM489847	KP722330	KP722208	KP722432
Myrcia neuwiedeana (O.Berg) E.Lucas & C.E.Wilson	Staggemeier, V.G. 793	UB, K, UFG, RB	Staggemeier et al. (2015)	KP722402	KP722310	KP722360	KP698774	KP722480
Myrtus communis L.	Lucas, E. 211 (Cult Kew)	K	Lucas et al. (2011); Staggemeier et al. (2015) + NGS	AM234149	AM489872	KP722327	KP722221	KP722420
Siphoneugena densiflora O.Berg	Mazine, F.F. 1050	K, ESA, MBM	Lucas et al. (2011); Staggemeier et al. (2015)	AM489412	AM489571	JN091389	KP722220	KP722444

Supplementary Material

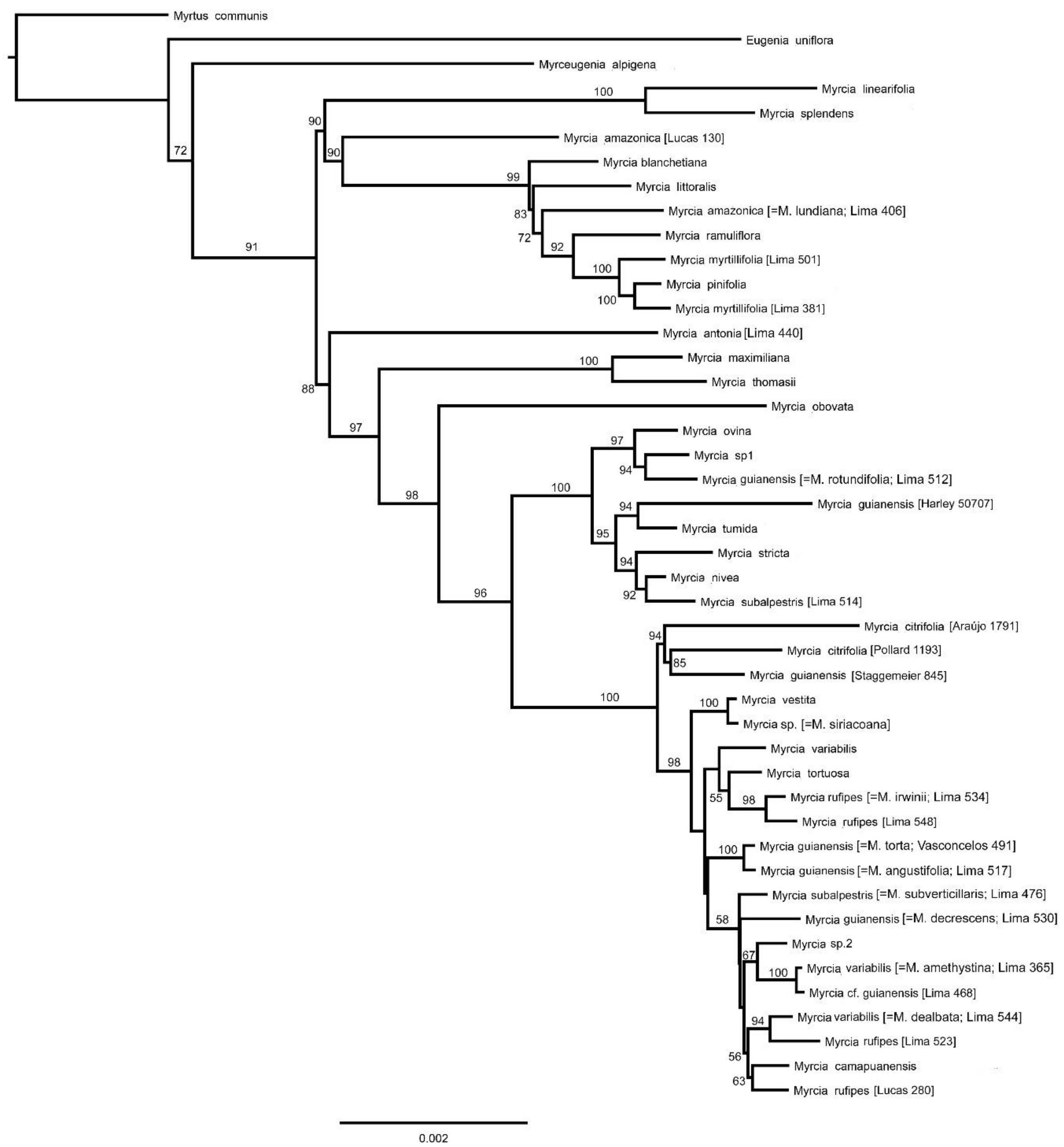


Figure S1. Phylogram obtained from Maximum Likelihood analysis of complete plastid sequences for 45 terminals. Bootstrap percentages ≥ 50 are shown at nodes.

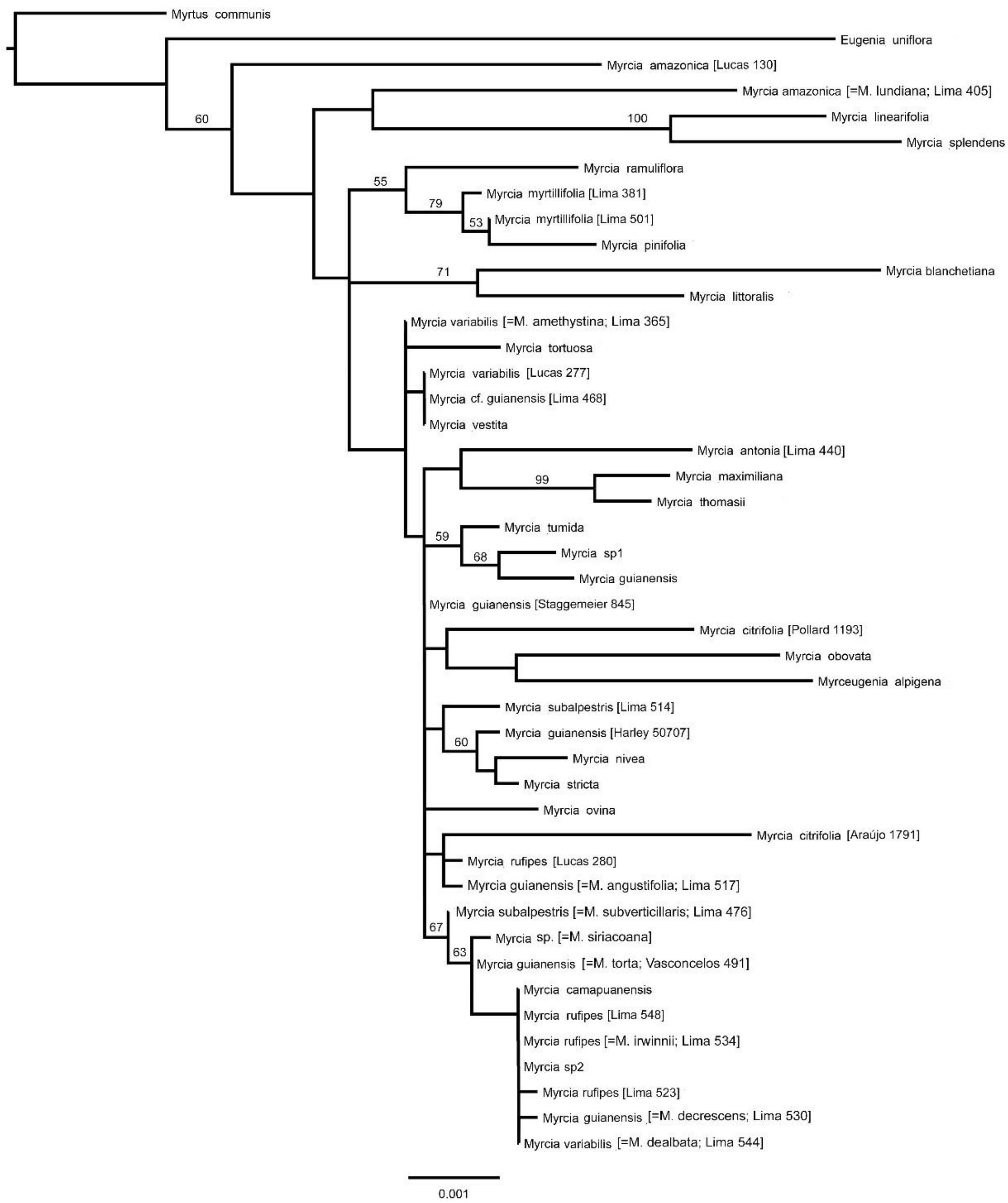


Figure S2. Phylogram obtained from Maximum Likelihood analysis of the nuclear ribosomal unit for 45 terminals. Bootstrap percentages ≥ 50 are shown at nodes.

CAPÍTULO 2

Novidades taxonômicas em *Myrcia guianensis* e espécies aliadas (Myrtaceae: Myrteae), incluindo tipificação em massa em um grupo grande e taxonomicamente desafiador

Taxonomic novelties in *Myrcia guianensis* and allied species (Myrtaceae: Myrteae), including mass-typification in a large and taxonomically challenging group *

* Manuscrito aceito para publicação no periódico *Kew Bulletin* em 8/maio/2017.
° Não é de inteção dos autores que as novidades nomenclatuais aqui apresentadas sejam consideradas como efetivamente publicadas.

Taxonomic novelties in *Myrcia guianensis* and allied species (Myrtaceae: Myrteae), including mass-typification in a large and taxonomically challenging group * °

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° Não é de inteção dos autores que as novidades nomenclatuais aqui apresentadas sejam consideradas como efetivamente publicadas.

Summary. The '*Myrcia guianensis* group', or Guianensis Clade, comprises ca. 30 species distributed mainly in the Cerrado and Atlantic Forest biomes of Brazil. The group is currently being monographed and during this process, type collections have been analysed and a thorough literature search completed; 36 new synonyms are recognized, and 95 lectotypifications and five neotypifications are made.

Key words. Lectotypification; neotypification; nomenclature; Otto Berg; synonymy

Introduction

Myrcia s.l. is a monophyletic group including three often currently accepted genera, *Myrcia* DC., *Marlierea* Cambess. and *Calyptranthes* Sw. (Lucas *et al.* 2011) and totalling more than 700 species (Govaerts *et al.* 2016). This group can be divided into nine monophyletic informal subgroups supported by molecular and morphological data (Lucas *et al.* 2011, Staggemeier *et al.* 2015). Based on this phylogenetic hypothesis, a formal subgeneric classification is in preparation (Lucas *et al.* in prep.) in tandem with monographic revision of many of these subgeneric groups.

The Guianensis clade (clade 4 *sensu* Lucas *et al.* 2011) includes ca. 30 species distributed throughout the Neotropics, mainly in the Cerrado and Atlantic Forest biomes of Brazil (Lucas *et al.* in prep., BFG 2015). *Myrcia guianensis* gives its name to the group and, in its broadest circumscription encompasses vast morphological variation. Multiple forms of this taxon described as new species or varieties since the publication of its basionym in 1828 have resulted in unstable nomenclature and often unusable taxonomy. Nowadays, most of these names are treated as synonyms of *Myrcia guianensis* (BFG 2015, Govaerts *et al.* 2016), producing an unusually high number of synonyms. Despite this confusion, the nomenclature and taxonomy of *Myrcia guianensis* and its allied names and species have never been studied as a whole.

During the preparation of a complete taxonomic revision of the Guianensis clade, names cited by an author based on more than one gathering were commonly found, as were situations where holotype material had been lost or destroyed. The 95 lectotypifications and five neotypifications required in these cases are provided here along with 36 new synonyms. Additional notes are provided for some species.

Materials and Methods

The following herbaria were visited: BM, BR, C, G, G-DC, HBR, K, P, SP, SPF, R, RB, U, UB and W (acronyms follow Thiers 2016); additional type images from other herbaria were seen online through JSTOR Global Plants (http://plants.jstor.org/) or on the websites of individual herbaria. All specimens interpreted as duplicates are listed as isotypes or isolectotypes, even when the material is a fragment such as frequently found in F. Cited specimens indicated '[photo]' denotes that digital images were viewed. In these cases, selected lecto- or neo-type is the real specimen, not its image. Unless specified as 'n.v.', all specimens listed were seen and analyzed, either personally or virtually. Although LE was not visited and many of its types were not available, possible holotypes from this herbarium are reported as 'n.v.' instead of designating a lectotype. Remaining syntypes are available in the protologues or on request from the first author. Lectotypes are designated even when an apparent holotype appears obvious following the recommendations of McNeill *et al.* (2012) who highlighted the uncertainty that a specimen at the author's institution might have been the only material examined by that author at the time. Synonym lists include only names being lecto- or neo-typified and new synonyms. Other relevant observations and synonyms of particular common usage with their respective authorities are reported in 'General notes' at the end of the synonym list of each species. Complete synonym lists can be found in Govaerts *et al.* (2016) and BFG (2015) or on request from the first author. All illegitimate names and nomina nuda are reported for each accepted name or synonym dealt with here. Following McNeil *et al.* (2012), nom. illegit. signifies either names based on the same type of an ealier legitimate name (here listed within the same paragraph, indicating homotypes) or that an earlier published epithet is repeated (here listed with the correct name, when available, within square brackets). To avoid repetition in the text, a general explanation of the rationale applied to names published by the most common authors of the group (Berg, de Candolle, Cambessèdes and Kiaerskou) is given below with specific cases discussed under each name.

Otto Berg provided most Guinaensis clade names during or after his treatment of Myrtaceae for *Flora Brasiliensis* (1857-1859). Several of these require lectotypification after destruction of the holotype in the B herbarium during WWII (Stafleu & Cowan 1976), or because Berg cited more than one gathering and/or herbarium in the protologue as syntypes. In each case the lectotype selected is the specimen bearing Berg's handwriting that best matches the protologue. Alternatively, Berg described new species with two or more varieties and multiple syntypes, but without citing which of them is the typical variety and without linking the syntype to its respective taxon. In these cases, the typical variety is assumed to be the one with a more complete description, usually the first presented (designated by Berg by 'α'). It is generally possible to recognize the likely type of each variety through Berg's handwriting on the labels of the herbarium sheets.

According to Stafleu & Cowan (1976), de Candolle's types are housed at G-DC. However, de Candolle cited Martius' herbarium ('v. s. in h. Mart.') in the protologues of his *Prodomus* (1828). Although after his death most of Martius's herbarium was sent to BR, his Brazilian collections remained in M (Stafleu & Cowan, 1981). Thus, we consider the holotypes housed in M and the isotypes in G-DC. When there is more than one specimen in M, material bearing de Candolle's handwriting is chosen as lectotype.

Cambessèdes based his treatment of Myrtaceae for *Flora Brasiliae Meridionalis* (1832) on Saint-Hilaire's collections. According to Stafleu & Cowan (1976), Cambessèdes' types are housed at MPU, but many duplicates bearing Cambessèdes' handwriting are in P, indicating that he studied both duplicates. In such cases, lectotypification is necessary; the material selected as lectotype is the duplicate that best matches the protologue.

Kiaerskou's types are in C (Stafleu & Cowan 1979). When lectotypification was considered necessary because of the presence of more than one duplicate, the lectotype selected is the one that which best matches the protologue, often with an illustration of the leaf made by Kiaerskou attached to the herbarium sheet.

New typifications

Myrcia citrifolia (*Aubl.) Urb.* (Urban 1919: 150), non (Aubl.) D.Legrand (1961: 297). *Myrtus cotini-folio* Plum. (Plumier 1703: 19) **nom. nud.** *Myrtus citrifolia* Aubl. (Aublet 1775a: 513 [description], 1775b: 20 [name, #4]). *Myrtus acris* var. b Sw. (Swartz 1788: 79) **nom. illegit.** *Myrtus coriacea* Vahl (1791: 59) **nom. illegit.** *Myrtus cotinifolia* J.F.Gmel. (Gmelin 1791: 792) **nom. illegit.**, non (Jacq.) Spreng. (Sprengel 1825: 481) [= *Eugenia cotinifolia* Jacq.], nec Poir. (Poiret 1798: 410) [= *Pimenta racemosa* (Mill.) J.W.Moore]. *Myrcia coriacea* (Vahl) DC. (de Candolle 1828: 243) **nom. illegit.** *Aulomyrcia coriacea* (Vahl) O.Berg (1855: 70) **nom. illegit.** *Myrcia coriacea* var. *swartziana* Griseb. (Grisebach 1860: 234) **nom. illegit.** *Aulomyrcia citrifolia* (Aubl.) Amshoff (1948: 531). Type: *Plumier* s.n. (specimen unknown). Plate in Pl. Amer., Fasc. 9: 203, t. 208, fig. 2, 1759 (lectotype, selected by McVaugh 1969).

Eugenia paniculata Jacq. (Jacquin April 1789: 108), non Lam. (Lamarck October 1789:199) **nom. illegit.** [= *Syzygium borbonicum* J.Guého & A.J.Scott], nec Sieber ex C.Presl (1828: 274) **nom. invalid.** [= *Myrcia ferruginea* G.Don], nec Cambessèdes in Saint-Hilaire *et al.* 1832: 338) **nom. illegit.** [= *Myrcia nitida* Cambess.], nec Bello (1881: 271) **nom. illegit.**, nec (Gaertn.) Britten (1899: 247) **nom. illegit.** [= *Syzygium paniculatum* Gaertn.]. *Aulomyrcia jacquiniana* O.Berg (1855: 69) **nom. illegit.** *Myrcia coriacea* var. *jacquiniana* (O.Berg) Griseb. (Grisebach 1860: 234) **nom. illegit.** *Myrcia paniculata* (Jacq.) Krug & Urb. (Krug & Urban 1895: 577). *Myrcia paniculata* var. *jacquiniana* (O.Berg) Duss (1896: 263). *Myrcia citrifolia* var. *jacquiniana* (O.Berg) Stehlé & Quentin (1949: 57). Type: [Martinique] 'Martinica', s.d., *Aquart* s.n. (lectotype W 0032556, selected here).

NOTES. Jacquin described *Eugenia paniculata* without citing the herbarium, however his types are at BM, LINN and W (D'Arcy 1970; Stafleu & Cowan 1979). Berg (1855) described *Aulomyrcia jacquiniana*, an illegitimate name based on the same type of *E. paniculata*, indicating a single specimen, *Aquart* s.n., in W ('herb. Vindob.', W0032556). McVaugh (1969) mentioned this collection in W as a possible type of *E. paniculata*, observing that it is illustrated in Jacquin's work (Tab. 5, Fig. 1). The W collection was the only one found and is selected as lectotype.

Eugenia acetosans Poir. (Poiret in Lamarck 1813: 125). *Myrtus acetosans* (Poir.) Spreng. (Sprengel 1825: 488). *Aulomyrcia acetosans* (Poir.) O.Berg (1861: 662). Type: [French Guiana, Cayenne] 'dans la Guiane', s.d., *Richard* s.n. (lectotype P 00547167, selected here; isolectotypes P 00798851, P 00798852, P 00798853, F 0065060 [photo]).

NOTES. Poiret cited *Richard* s.n. as type of *Eugenia acetosans* and was therefore housed in P (Stafleu & Cowan 1983), where a sheet of four gatherings was found, each with its own label and barcode. The material selected as lectotype is the more complete of these numbers, with leaves and inflorescences, and more information on its label.

Aulomyrcia triflora O.Berg (1855: 79). Type: [British Guiana] 'Habitat prope Roraima, in Guiana Anglica', 1843, *Schomburgk* 978 (holotype B†; lectotype K 000342677, selected here).

NOTES. McVaugh (1969) proposed *Aulomyrcia triflora* as synonym of *Myrcia citrifolia*, although Govaerts *et al.* (2016) and BFG (2015) do not synonymise the name. The synonymy is maintained here as the diagnostic characters of *A. triflora* fall into the morphological range of *M. citrifolia*. McVaugh (1969) provided further discussion.

Myrcia coriacea var. *imrayana* Griseb. (Grisebach 1860: 234). *Myrcia paniculata* var. *imrayana* (Griseb.) Duss (1896: 264). *Myrcia citrifolia* var. *imrayana* (Griseb.) Stehlé & Quentin (1949: 57). Type: Dominica, s.d., *Imray* 364 (lectotype K 000261747, selected here; isolectotypes GH 00071066 [photo], GOET 007312 [photo]).

NOTES. The type of *Myrcia coriacea* var. *imrayana*, as well as other types of Grisebach's Flora of the British West Indian Islands (1860) are deposited in K and GOET (Stafleu & Cowan 1976). The more complete K material is chosen as lectotype. In addition to *M. coriacea* var. *imrayama*, *M. coriacea* var. *swartziana* and *M. coriacea* var. *jacquiniana*, Grisebach also described *M. coriacea* var. *reticulata* Griseb. (Grisebach 1860: 182) and *M. coriacea* var. *acutifolia* Griseb. (Grisebach 1866: 86), all cited as synonyms of *M. citrifolia* by Govaerts *et al.* (2016). While the first three varieties are indeed synonyms of *M. citrifolia*, the last two are based on Wright's collections from Cuba and comprise mixed collections here recognized as *M. maestrensis* (Urb.) Alain, *Pimenta racemosa* (Mill.) J. W. Moore and *Calyptranthes* sp.

GENERAL NOTES. The following names are also synonyms of *Myrcia citrifolia*: *Eugenia marginata* Jacq., *Aulomyrcia coriacea* var. *parvifolia* Pers., *Myrcia vernicosa* DC. and *E. saviifolia* Alain (BFG 2015; Govaerts et al. 2016). Further discussion of the nomenclature, typification and synonyms of *Myrcia citrifolia* (as *Myrtus cotini folio*) can be found in Veldkamp (2013, p. 120).

Myrcia glabra (*O.Berg) D.Legrand* (1961: 298). *Aulomyrcia glabra* O.Berg (in Martius *et al.* 1857: 119). Type: [Brazil, São Paulo] 'Habitat in fruticetis prov. S. Pauli', s.d., *Sellow* s.n. (holotype B†; lectotype BR 0000005280605, selected here; isolectotypes F 0064720 [photo], K 000343995, LE 00007071 [photo], P 00163069, P 00163070, W 0032599).

Aulomyrcia acrantha O.Berg (in Martius *et al.* 1857: 71). Type: [Brazil] ' Habitat ad ripas prope Santo-Antonio-da-Patrulha in prov. Rio Grande do Sul', s.d., *Sellow* s.n. (hototype B†). Brazil, Rio Grande do Sul, Porto Alegre, May 1899, *Reineck & Czermak* 393 (neotype P 05291402, selected here; isoneotype P 05291403).

NOTES. The holotype of *Aulomyrcia acrantha* was destroyed in B and no duplicates were found in other herbaria. The holotype is assumed to have been of fruiting material since flowers are not mentioned in the protologue. *Aulomyrcia acrantha* is recognizable by the puberulous young leaves which are glabrescent in maturity, coriaceous, oval-oblong, acute apex, attenuate base, flat midveined on the adaxial surface, short petioles, and compressed glabrous inflorescences; these features easily fit the circumscription range of *Myrcia glabra*. No further named material of *A. acrantha* was found, nor fruiting material with these features. Of the specimens identified as *M. glabra*, two flowering duplicates in P match the protologue of *A. acrantha* allowing one (*Reineck & Czermak* 393) to be specified as the neotype. The collection localities of the holotype of *A. acrantha* and *Reineck & Czermak* 393 are very close, with similar vegetation.

Aulomyrcia laxiflora var. *latifolia* O.Berg (in Martius *et al.* 1857: 114), **synon. nov.** Type: [Brazil, São Paulo] 'Prope villam Mogi das Cruzes in prov. S. Pauli', s.d., *Saint-Hilaire* 654 (lectotype P 00161408, selected here; isolectotype P 00161407).

NOTES. Berg described *Aulomyrcia laxiflora* var. *latifolia* based only on the description of the unnamed variety *beta* (β) of Cambessèdes (1832, p. 319). However, the type *Saint-Hilaire* 654 was probably not seen by Berg and does not match the morphology of the quite distinct *Myrcia laxiflora*; it does however match the collection of *Myrcia glabra* so justifying its synonymization.

Myrcia citrifolia (Aubl.) D.Legrand (1961: 297), non (Aubl.) Urb. (Urban 1919: 150).

NOTES. Legrand (1961) created a later isonym of *Myrcia citrifolia* and treated plants from southern Brazil as such. In 1969, the same author corrected the mistake and synonymized his *Myrcia citrifolia* under *M. glabra*.

Myrcia guianensis (*Aubl.) DC.* (de Candolle 1828: 245). *Eugenia guianensis* Aubl. (Aublet 1775: 506). *Myrtus guianensis* (Aubl.) Ham. (Hamilton 1825: 45). *Aguava guianensis* (Aubl.) Raf. (Rafinesque 1838: 107). Type: [British Guiana] 'Habitat in silvis propè montem Serpent dictum', s.d., *Aublet* s.n. (holotype BM 000953654; isotype LINN HS883-22 [photo]).

Myrcia elegans DC. (de Candolle 1828: 251). *Calyptromyrcia elegans* (DC.) O.Berg (1855: 34). *Myrcianthes elegans* (DC.) Mattos (2009: 2). Type: [Brazil, Pará] 'In Brasiliae prov. Paraensi', s.d., *Martius* s.n. (lectotype M 0136868 [photo], selected here; isolectotype M 0136867 [photo]).

Myrcia exsucca DC. (de Candolle 1828: 247). *Aulomyrcia exsucca* (DC.) O.Berg (1855: 79). *Myrcia queimadensis* Mattos (2006: 4) **nom. superfl.** Type: [Brazil, Minas Gerais] 'In Brasiliae campestribus desertis' (on the protologue), s.d., *Martius* s.n. (lectotype M 0136858 [photo], selected here; isolectotypes G-DC, M 00136859 [photo]).

Myrcia lauriflora DC. (de Candolle 1828: 252). *Aulomyrcia lauriflora* (DC.) O.Berg (1855: 64). Type: [Brazil] 'In Brasiliae prov. Pará', s.d., *Martius* s.n. (lectotype M 0136962 [photo], selected here; isolectotypes G-DC, M 00136961 [photo], M 00136963 [photo]).

Myrcia leucadendron DC. (de Candolle 1828: 251). *Aulomyrcia leucadendron* (DC.) O.Berg (in Martius *et al.* 1857: 115). Type: [Brazil, São Paulo] 'In Brasilia', s.d., *Martius* s.n. (lectotype M 0136958 [photo], selected here; isolectotypes M 00136957 [photo], M 00136959 [photo]).

Myrcia myoporina DC. (de Candolle 1828: 246). *Aulomyrcia glandulosa* var. *obovata* O.Berg (in Martius *et al.* 1857: 139) **nom. illegit.** *Myrcia glandulosa* var. *obovata* (O.Berg) N.Silveira (1985a: 67) **nom. illegit.** Type: [Brazil] 'Brasilia', s.d., *Martius* s.n. (lectotype W-Rchb. 1889-0342000, selected here; isolectotype P 00161186).

NOTES. De Candolle (1828) described flowers and fruits in the protologue of *Myrcia myoporina*, based on Martius' collection in M. A single flowering gathering identified as such by himself exists in M, however this specimen is a misindentified *Eugenia*. Berg (1857) noted this confusion when describing the illegitimate *Aulomyrcia glandulosa* var. *obovata*, based on the same type specimen of *M. myoporina*. No fruiting material of *M. myoporina* was found in M or elsewhere. Two other Martius' collections with flowers were found at W and P; they match the diagnosis of *M. myoporina* well and are respectively selected as lecto and isolectotype.

Myrcia crassicaulis Cambess. (Cambessèdes in Saint-Hilaire *et al.* 1832: 311). *Aulomyrcia crassicaulis* (Cambess.) O.Berg (1855: 74). Type: [Brazil, Minas Gerais] 'In campis prope pagum Curaçao de Jesus in parte accidentali desertaque provinciae Minas Geraes quam vocant Certaó', s.d., *Saint-Hilaire* 1944 (lectotype MPU 011015 [photo], selected here; isolectotypes F 0076585 [photo], P 00735115, P 00735116).

Myrcia hiemalis Cambess. (Cambessèdes in Saint-Hilaire *et al.* 1832: 332). Type: [Brazil, Minas Gerais] 'In campis prope praedium S. Bento in parte deserta occidentalisque provinciae Minas Geraes', s.d., *Saint-Hilaire* 1935 (lectotype P 00161436, selected here; isolectotypes F 0065494 [photo], MPU 011038 [photo], P 00161437).

Myrcia microcarpa Cambess. (Cambessèdes in Saint-Hilaire *et al.* 1832: 324). *Aulomyrcia microcarpa* (Cambess.) O.Berg (in Martius *et al.* 1857: 81). Type: [Brazil, São Paulo] 'In campis prope Capivarhy in provicia Sancti Pauli', s.d., *Saint-Hilaire* 1336 (lectotype P 00161401, selected here; isolectotypes F 0065528 [photo], MPU 010946 [photo], P 00161400, P 00161402).

Myrcia suaveolens Cambess. (Cambessèdes in Saint-Hilaire *et al.* 1832: 315). *Aulomyrcia suaveolens* (Cambess.) O.Berg (1855: 78). Type: [Brazil, Minas Gerais and Goiás] 'In campis provinciarum Minas Geraes et Goyaz haud infrequens', s.d., *Saint-Hilaire* 908 (lectotype MPU 010967 [photo], selected here; isolectotypes F 0065576 [photo], P 00161364, P 00161365, P 00161366, P 00161367, P 00161368).

Aulomyrcia conduplicata O.Berg (1855: 76). Type: [British Guiana] 'Habitat in savannis Guianae Anglicae', s.d., *Schomburgk* 393 (holotype B†). British Guiana, Basin of Rupununi River, Yupukari, lat. about 3°40' N, 15 Oct. 1937, *Smith* 2274 (neotype K 000343168, selected here).

NOTES. The holotype of *Aulomyrcia conduplicata* was destroyed in B and no duplicates have been found. Diagnostic characters of the species fit into the variation of *Myrcia guianensis*. Of the collections from British Guiana studied by us, *Smith* 2274 at K is chosen as neotype. This specimen is a good match for the description of *A. conduplicata*, presenting its main characteristics: obovate to oblong and conduplicate leaves, glabrous when mature, with obtuse to rounded apices and cuneate bases. *Smith* 2274 was also collected in savannah vegetation, as was the destroyed holotype.

Aulomyrcia dichroma O.Berg. (1855: 65). Type: [British Guiana] 'Hibitat ad ripas fluminis Moracca in Guiana Anglica', s.d., *Schomburgk* 1491 (holotype B†; lectotype LE 00007052 [photo], selected here).

Aulomyrcia obtusa var. *longipes* O.Berg (1855: 67). Type: [Surinam] 'Habitat in Guiana Batava, in arenosis prope Mariepaston', s.d., *Kegel* s.n. (lectotype GOET 008252 [photo], selected here).

Aulomyrcia obtusa var. *panicularis* O.Berg (1855: 67). Type: [Surinam] 'Habitat in Guiana Batava, in arenosis prope Mariepaston', s.d., *Kegel* s.n. (lectotype GOET 008251 [photo], selected here).

Aulomyrcia obtusa var. *pauciflora* O.Berg (1855: 67). Type: [Surinam] 'Habitat in Guiana Batava, in arenosis prope Mariepaston', s.d., *Kegel* s.n. (lectotype GOET 008249 [photo], selected here).

NOTES. Berg created five varieties when transferring *Myrcia obtusa* to *Aulomyrcia*. For *Aulomyrcia obtusa* var. *tenuifolia, A. obtusa* var. *pauciflora, A. obtusa* var. *panicularis* and *A. obtusa* var. *longipes* he cited *Kegel* collections in 'hb. Kegel.', now at GOET (Stafleu & Cowan 1979). The types of these varieties are recognisable in GOET through Berg's handwriting on the labels. Berg used the holotype of the basionym *Myrcia obtusa* (*Kegel*

1308) as type of *A. obtusa* var. *tenuifolia*; this therefore is the typical variety. There are no collection numbers on the other sheets and they differ slightly in their morphology. Each specimen bearing Berg's identification matches the protologue closely and is selected as lectotype of the respective varieties.

Aulomyrcia angustifolia O.Berg (in Martius *et al.* 1857: 135). *Myrcia angustifolia* (O.Berg) Nied. (Niedenzu in Engler & Prantl 1893: 76), non Glaz. (Glaziou 1908: 210) **nom. nud.** Type: [Brazil, Minas Gerais] 'Habitat ad montes Serra do Lenheiro prov. Minarum prope S. João del Rey', s.d., *Sellow* s.n. (holotype B†; lectotype K 000342611, selected here; isolectotypes BR 0000005236305, LE 00007021 [photo], P 00161484, P 00161485, W 0033192).

Aulomyrcia biformis O.Berg (in Martius *et al.* 1857: 141) **synon. nov.** Type: [Brazil, Minas Gerais] 'Habitat in montibus Serra de Itambé prov. Minarum', s.d., *Pohl* s.n. (holotype BR [no barcode]).

NOTES. *Aulomyrcia biformis* is an unplaced name in *Myrcia* based on a single collection from the Brazilian state of Minas Gerais. The author suggested similiarities to *A. vaccinifolia*, previously synonymized under *Myrcia guianensis.* Analysis of the type and protologue shows that *A. biformis* fits into the morphological variation of *M. guianensis* and the synonymisation is here proposed.

Aulomyrcia bimarginata O.Berg (in Martius *et al.* 1857: 115) **synon. nov.** Type: [Brazil, Minas Gerais] 'Habitat ad Piedade prov. Minarum', s.d., *Pohl* 1031 (lectotype W 0032578, selected here; isolectotypes F 0064684 [photo], K 000342630, K 000342631, W 0032579].

NOTES. *Aulomyrcia bimarginata* is another unplaced name based on a single collection and recognized mainly by the two marginal veins instead of the usual single one in species of the

Guianensis clade. Despite this, branches, leaves, inflorescences and flowers match the morphological variation of *Myrcia guianensis*. The type of *A. bimarginata* is from Minas Gerais, Brazil, where many forms of *M. guianensis* occur. We have not found further material with the features of *A. bimarginata*. The duplicate marginal vein appears simply to add to the huge morphological foliar plasticity of *M. guianensis*.

Aulomyrcia cassinioides var. *glabrata* O.Berg (in Martius *et al.* 1857: 129). Type: [Brazil, Minas Gerais] 'Habitat ad flumen Rio S. Francisci prov. Minarum', s.d., *Martius* s.n. (lectotype M 0136770 [photo], selected here; isolectotype M 0136769 [photo]).

Aulomyrcia clausseniana O.Berg (in Martius *et al.* 1857: 118) **synon. nov.** Type: [Brazil] 'Rio de Janeiro, in M. Serra de Tinguá', s.d., *Schott* 1032 (lectotype W 0032558, selected here; isolectotypes F 0064701 [photo], K 000342685, K 000342686, W 0032557).

NOTES. *Aulomyrcia clausseniana* is based on *Schott* 1032 from Rio de Janeiro and *Claussen* 532 from Minas Gerais, Brazil. The leaves and inflorescences of the types are very similar to other names from the same geographical region already synonymized under *Myrcia guianensis*, such as *M. fastigiata*. Again, the characters used to distinguish *A. clausseniana* fit easily into the circumscription of *M. guianensis*.

Aulomyrcia decrescens O.Berg (in Martius *et al.* 1857: 135). *Myrcia decrescens* (O.Berg) Mattos (2008: 4). Type: [Brazil, Minas Gerais] 'Habitat ad Rio Preto et Caldas do Frey Raynaldo prov. Minarum', s.d., *Pohl* 2003 (lectotype W 0032618, selected here; isolectotype F 0064706 [photo], W 0032617).

Aulomyrcia fragilis O.Berg (in Martius *et al.* 1857: 117). Type: [Brazil, Bahia] 'Habitat ad urbem Jacobina prov. Bahiensis', s.d., *Blanchet* 3587 (lectotype LE 00007063 [photo], selected here; isolectotypes BM 000953617, BM 000953618, BR 0000005236633, F 0064713 [photo], G 00222301, K 000018553, MICH 1109833 [photo], NY 00386663 [photo], NY 00386664 [photo], P 00161339, P 00163086, P 00163087, P 00163088, P 00163089, P 00697224, U 0005129, W 0032595, W 0032596).

Aulomyrcia gardneriana O.Berg (in Martius *et al.* 1857: 129), non *Myrcia gardneriana* O.Berg (in Martius *et al.* 1857: 184). *Aulomyrcia gardneriana* var. *virescens* O.Berg (in Martius *et al.* 1857: 130). *Myrcia renatoana* (O.Berg) Mattos (1966: 62). Type: [Brazil] 'Habitat in provinciis Ceará et Piauhy', s.d., *Gardner* 1625 (lectotype W 0032530, selected here; isolectotypes BM 001191669, BR 0000005269976, F 0064718 [photo], F 0064719 [photo], G 00222415, GH 00071095 [photo], K 000018492, K 000018493, MICH 1109831 [photo], NY 00386666 [photo], P 00163080, P 00163081, S 05-2437 [photo], W 1889-0116299).

Aulomyrcia gardneriana var. *caerulescens* O.Berg (in Martius *et al.* 1857: 130). Type: [Brazil] 'Habitat in provinciis Ceará et Piauhy', s.d., *Gardner* 1621 (lectotype W 0032529, selected here; isolectotypes F 0064714 [photo], F 0064715 [photo], G 00222440, G 00222441, GH 00071094 [photo], NY 00386665 [photo], P 00163077, P 00163078, P 00163079, S 05-2436 [photo], US 00117778 [photo], W 1889-0116290).

Aulomyrcia glandulosa O.Berg (in Martius *et al.* 1857: 139). *Aulomyrcia glandulosa* var. *elliptica* O.Berg (in Martius *et al.* 1857: 139). *Myrcia glandulosa* (O.Berg) Kiaersk. (Kiaerskou 1893: 83). Type: [Brazil, Minas Gerais] 'In Morro da Tapanhoacanga, in prov. Minarum', s.d., *Sellow s.n.* (lectotype K 000343097, selected here; isolectotypes LE 00007072 [photo], P 00161261).

Aulomyrcia glandulosa var. *longifolia* O.Berg (in Martius *et al.* 1857: 139). Type: [Brazil, Goiás] 'Montes Serra dos Montes Claros, in prov. Goyaz', s.d., *Pohl 5764* (lectotype W 0032600, selected here).

Aulomyrcia hepatica O.Berg (in Martius *et al.* 1857: 132). *Myrcia hepatica* (O.Berg) Kiaersk. (Kiaerskou 1893: 86). Type: [Brazil, Minas Gerais] 'Habitat ad villam do Presidio de S. João Baptista prov. Minarum', 1837, *Pohl* 1074 (lectotype W 0032526, selected here; isolectotypes F 0064723 [photo], K 000343355, K 000343356, W 0032531).

Aulomyrcia lingua O.Berg (in Martius *et al.* 1857: 130). *Aulomyrcia lingua* var. *glabrata* O.Berg (in Martius *et al.* 1857: 130). Type: [Brazil, Minas Gerais] 'In campis ad Colonel Gerealdo in prov. Minarum', s.d., *Sellow* s.n. (holotype B†). Brazil, Minas Gerais, Jardim, 13 Nov. 1845, *Widgren* 795 (neotype BR [no barcode], selected here).

NOTES. The apparently only gathering of the type of *Aulomyrcia lingua* was destroyed in B. The neotype selected, *Widgren* 795 in BR, presents Berg's indentification on its label as *Aulomyrcia lingua* var. *rufa* but it is a good match for the typical variety *A. lingua* var. *glabrata* as the varieties are poorly distinguished.

Aulomyrcia mansoni O.Berg (in Martius *et al.* 1857: 121). *Myrcia mansoni* (O.Berg) N.Silveira (1985b: 1). Type: [Brazil, Mato Grosso] 'Habitat prope urbem Cuyabá in prov. Matto Grosso', s.d., *Manso & Lhotzki* 46 (holotype: B†; lectotype HAL 0089700 [photo], selected here; isolectotype G 00222243).

Aulomyrcia nigropunctata O.Berg (in Martius *et al.* 1857: 116). *Myrcia nigropunctata* (O.Berg) N.Silveira (1895: 1). Type: [Brazil] 'Habitat ad Rio de Janeiro prope Fazenda Lopez', s.d., *Pohl* 1029 (lectotype W 0032474, selected here; isolectotype W 0032473).

Aulomyrcia obscura O.Berg (in Martius *et al.* 1857: 132). *Myrcia obscura* (O.Berg) N.Silveira (1985a: 66). Type: [Brazil] 'In Brasilia meridionali', s.d., *Sellow* s.n. (holotype B†). Brazil, s.d., *Claussen* 163A (neotype BR [no barcode], selected here).

NOTES. The type of *Aulomyrcia obscura* was destroyed in B and no duplicates have been found. The neotype selected, *Claussen* 163A, matches the protologue exactly.

Aulomyrcia obtecta O.Berg (in Martius *et al.* 1857: 117). *Myrcia obtecta* (O.Berg) Kiaersk. (Kiaerskou 1893: 89). Type: [Brazil, São Paulo] 'Habitat in campis et fruticetis ripariis prov. S. Pauli', s.d., *Sellow* s.n. (holotype B†; lectotype BR 0000005236961, selected here).

NOTES. The holotype of *Aulomyrcia obtecta*, *Sellow* s.n., was destroyed in B. Sellow's collections have been found in many other herbaria (BR, F, G, K, LE, P, W, U) identified as *A. obtecta* by Berg. However, they do not seem to be duplicates due to their morphological dissimilaries. The numbers on their labels, perhaps the herbarium numbers, are also mixed. The specimen deposited in BR is the best match for the protologue and is chosen as lectotype.

Aulomyrcia plumbea O.Berg (in Martius *et al.* 1857: 142). *Myrcia plumbea* (O.Berg) Mattos (2008: 4). Type: [Brazil] 'Habitat in Minas Geraes', s.d., *Pohl* 1085 (lectotype W 0037137, selected here; isolectotypes BR 0000005230518, F 0064752 [photo], K 000344063, K 000344064, W 0037138, W 0037139).

Aulomyrcia pusilla O.Berg (in Martius *et al.* 1857: 140). *Myrcia pusilla* (O.Berg) Mattos (2008: 2). Type: [Brazil, Minas Gerais] 'Habitat inter Rio Jequetahi et Munda Fonza (?) prov. Minarum', s.d., *Pohl* 1084 (lectotype W 0027991, selected here; isolectotypes F 0064759 [photo], K 000344083, W 0027990).

Aulomyrcia rotundifolia O.Berg (in Martius *et al.* 1857: 123). *Myrcia rotundifolia* (O.Berg) Kiaersk. (Kiaerskou 1893: 89) **synon. nov.** Type: [Brazil] 'Habitat in prov. Alagoas', s.d., *Gardner* 1300 (holotype W 0037124; isotypes K 000018589, OXF 00067826T).

NOTES. The morphotype of *Aulomyrcia rotundifolia* is widely distributed in *restingas* from northeastern Brazil. In that region, this species is poorly distinguished from *Myrcia* *guianensis* based on the ovate to orbicular leaves in *A. rotundifolia* (vs. generally elliptic in *M. guianensis*). Many individuals however, present both leaf-shapes and other differences between these species are barely perceptible. Previous works have informally treated *Aulomyrcia rotundifolia* under *Myrcia guianensis* (Lourenço & Barbosa 2012; Proença *et al.* 2013).

Aulomyrcia scrobiculata O.Berg (in Martius *et al.* 1857: 137), non *Myrcia scrobiculata* O.Berg (1861: 668). Type: [Brazil] ‘Habitat in campis prov. Rio Grande do Sul’, s.d., *Sellow* 5297 (holotype B†; lectotype K 000344358 selected by Sobral *et al.* 2010).

NOTES. Sobral *et al.* (2010) incorrectly indicated *Aulomyrcia scrobiculata* as basionym of *M. scrobiculata*. Berg described both species based on different types: *Sellow s.n.* from Rio Grande do Sul as *Aulomyrcia scrobiculata* and *Claussen s.n.* from Minas Gerais as *Myrcia scrobiculata*. The descriptions of these species are completely divergent, indicating that they are not the same taxon. Although the type of *Myrcia scrobiculata* has not been located, its description suggests that the species does not belong to the Guianensis clade (M. Sobral pers. comm.). As such, we maintain only *A. scrobiculata* in the synonymy list of *M. guianensis*.

Aulomyrcia suffruticosa O.Berg (in Martius *et al.* 1857: 136) **synon. nov.**, non *Myrcia suffruticosa* O.Berg (1857: 189). *Myrcia paracatuensis* Kiaersk. (Kiaerskou 1893: 99). Type: [Brazil, Goiás] ‘Habitat ad montem Serra dos Cristaes in prov. Goyaz’, s.d., *Pohl* 817 (holotype W 0040179).

NOTES. Sobral *et al.* (2010) proposed *Aulomyrcia suffruticosa* as synonym of *Myrcia parnahibensis* (O.Berg) Kiaersk., but the analysis of the type material suggested that the species are morphologically different. *Aulomyrcia suffruticosa* has longer petioles, raised adaxial midvein, larger buds and 3-locular ovaries. In turn, *Myrcia parnahibensis* has shorter pinkish petioles, channeled adaxial midvein, delicate inflorescences and 2-locular ovaries, not

3-locular as indicated in its protologue (verified in the holotype in W). Moreover, molecular data show clearly that *M. parnahibensis* and other 2-locular species emerge out of the Guianensis clade (Lima *et al.* in prep.). There is no consistent difference between *A. suffruticosa* and the very variable *M. guianensis*, despite the tendency for narrower leaves in the former. Leaf width varies greatly along the distribution of *M. guianensis*; other species with narrow leaves (i.e. *A. angustifolia*, *A. cymosa*, *A. torta*) have already been synonymized under *M. guianensis*. *Aulomyrcia suffruticosa* is here added to that list.

Aulomyrcia bracteata O.Berg (in Martius *et al.* 1859: 554). *Myrcia didrichseniana* Kiaersk. (Kiaerskou 1893: 82). Type: [Brazil] 'Habitat in collibus siccis prope S. Domingo, prov. Rio de Janeiro', Feb. 1822, *Riedel* 749 (lectotype LE 00007028 [photo], selected here; isolectotypes F 0093807 [photo], F 0093808 [photo], G 00222575, G 00222575, K 000342830, LE 00007029 [photo], LE 00007030 [photo], LE 00007031 [photo], M 0136777 [photo], P 00546179, P 00546180, S 05-2408 [photo], U 0005104, W 0033245).

Aulomyrcia cymosa O.Berg (in Martius *et al.* 1859: 552). *Myrcia cymosa* (O.Berg) Nied. (Niedenzu in Engler & Prantl 1893: 76), non (O.Berg) Nied. (Niedenzu in Engler & Prantl 1893: 76) **nom. illegit.** [= *Calyptromyrcia cymosa* O.Berg]. Type: [Brazil, Minas Gerais] 'Habitat ad ripam rivulorum in montibus Serra da Lapa prov. Minarum', Nov. 1824, *Riedel* 973 (lectotype LE 00007045 [photo], selected here; isolectotypes F 0064705 [photo], G 00222529, GH 00071086 [photo], K 000342775, LE 00007046 [photo], LE 00007047 [photo], NY 00386658 [photo], P 00161293, P 00161294, P 00161295, U 0252956, W 0033251).

NOTES. When transferring *Aulomyrcia* and *Calyptromyrcia* species to *Myrcia*, Niedenzu (1893) created the same name *Myrcia angustifolia* for both *Aulomyrcia angustifolia* and *Calyptromyrcia angustifolia*. This case of homonyms of equal priority was clearly explained and resolved by Nic Lughadha (1994) who accepted *Myrcia cymosa* (= *Aulomyrcia cymosa*) and rejected *M. cymosa* (= *Calyptromyrcia cymosa*) following the recommendations of the ICBN.

Aulomyrcia desertorum O.Berg (in Martius *et al.* 1859: 556). *Myrcia desertorum* (O.Berg) N.Silveira (1985: 1). Type: [Brazil, Minas Gerais] ‘Habitat in deserto inter Alegres et Andrequecé prov. Minarum’, Sep. 1834, *Riedel* 2575 (lectotype LE 00007049 [photo], selected here; isolectotypes G, LE 00007048 [photo]).

Aulomyrcia jequitinhonhensis var. *glauca* O.Berg (in Martius *et al.* 1859: 560). Type: [Brazil, Minas Gerais] ‘In campis siccis prope S. Luzia prov. Minarum’, Oct. 1824, *Riedel* s.n. (lectotype LE 0007077 [photo], selected here).

Aulomyrcia maritima O.Berg (in Martius *et al.* 1859: 553). Type: [Brazil] ‘Habitat in silvaticis arenosis maritimis prov. Rio de Janeiro’, Oct. 1832, *Riedel* 1019 (lectotype LE 00007096 [photo], selected here; isolectotypes F 0064739 [photo], G, K 000344009, LE 00007097 [photo], P 00163100, P 00163101, U 0005132).

Aulomyrcia obscura var. *genuina* O.Berg (in Martius *et al.* 1859: 556). Type: [Brazil, Minas Gerais] ‘In silvis prope Barra do Jequitiba’, s.d., *Riedel 828* (lectotype LE 00007105 [photo], selected here; isolectotypes G, K 000343992, LE 00007106 [photo], P 00161180, P 00161181, U 0005128).

Aulomyrcia obscura var. *longipes* O.Berg (in Martius *et al.* 1859: 556). *Myrcia obscura* var. *longipes* (O.Berg) N.Silveira (1985: 66). Type: [Brazil, Minas Gerais] ‘In collibus siccis umbrosis prope Caetité prov. Minarum’, Oct. 1824, *Riedel* 617 (lectotype LE 00007008 [photo], selected here; isolectotypes LE 00007007 [photo], LE 00007009 [photo], P 00161182).

Aulomyrcia regeliana O.Berg (in Martius *et al.* 1859: 557). *Aulomyrcia regeliana* var. *oppositifolia* O.Berg (in Martius *et al.* 1859: 557). *Myrcia camapuana* Mattos (2006: 2). Type: [Brazil] 'Habitat in campis arenosis prope Camapuan prov. Mato Grosso', Oct. 1826, *Riedel* 634 (lectotype LE [no barcode] [photo], selected here).

Aulomyrcia regeliana var. *sparsifolia* O.Berg (in Martius *et al.* 1859: 557). Type: [Brazil] 'Habitat in campis arenosis prope Camapuan, prov. Mato Grosso', Oct. 1826, *Riedel* 634 (lectotype LE [no barcode] [photo], selected here).

NOTES. Berg based *Aulomyrcia regeliana* and its varieties on Riedel collections in LE. Two specimens of *Riedel* 634 that match *A. regeliana* were found in LE. These specimens bear Berg's handwritten identification as *Aulomyrcia camapuanensis*, a name which was never published. One of the sheets bears the complete locality ('in campis arenosis p. Camapuan') and morphological notes ('suff. erectus et procumbus. Fol. glabr. Florib. terminalib. albis'), reproduced exactly as in the protologue of the typical variety *A. regeliana* var. *oppositifolia*. This specimen was selected as lectotype of the latter variety. The second sheet bears only 'Brasilia: Camapuan' on its labels, but matches the description of *A. regeliana* var. *sparsifolia* well; it is therefore designated as lectotype of this variety.

Aulomyrcia androsaemoides O.Berg (1861: 661). *Myrcia androsaemoides* (O.Berg) Krug & Urb. (Krug & Urban 1895: 579). Type: [French Guiana] 'Habitat in Insula Cayenne', s.d., *Richard* s.n. (lectotype P 00163123, selected here; isolectotype P 00163124).

Aulomyrcia buxizans O.Berg (1861: 664). Type: [British Guiana] 'Habitat in ripis inundatis fluvii Kourou Guyanae Gallicae', s.d., *Richard* 50 (lectotype P 00163121, selected here; isolectotypes F 0064691 [photo], F 0064692 [photo], P 00163122).

Myrcia cymosopaniculata Kiaersk. (Kiaerksou 1893: 90). Type: Brazil, Rio de Janeiro, Corcovado, 26 Sep. 1880, *Glaziou* 11986 (lectotype C 10015838, selected here;

isolectotypes A 00071087 [photo], ASU 0019287 [photo], BM 000953626, BR 0000005239184, BR 0000005238866, C 10015839, F 0065473 [photo], F 0065474 [photo], G 00222570, K 000342776, K 000342777, LE [photo], P 00161287, P 00161288, P 00161289, R 000008994).

Myrcia fastigiata Kiaersk. (Kiaerksou 1893: 92). Type: Brazil, Rio de Janeiro, Alto Macahé, 22 Sep. 1888, *Glaziou* 17677 (lectotype C 10015842, selected here; isolectotypes C 10015843, F 0065483 [photo], F 0065484 [photo], F 0065508 [photo], G 00222407, LE 00007157 [photo], P 00161265, P 00161266).

Myrcia yungasensis Rusby (1893: 27). Type: Bolivia, Yungas, 1890, *Bang* 293 (lectotype NY 00405494 [photo], selected here; isolectotypes BM 001191677, BR 0000008551993, E 00433030 [photo], G 00222413, GH 00071139 [photo], K 000261049, M 0136973 [photo], MIN 1001840 [photo], NY 00405493 [photo], PH 00018867 [photo], US 00048596 [photo], US 00048597 [photo], WIS v0255104 [photo]).

NOTES. Rusby did not cite a herbarium in the protologue of *Myrcia yungasensis*, however his types are mainly housed in NY and MICH (Stafleu & Cowan 1983). Two duplicates were found in NY, and the most representative is selected as lectotype.

Myrcia androsaemoides var. *parvifolia* Krug & Urb. (Krug & Urban 1895: 579). Type: [Trinidad and Tobago] Trinidad, in sylvis ad Caroni, Nov. 1883, *Eggers & Rensch* 1137 (lectotype P 00161252, selected here; isolectotypes P 00161251, P 05259079).

NOTES. The authors of *Myrcia androsaemoides* var. *parvifolia* cited the syntypes *Eggers & Rensch* 1137 and *Eggers & Toepffer* 1096. Types of the flora of the West Indies studied by Krug and Urban were deposited in B (Stafleu & Cowan 1979) and destroyed. The most complete remaining duplicate is designated as lectotype.

Myrcia lehmannii Hieron. (Hieronymus 1895: 65) **synon. nov.** Type: [Colombia] Columbia: crescit in silvis camporum sabanas dictorum prope Frontino, civitatis Antioquia, alt. s.m. 1200-1700 m., s.d., *Lehmann* 7241 (lectotype K 000261046, selected here; isolectotypes K 000330329, F 0065517 [photo], GH 00071106 [photo], S 05-2457 [photo], PH 00018864 [photo], US 00117758 [photo]).

NOTES. Examination of the type and protologue of *Myrcia lehmannii* shows that it is a synonym of *M. guianensis*. The author compares *M. lehmannii* to *Aulomyrcia poeppigiana*, previously synonymized under *M. guianensis*, highlighting leaves with more glands and larger flowers of the former, characters that are very variable troughout the distribution of *M. guianensis*. *Myrcia lehmannii* is from the Colombian Amazon and is particularly similar to collections of *M. guianensis* from there. Hieronymus' types were deposited in B (Staufleu & Cowan 1979) and subsequently destroyed during WW2. The duplicate in K bearing the author's handwriting is chosen as lectotype.

Calycorectes maracayuensis Barb.Rodr. (Barbosa Rodrigues in Chodat & Hassler 1907: 807) **nom. nud., synon. nov.**

Myrcia divaricata Barb.Rodr. (Barbosa Rodrigues in Chodat & Hassler 1907: 803) **nom. nud., synon. nov.**, non (Lam.) DC. (de Candolle 1828: 243) [= *Myrcia splendens* (Sw.) DC.], nec (O.Berg) Lemée (1954: 146) **nom. illegit.** [= *Myrcia rufipila* McVaugh].

Myrcia cochleata Barb.Rodr. (Barbosa Rodrigues in Chodat & Hassler 1907: 803) **nom. nud., synon. nov.**

Myrcia daphnoides var. *nervosa* Glaz. (Glaziou 1908: 218) **nom. nud., synon. nov.**

GENERAL NOTES. The following names also belong to the synonymy of *Myrcia guianensis*: *Myrtus pyrifolia* J. St.-Hil. in Duham., *Myrcia cassinioides* DC., *M. daphnoides* DC., *M. elaeodendra* DC., *M. pallens* DC., *M. schrankiana* DC., *M. spixiana* DC., *M. torta* DC., *M. obtusa* Schauer, *M. alternifolia* Miq., *M. surinamensis* Miq., *Aulomyrcia cuneata* O.Berg, *A. obtusa* var. *grandifolia* O.Berg, *A. roraimensis* O.Berg, *A. schomburgkiana* O.Berg, *A. alagoensis* O.Berg, *A. botrys* O.Berg, *A. emarginata* O.Berg, *A. jequitinhonhensis* O.Berg, *A. jequitinhonhensis* var. *grandifolia* O.Berg, *A. pallens* var. *ovata* O.Berg, *A. pallens* var. *subcordata* O.Berg, *Aulomyrcia scrobiculata* O.Berg, *A. vaccinifolia* O.Berg, *A. velhensis* O.Berg, *A. uaupensis* O.Berg, *M. roraimae* Oliv., *M. adpressepilosa* Kiaersk., *M. dermatophylla* Kiaersk., *M. diaphanosticta* Kiaersk., *M. fastigiata* var. *coriacea* Kiaersk., *M. rhabdoides* Kiaersk., *M. arimensis* Britton, *M. incisa* D.Legrand, *Myrcianthes terminalis* Mattos & D.Legrand, and *Myrcia stemmeriana* D.Legrand (BFG 2015; Govaerts *et al.* 2016).

Molecular data (Lima *et al.* in prep.) has demostrated that all 2-locular species previously considered synonyms of *Myrcia guianensis* (BFG 2015; Govaerts et al. 2016) belong to *Myrcia* sect. *Aulomyrcia* (O.Berg) Griseb. That section corresponds to clade 9 of Lucas *et al.* (2011) and were treated as such (Lucas *et al.* 2016). This is the case for *Myrcia dictyophylla* (O.Berg) Mattos & D.Legrand, *M. heringeriana* Mattos, *M. myrtillifolia* DC., *M. pallida* (O.Berg) N.Silveira, *M. rorida* (O.Berg) Kiaersk., *M. rubella* Cambess. and *M. taubatensis* Kiaersk.

BFG (2015) and Govaerts *et al.* (2016) treated *Myrcia collina* S. Moore, *M. corumbensis* Glaz. and *Myrciaria silveirana* D.Legrand as synonyms of *M. guianensis*, however, their protologues and types do not match the morphology of the Guianensis clade. The morphology of these species suggests *Myrcia collina* may instead be assigned to clade 5, while *M. corumbensis* and *Myrciaria silveirana* are assigned to clade 8 (Lucas *et al.* 2011).

Myrcia hypericoides *Cambess.* (Cambessèdes in Saint-Hilaire 1832: 317). *Aulomyrcia hypericoides* (Cambess.) O.Berg (1855: 62). Type: [Brazil, Minas Gerais] ‘In campis prope Campo Alegre, in parte deserta occidentalique provinciae Minas Geraes’, s.d., *Saint-Hilaire 536* (lectotype P 00161434, selected here; isolectotypes F 0065498 [photo], P 00161435).

Aulomyrcia orthophylla O.Berg (in Martius *et al.* 1859: 549). *Myrcia orthophylla* (O.Berg) Kiaersk. (Kiaerskou 1893: 90). Type: [Brazil, Goiás] ‘Habitat in campis editis graminosis siccis super Chapada de S. Marcos prov. Goyazensis’, Aug. 1834, *Riedel* 2492 (lectotype LE 00007111 [photo], selected here; isolectotypes G 00222017, K 000344024, LE 00007112 [photo], LE 00007113 [photo], P 00161167, P 00161168, P 00161169, S 05-2470 [photo], U 0005134, W 0070602).

Myrcia laricina (*O.Berg) Burret ex Luetzelb.* (Burret ex Luetzelburg 1926: 201). *Aulomyrcia laricina* O.Berg (in Martius *et al.* 1857: 61). Type: [Brazil, Piauí] ‘Habitat in prov. Piauhy’, Nov. 1939, *Gardner* 2875 (lectotype W 0032527, selected here; isolectotypes BM 000953606, F 0064735 [photo], G 00222234, GH 00071105 [photo], K 000001882, K 000001883, P 00163106, W 1889-0116275).

Myrcia laxiflora *Cambess.* (Cambessèdes in Saint-Hilaire *et al.* 1832: 319). *Aulomyrcia laxiflora* (Cambess.) O.Berg (in Martius *et al.* 1857: 114). *Aulomyrcia laxiflora* var. *angustifolia* O.Berg (in Martius *et al.* 1857: 114). Type: [Brazil] ‘In sylvis primaevis ad ripas flimunis Parahyba in provincia Rio de Janeiro’, s.d., *Saint-Hilaire* C-14 (lectotype P 00161412, selected here; isolectotypes F 0065516 [photo], MPU 010943 [photo], P 00161409, P 00161410, P 00161411).

NOTES. Although Cambessèdes cited 'provincia Rio de Janeiro' in the protologue of *Myrcia laxiflora*, all duplicates of *Saint-Hilaire* C-14 bear 'province de Minas Geraes' on their labels. Indeed, the precise collection locality was 'Rio Parahyba' (Paraíba do Sul River), at the border between the Brazilian states of Minas Gerais and Rio de Janeiro, which may have been misunderstood.

Calyptromyrcia costata O.Berg (in Martius *et al.* 1857: 56). *Myrcia batistana* Mattos (2009: 3). Type: [Brazil, Minas Gerais] 'Habitat ad Praesidio de S. João Baptista in montibus Serra do Mar in prov. Minas Geraes', s.d., *Sellow* s.n. (holotype B†; lectotype LE [no barcode] [photo], selected here).

Calyptromyrcia cymosa O.Berg (in Martius *et al.* 1857: 58) **synon. nov.** *Aulomyrcia cymosa* var. *major* O.Berg (in Martius *et al.* 1857: 58). *Myrcia cymosa* (O.Berg) Nied. (Niedenzu in Engler & Prantl 1893: 76) **nom. illegit.**, non (O.Berg) Nied. (Niedenzu in Engler & Prantl 1893: 76) [= *Aulomyrcia cymosa* O.Berg]. *Myrcianthes cymosa* (O.Berg) Mattos (2000: 1). Type: [Brazil, São Paulo] 'Habitat in prov. S. Pauli', s.d., *Sellow* s.n. (lectotype BR 0000005239191, selected here).

Calyptromyrcia cymosa var. *minor* O.Berg (in Martius *et al.* 1857: 58) **synon. nov.** Type: [Brazil, São Paulo] prov. S. Pauli, s.d., *Sellow* s.n. (lectotype K 000913130, selected here).

NOTES. *Calyptromyrcia cymosa* was listed as synonym of *Myrcia guianensis* by BFG (2015), but our study indicates it to be a synonym of *M. laxiflora*. *Calyptromyrcia cymosa* and *M. laxiflora* share chartaceous leaves, few-flowered inflorescences, very short calyx lobes, almost indistinguishable in the buds, and hypanthium tearing slightly at anthesis. Their types are from the same vegetation in southeastern Brazil, where *Myrcia laxiflora* is very common. Berg did not cite a specific type for each variety. Materials identified as types of *C. cymosa* were located at BM, BR, F, G, K, P, U and W; however, they do not seem to be duplicates of the same gathering. The material selected as lectotype best matches the protologue and bears Berg's handwriting. The other sheets are not considered as isolecotypes. The homonym *Myrcia cymosa* of Niedenzu (1893) is disussed in the notes of *Myrcia guianensis* (*Aulomyrcia cymosa*) and by Nic Lughadha (1994).

GENERAL NOTES. The following names are also synonyms of *Myrcia laxiflora*: *Calyptromyrcia paniculata* O.Berg, *C. paniculata* var. *opaca* O.Berg, and *Myrcia lateriflora* Kiaersk. (BFG 2015; Govaerts et al. 2016). *Aulomyrcia laxiflora* var. *latifolia* is proposed as a synonym of *M. glabra* (see notes on *M. glabra* for further details).

Myrcia nivea *Cambess.* (Cambessèdes in Saint-Hilaire *et al.* 1832: 332). *Aulomyrcia nivea* (Cambess.) O.Berg (in Martius *et al.* 1857: 103). *Aulomyrcia nivea* var. *andromedaefolia* O.Berg (in Martius *et al.* 1857: 103). Type: [Brazil, Minas Gerais] 'In dumetis vulgo Carrascas prope praedium vulgo Fazenda do Riberão in parte provinciae Minas Geraes dicta Minas Novas', s.d., *Saint-Hilaire* 1751 (lectotype P 00161393, selected here; isotypes F 0065535 [photo], MPU 010950 [photo], P 00161394, P 00161395)

Aulomyrcia nivea var. *rosmarinifolia* O.Berg (in Martius *et al.* 1857: 103). *Myrcia nivea* var. *rosmarinifolia* (O.Berg) Mattos (1975: 3). Type: Brazil, s.d., *Helmreichen* s.n. (lectotype BR 0000005236992, selected here).

Myrcia cambessedesiana O.Berg (in Martius *et al.* 1857: 202). Type: [Brazil, Minas Gerais] 'Habitat inter Estrema vicum et Vieira do Mattos praedium in prov. Minarum', s.d., *Pohl*

1002 (lectotype W 0032624, selected here; isolectotypes K 000262446, K 000262447, W 0032625).

Myrcia tomentosa Glaz. (Glaziou 1908: 213) **nom. nud., synon. nov.**, non (Aubl.) DC. (de Candolle 1828: 245).

NOTES. Analysis of the types showed no morphological difference between Glaziou's *Myrcia tomentosa* (*Glaziou* 21556) and *M. nivea*; the former name is therefore synonymised here.

Myrcia obovata (*O.Berg) Nied.* (Niedenzu in Engler & Prantl 1893: 761). *Aulomyrcia obovata* O.Berg (in Martius *et al.* 1857: 122). *Eugenia crassifolia* Miq. (Miquel 1846: 439) **nom. illegit.**, non DC. (de Candolle 1828: 266) [= *Siphoneugena crassifolia* (DC.) Proença & Sobral], nec Ant. Molina (1953: 169) **nom. illegit.** [= *Eugenia hondurensis* Ant.Molina], nec Vieill. ex Brongn. & Gris (Viellard ex Brongniart & Gris 1865: 469) **nom. illegit.** [= *Eugenia brongniartiana* (Vieill. ex Brongn. & Gris) Guillaumin]. *Myrcia crassifolia* (Miq.) Kiaersk. (Kiaerskou 1893: 89). Type: [Brazil, Minas Gerais] 'Habitat in prov. Minarum', 1840, *Claussen* 1526 (lectotype U 0005127, selected here; isolecotypes BM 001191660, MO 313632 [photo], P 00550998, W 0033297).

Aulomyrcia atrovirens O.Berg (in Martius *et al.* 1857: 121). Type: [Brazil, Minas Gerais] 'Habitat in prov. Minarum', s.d., *Pohl* 1060 (holotype B†, lectotype W 0032513, selected here; isolectotypes BR 0000008551443, K 000342613).

Aulomyrcia pallens var. *petiolaris* O.Berg (in Martius *et al.* 1857: 123) **synon. nov.** Type: [Brazil, Minas Gerais] s.d., *Saint-Hilaire* s.n. (lectotype P 00163128, selected here; isolectotypes P 00163126, P 00163127).

NOTES. Berg made a mistake when citing *Laruotte* as collector of the type of *Aulomyrcia pallens* var. *petiolaris*. He described this variety based on the description and material cited by Cambessèdes (1832) as ‘in provincia Minas Gerais. Ab indefesso Laruotte lecta’, which is Saint-Hilaire’s collection bearing a note made by Laruotte on its label. Berg probably did not see the collection, as it is deposited in P. Morphological analysis indicates *A. pallens* var. *petiolaris* to be a synonym of *M. obovata*, unlike the other varieties that are synonyms of *M. guianensis*. *Aulomyrcia pallens* var. *petiolaris* presents glabrous obovate leaves with conspicuous glands and attenuate bases somewhat decurrent on the petiole. There is no substantial difference between the two taxa.

Myrcia retusa (*O.Berg) Nied.* (Niedenzu in Engler & Prantl 1893: 76). *Aulomyrcia retusa* O.Berg (in Martius *et al.* 1857: 142). Type: [Brazil, probably São Paulo] ‘Habitat in campis ad Rio das Pedras prov. Minarum’, s.d., *Sellow* s.n. (holotype B†; lectotype BR 0000005232475, selected here; isolectotypes F 0064802 [photo], K 000344159, P 00161118, P 00161119, W 0032450).

Myrcia obcordata Mattos (1964: 1) **synon. nov.** Type: Brazil, São Paulo, Santo André, Paranapiacaba, 5 Dec. 1961, *Mattos 10588* (holotype SP 001367; isotypes C, HAS n.v., RB 00542155, RB 00557165, SPF 00067432).

GENERAL NOTES. *Myrcia retusa* was treated as synonym of *M. guianensis* by BFG (2015) and Govaerts *et al.* (2016). These species can be easily distinguished by the consistently smaller leaves with retuse apex and inflorescences always reduced to three flowers in the former. *Myrcia retusa* is limited to eastern São Paulo state, occurring in the forests or *campos* of the Serra do Mar. Berg wrongly cited ‘prov. Minarum’ when indicating the type of *M.*

retusa. According to Sellow's itinenary (Urban 1906), the precise locality 'Rio das Pedras' is actually in 'prov. S. Paulo', the same region where *Myrcia retusa* has frequently been collected. *Myrcia obcordata* has identical morphology to *M. retusa*. Mattos described 2-locular ovaries in the protologue of *M. obcordata*. We have not checked the locularity of the type collection, but all other examined specimens present 3-locular ovaries, as does *M. retusa* and the other Guianensis clade species.

Myrcia rufipes *DC.* (de Candolle 1828: 247). *Aulomyrcia rufipes* (DC.) O.Berg (in Martius *et al.* 1857: 131). *Aulomyrcia rufipes* var. *bracteata* O.Berg (in Martius *et al.* 1857: 131). Type: [Brazil, Minas Gerais] 'In Brasiliae prov. Minarum', s.d., *Martius* s.n. (holotype M 0137031 [photo], isotype G-DC).

Myrcia campestris DC. (de Candolle 1828: 247) **synon. nov.** *Aulomyrcia campestris* (DC.) O.Berg (in Martius *et al.* 1857: 128). *Aulomyrcia campestris* var. *rufa* O.Berg (in Martius *et al.* 1857: 128). Type: [Brazil, Minas Gerais] 'in Brasiliae campis prov. Minarum', s.d., *Martius* s.n. (lectotype M 0136772 [photo], selected here; isolectotypes G-DC, M 0136771 [photo]).

NOTES. *Myrcia campestris* and *Aulomyrcia campestris* var. *brunnea* (below) were listed as synonyms of *Myrcia guianensis* by BFG (2015) and Govaerts *et al.* (2016) but the current study indicates them to be synonyms of *Myrcia rufipes* as previously suggested by Kawasaki (1989). As *Myrcia rufipes*, they have rufous trichomes on the branches, leaves, inflorescences and flowers. The leaves are coriaceous and strongly revolute, similar to some forms of *M. rufipes* (= *Aulomyrcia crassifolia*).

Myrcia rimosa Cambess. (Cambessèdes in Saint-Hilaire *et al.* 1832: 333) **synon. nov.** Type: [Brazil] 'In pascuis partis desertae occidentalisque provinciae Minas Geraes dictae Sertão', s.d., *Saint-Hilaire* s.n. (lectotype P 00798917, selected here; isolectotypes F 0065560 [photo], MPU 010961 [photo], P 00798918, P 00798919).

NOTES. *Myrcia rimosa* is a poorly understood species with few specimens identified as such in herbaria. It has the characteristics cited above, although the leaves are more congested than usual for the species. As a result, *M. rimosa* may be recognised as *M. rufipes* and thus we propose the synonymy.

Aulomyrcia campestris var. *brunnea* O.Berg (in Martius *et al.* 1857: 128) **synon. nov.** Type: [Brazil, Minas Gerais] 'Ad Engenho do Mato in eadem prov. (Minarum)', s.d., *Pohl* 5769 (lectotype W 0032628, selected here; isolectotypes F 0064697 [photo], W 0032627).

Aulomyrcia crassifolia O.Berg (in Martius *et al.* 1857: 128), non *Myrcia crassifolia* Kiaersk. (Kiaerskou 1893: 89). *Myrcia irwinii* Mattos & D.Legrand (1975: 4). Type: [Brazil, Minas Gerais] 'Habitat inter Viera do Mattos et Calumbão prov. Minarum', 1837, *Pohl* 1075 (lectotype W 0032565, selected here; isolectotypes K 000343442, W 0032566).

Aulomyrcia crenulata O. Berg (in Martius *et al.* 1857: 141) **synon. nov.** *Aulomyrcia crenulata* var. *hirta* O. Berg in Martius (1857: 141). *Myrcia crenulata* (O. Berg) Mattos (2008: 3). Type: [Brazil] Brasilia, Minas Novas prope Rio de S. Francisco' (label), *Martius s.n.* (holotype M 0136756 [photo]).

Aulomyrcia crenulata var. *glabrata* O.Berg (in Martius *et al.* 1857: 141) **synon. nov.** Type: [Brazil, Minas Gerais] 'Inter Calumbão et Barreiros in prov. Minarum', s.d., *Pohl* 1086 (lectotype W 0033203, selected here; isolectotypes F 0064703 [photo]; K 000342744, K 000342745, W 0033203, W 0032567).

NOTES. *Aulomyrcia crenulata* and its varieties were also listed as synonyms of *Myrcia guianensis* by BFG (2015) but they have the same pattern of indument and revolute leaves of *Myrcia rufipes*. The synonymy of the former into the latter is here proposed.

Aulomyrcia rufipes var. *grandiflora* O.Berg (in Martius *et al.* 1857: 131). *Myrcia rufipes* var. *grandiflora* Kiaersk. (Kiaerskou 1893: 95). *Aulomyrcia pilantha* var. *grandiflora* O.Berg (in Martius *et al.* 1859: 556). Type: [Brazil, Minas Gerais] 'Inter Arrayal Nossa Senhora da Piedade et Villa do Fanado v. Cidade de Minas Novas prov. Minarum', s.d., *Pohl* 1082 (lectotype W 0037119, selected here; isolectotypes K 000344312, K 000344313, W 0040186).

Aulomyrcia rufipes var. *latifolia* O.Berg (in Martius *et al.* 1857: 131). Type: [Brazil, Minas Gerais] 'In prov. Minarum', 1840, *Claussen* 308 (lectotype BR 0000005233212, selected here; isolectotype BM 001191666, G 00222039).

Aulomyrcia ternifolia O.Berg (in Martius *et al.* 1857: 134) **synon. nov.** Type: [Brazil, Minas Gerais] 'Habitat in prov. Minarum', July 1840, *Gardner* 4659 (lectotype W 0042738, selected here; isolectotypes BM 001191665, G 00222001, K 000344638, K 000344639, W 1889-0116251).

NOTES. *Aulomyrcia ternifolia* is an unplaced name in *Myrcia* known only from the type collection. It has rufous trichomes troughout, verticillate leaves and short petioles, characters that place it within the variation of *Myrcia rufipes.*

GENERAL NOTES. The following names are also synonyms of *Myrcia rufipes*: *Aulomyrcia rufipes* var. *angustifolia* O.Berg, *A. rufipes* var. *dives* O.Berg, *A. pilantha* O.Berg, *A. pilantha* var. *longifolia* O.Berg, *A. pilantha* var. *latifolia* O.Berg (BFG 2015; Govaerts et al. 2016).

Myrcia subalpestris *DC.* (de Candolle 1828: 250). *Aulomyrcia subalpestris* (DC.) O.Berg (1855: 73). Type: [Brazil, Minas Gerais] 'In Brasiliae prov. Minarum', s.d., *Martius* s.n. (holotype M 0137008 [photo], isotype G-DC).

Aulomyrcia corymbiflora O.Berg (1855: 127) **synon. nov.** Type: [Brazil] 'In monte vulgo Serra de Curumatahi in prov. Minarum', s.d., *Saint-Hilaire* 2031 (lectotype P 00161343, selected here; isolectotypes P 00161344, P 00161345).

NOTES. BFG (2015) treated *A. corymbiflora* as synonym of *Myrcia vestita*, probably due to the dense hairs in the young leaves. Our study however, found *Aulomyrcia corymbiflora* morphologically indistinguishable from *Myrcia subalpestris*.

Aulomyrcia subverticillaris O.Berg (in Martius *et al.* 1857: 124) **synon. nov.** *Aulomyrcia subverticillaris* var. *incanescens* O.Berg (in Martius *et al.* 1857: 124). *Myrcia subverticillaris* (O.Berg) Kiaersk. (Kiaerskou 1893: 88). Type: [Brazil] Brasilia, s.d., *Sellow* s.n. (lectotype K 000344445, selected here).

Aulomyrcia subverticillaris var. *rufa* O.Berg (in Martius *et al.* 1857: 124) **synon. nov.** Type: [Brazil, Minas Gerais] 'aliisque locis ejusd. prov. [Minarum]', Sep. 1840, *Gardner* 4664 (lectotype W 0040181, selected here; isolectotypes BM 001191651, G 00227999, K 000344443, K 000344444, W 1889-0116271)

Aulomyrcia subverticillaris var. *angustifolia* O.Berg (in Martius *et al.* 1857: 124) **synon. nov.** Type: [Brazil, Minas Gerais] 'aliisque locis ejusd. prov. [Minarum]', s.d., *Martius* 1232 (lectotype M 0137006 [photo], selected here; isolectotypes BM 001191652, BR 0000005233229, BR 0000005233557, BR 0000005232574, F 0064775 [photo], GH

00395030 [photo], HAL 0089803 [photo], K 000344449, M 0137007 [photo], NY 00386694 [photo], P 00161042, S 05-2523 [photo], W 0040174, W 1889-0341991).

NOTES. Comparison of the protologues and types of *Myrcia subalpestris* and *Aulomyrcia subverticillaris* and its varieties found the species to be morphologically indistinguishable. These species are shrubs or trees with leaves densely covered on the abaxial surface by brown or rufous hairs that turn grey and fall at maturity. Petioles are generally long and relatively thin, adaxial leaf venation is inconspicuous (at least in young leaves) and the ovaries are mostly glabrous. Berg listed several syntypes when describing the varieties of *A. subverticillaris* but did not specify which type corresponds to the respective variety. The types were recognizable through identification on the labels in Berg's hand. Materials that best match the protologues are selected as lectotypes.

Aulomyrcia bicudoensis O.Berg (in Martius *et al.* 1859: 557) **synon. nov.** *Myrcia bicudoensis* (O.Berg) Mattos (2009: 4). Type: [Brazil] 'Habitat in desertis prope Bicudo prov. Mato Grosso' (protologue), prov. Minas [Gerais] (label), Nov. 1834, *Riedel* s.n. (lectotype LE 00007025 [photo], selected here; isolectotype LE 00007026 [photo]).

NOTES. *Aulomyrcia bicudoensis* is morphologically indistinguishable from *M. subalpestris*, although BFG (2015) treated it as synonym of *Myrcia vestita*. In the protologue of *A. bicudoensis*, Berg cited 'habitat ad desertis prope Bicudo prov. Mato Grosso' as the collection locality, but the herbarium labels bear 'p. Bicudo, prov. Minas [Gerais], Nov. 1834'. According to Urban (1906), Sellow visited Minas Gerais between 1833 and 1835 indicating a mistake by Berg. No information regarding the precise locality of 'Bicudo' was found. *Myrcia subalpestris* is common in southwestern Minas Gerais, São Paulo and southeastern Mato Grosso do Sul.

Aulomyrcia daphnoides var. *ochracea* O. Berg (1860: 663) **synon. nov.** Type: [Brazil, Minas Gerais] 'Habitat in campis prope Caldas prov. Minarum in Brasilia', 25 Sep. 1854, *Lindberg 314* (holotype BR 0000013473792).

NOTES. *Aulomyrcia daphnoides* var. *ochracea* shares the diagnostic features of *M. subalpestris*. *Aulomyrcia daphnoides* var. *ochracea* is quite distinct from its typical variety, which is a synonym of *M. guianensis*.

Myrcia tortuosa (*O.Berg) N.Silveira* (1985a: 67). *Aulomyrcia tortuosa* O.Berg (in Martius *et al.* 1859: 558). Type: [Brazil, Goiás] 'Habitat in campis editis super Chapada de S. Marcos prov. Goyazensis', Aug. 1834, *Riedel* 2497 (holotype LE n.v., isotypes F 0064777 [photo], G 00222008, P 00161056, P 00161057).

Aulomyrcia linguiformis O.Berg (in Martius *et al.* 1857: 125). *Myrcia linguiformis* (O.Berg) N.Silveira (1985a: 66). Type: [Brazil, Goiás] 'Habitat ad Porto Real in prov. Goyaz', s.d., *Pohl* 1065 (lectotype W 0032542, selected here; isolectotypes F 0064737 [photo], K 000343727, K 000343728, M 0136956 [photo], W 0032543).

Aulomyrcia pachyclada O.Berg (in Martius *et al.* 1857: 133). *Aulomyrcia pachyclada* var. *spathulata* O.Berg (in Martius *et al.* 1857: 133). *Myrcia pachyclada* (O.Berg) N.Silveira (1985b: 2). *Myrcia pachyclada* var. *spathulata* (O.Berg) N.Silveira (1985b: 2). Type: [Brazil] 'In campis prope Itararé', s.d., *Sellow* s.n.; 'ad S. Ignacio prov. Paraná', s.d., *Sellow* s.n. (syntypes B†). Brazil, Mato Grosso do Sul, Três Lagoas, Faz. Floresta prop. Joaquim Queiros, 17 Sep. 1964, *Gomes Jr. 2139* (neotype UB 6670, selected here).

NOTES. The neotypification of *Myrcia pachyclada* is necessary since its syntypes were destroyed and no duplicates were found. The specimen selected as neotype was collected on the border between the states of São Paulo and Mato Grosso do Sul, Brazil, from where one of the syntypes was registered, and it is a good match for the protologue.

Aulomyrcia pachyclada var. *elliptica* O.Berg (in Martius *et al.* 1857: 134). Type: [Brazil, Goiás] 'Ad urbem Natividade, in regione boreali prov. Goyaz', s.d., *Pohl* 1019 (lectotype W 0037117, selected here; isolectotypes F 0064746 [photo], K 000344033, W 0037118).

GENERAL NOTES. *Aulomyrcia pachyclada* var. *prolifera* O.Berg is a further synonym of *Myrcia tortuosa* (Govaerts *et al.* 2016). BFG (2015) treated *Myrcia tortuosa* as synonym of *M. vestita*. Nevertheless, these species are distinguished by the indument on the buds, absent or very sparse in the former and dense in the latter (P.O. Rosa, pers. comm.).

Myrcia variabilis *DC.* (de Candolle 1828: 254). *Myrcia variabilis* var. *intermedia* DC. (de Candolle 1828: 254). *Aulomyrcia variabilis* (DC.) O.Berg (1855: 62). *Aulomyrcia variabilis* var. *intermedia* (DC.) O.Berg (in Martius *et al.* 1857: 106). Type: [Brazil, Minas Gerais] 'In Brasiliae prov. Minarum', s.d., *Martius* s.n. (lectotype M 0136979 [photo], selected here; isotype G-DC).

Myrcia variabilis var. *ovalifolia* DC. (de Candolle 1828: 2554) *Aulomyrcia variabilis* var. *ovalifolia* (DC.) O.Berg (in Martius *et al.* 1857: 106). Type: [Brazil, Minas Gerais] 'In Brasiliae prov. Minarum', s.d., *Martius* s.n. (lectotype M 0136981 [photo], selected here; isotype G-DC).

Myrcia variabilis var. *nummularia* DC. (de Candolle 1828: 254). *Aulomyrcia variabilis* var. *nummularia* (DC.) O.Berg (in Martius *et al.* 1857: 106). Type: [Brazil, Minas Gerais] 'In Brasiliae prov. Minarum', s.d., *Martius* s.n. (lectotype M 0136983 [photo], selected here; isotype G-DC).

NOTES. De Candolle described *Myrcia variabilis* and its varieties based on Martius' collections. Of the *Martius* s.n. specimens of this species in M, only one bears de Candolle's identification; this sheet is therefore selected as lectotype of the typical variety. Other materials, named as *Myrcia variabilis* var. *ovalifolia* and *M. variabilis* var. *nummularia*, match the protologues perfectly and are selected as lectotypes of the respective varieties.

Myrcia dealbata DC. (de Candolle 1828: 254) **synon. nov.** *Aulomyrcia dealbata* (DC.) O.Berg (in Martius *et al.* 1857: 102). *Aulomyrcia dealbata* var. *glaucescens* O.Berg (in Martius *et al.* 1857: 102). Type: [Brazil, Minas Gerais] 'In Brasiliae prov. Minas-Geraes', s.d., *Martius* s.n. (holotype M 0136877 [photo], isotype G-DC).

NOTES. The type collection of *M. dealbata* is recongnisable as *M. variabilis*, in particular sharing compressed glabrous branches, cordate, glabrous leaves with well-marked venation on both sides and calyx lobes pubescent internally. *Myrcia dealbata* has generally smaller dimensions than *M. variabilis* but is still acceptable under the morphological variation of the latter. Since they were described at the same time, we choose to maintain the more frequently used name *M. variabilis*.

Myrcia cordata Cambess. (Cambessèdes in Saint-Hilaire *et al.* 1832: 330). Type: [Brazil, Goiás] 'In campis petrosis prope tuguria vulgo Sitio do Ribeirão in parte australi provinciae Goyaz', s.d., *Saint-Hilaire* C1-907 (lectotype P 0161453, selected here; isolectotypes F 0065466 [photo], MPU 011013 [photo], P 0161453, P 0161455).

Aulomyrcia amethystina O.Berg (in Martius *et al.* 1857: 108) **synon. nov.** *Aulomyrcia amethystina* var. *pulchra* O.Berg (in Martius *et al.* 1857: 108)**.** *Myrcia amethystina* (O.Berg) Kiaersk. (Kiaerksou 1893: 90). *Myrcia amethystina* var. *pulchra* (O.Berg) Kiaersk. (Kiaerksou 1893: 90). Type: [Brazil, Minas Gerais] 'Ad praedium Olho-d'Agua prope vicum Contendas in desertis prov. Minarum', s.d., *Sellow* s.n. (holotype B†; lectotype LE 00007020 [photo], selected here; isolectotypes BR 000000523115, K 000342602).

Aulomyrcia amethystina var. *dealbata* O.Berg (in Martius *et al.* 1857: 108) **synon. nov.** *Myrcia amethystina* var. *dealbata* (O.Berg) Kiaersk. (Kiaerksou 1893: 90). Type: [Brazil, Minas Gerais] 'Ad villam S. João d'El Rey prov. ejusdem [Minarum]' s.d., *Pohl* 1073 (lectotype W 0033191, selected here; isolectotypes BR 000000530402, K 000342606, K 000342607).

Aulomyrcia intermedia O.Berg (in Martius *et al.* 1857: 107) **synon. nov.** *Myrcia intermedia* (O.Berg) Kiaersk. (Kiaerskou 1893: 90). Type: [Brazil, Goiás] 'Habitat ad Formiga Oliveira et Rio de S. Francisci et Parnahyba in prov. Goyaz', 1837, *Pohl* 1030 (lectotype W 0032482, selected here; isolectotypes BR 000005280643, F 0064727 [photo], K 000343436, K 000343437, W 0033014).

Aulomyrcia dealbata var. *pallida* O.Berg (in Martius *et al.* 1857: 103) **synon. nov.** Type: [Brazil, Minas Gerais] 'In parte ejusdem provinciae, dicta Minas Novas', s.d., *Martius* s.n. (holotype M 0136876 [photo]).

Aulomyrcia ovalis O.Berg (in Martius *et al.* 1857: 107). *Myrcia ovalis* (O.Berg) N.Silveira (1985b: 2). Type: [Brazil, Minas Gerias] 'Habitat in prov. Minarum', 1840, *Claussen* 529 (lectotype BR 0000005304684, selected here).

Aulomyrcia trifolia O.Berg (in Martius *et al.* 1857: 107) **synon. nov.** Type: [Brazil, Minas Gerais] 'Habitat ad Pompeo in parte occidentali prov. Minas Geraes', s.d., *Sellow* s.n. (lectotype BR 0000005304370, selected here).

NOTES. *Aulomyrcia amethystina*, *A. intermedia*, *A. ovalis* and *A. trifolia* are poorly delimited species grouped together in Berg's treatment (1857) and characterized by short petioles, glabrous to slightly puberulous branches and leaves, blades with well-marked venation and conspicuous glands on both sides, delicate inflorescences with thin peduncles and calyx lobes pubescent within. This morphotype, though not presenting a markedly cordate leaf-base, easily fits within the variation of *Myrcia variabilis*. Kiaerskou (1893) suggested *A. amethystina* and *A. intermedia* as possible varieties of *Myrcia variabilis*. BFG (2015) treat *Aulomyrcia amethystina* and *A. intermedia* as synonyms of *M. guianensis*, but the characters described above distinguish the former two species from the latter.

GENERAL NOTES. *Aulomyrcia variabilis* var. *suffruticosa* O.Berg is a further synonym of *Myrcia variabilis* (BFG 2015; Govaerts et al. 2016).

Myrcia vestita *DC.* (de Candolle 1828: 248). *Aulomyrcia vestita* (DC.) O.Berg (in Martius *et al.* 1859: 127). *Aulomyrcia vestita* var. *parviflora* O.Berg (in Martius *et al.* 1857: 127). *Myrcia vestita* var. *parviflora* (O.Berg) Kiaersk. (Kiaerskou 1893: 97). Type: [Brazil, Minas Gerais] 'In campis editis ferruginosis prov. Minarum Brasiliae', s.d., *Martius* s.n. (holotype M 0136975 [photo]; isotype G-DC).

Aulomyrcia thyrsiflora O.Berg (1855: 74). *Aulomyrcia thyrsiflora* var. *genuina* O.Berg (in Martius *et al.* 1857: 126). *Myrcia thyrsiflora* (O.Berg) Mattos (2008: 4). Type: [Brazil] 'Habitat in provincia Minas Geraes' (protologue); 'ad Fazenda Bom Retiro' (label), s.d., *Pohl* 1049 (lectotype W 0032442, selected here; isolectotypes BM 001191658, K 000344846, K 000344847).

Aulomyrcia thyrsiflora var. *laterifolia* O.Berg (in Martius *et al.* 1857: 126). Type: [Brazil] 'Ad Rancho de Francisco da Paula', s.d., *Pohl* 5761 (lectotype W 032440, selected here).

Aulomyrcia thyrsiflora var. *obtusifolia* (DC.) O.Berg (in Martius *et al.* 1857: 126). Type: [Brazil, Minas Gerais] 'Prope pagum Chapada, in parte proviciae ejusdem dicta Distrito dos Diamantes', s.d., *Martius* s.n. (lectotype M 0136974 [photo], selected here).

Aulomyrcia thyrsiflora var. *petiolaris* O.Berg (in Martius *et al.* 1857: 126). Type: [Brazil, Minas Gerais] 'In prov. Minarum', s.d., [*Sellow*, crossed out] *Pohl* s.n. (holotype B†; lectotype W 0032441, selected here).

NOTES. We recognised and selected the respective lectotypes of *Aulomyrcia thyrsiflora* and its varieties through the presence of identifications in Berg's hand on the labels. Berg cited *Sellow*, deposited and destroyed at B ('v. in hb. Berol.'), as type of *A. thyrsiflora* var. *petiolaris*. Material in W was found bearing 'Sellow' crossed out and replaced by 'Pohl' in Berg's handwriting. This material matches the original description, with the confusion likely due to a misunderstanding in the protologue; it has already been considered as type material (Garcia *et al.* 2015) and designated here as the lectotype.

Aulomyrcia vestita var. *grandifolia* O.Berg (in Martius *et al.* 1857: 127). *Myrcia vestita* var. *grandifolia* (O.Berg) Kiaersk. (Kiaerskou 1893: 97). Type: [Brazil, Minas Gerais] 'In eadem provincia haud infrequens', s.d., *Saint-Hilaire* 2354 (lectotype P 00161346, selected here; isolectotype P 00161347).

Aulomyrcia chapadensis O.Berg (in Martius *et al.* 1859: 554), non *Myrcia chapadensis* S. Moore (1895: 355). Type: [Brazil, Goiás] 'Habitat in campis editis lapidosis supra planitiem altam Chapada de S. Marcos prov. Goyazensis', Aug. 1834, *Riedel* 2498 (lectotype LE [no barcode] [photo], selected here; isotypes F 0064699 [photo], F 0064700 [photo], G 00301846, K 000342652, P 00161304, P 00161305).

Atomostigma mattogrossense Kuntze (1898: 76) **synon. nov.** Type: [Brazil, Mato Grosso] Mattogrosso, July 1892, *Kuntze* 880 (holotype NY 00418571 [photo]).

NOTES. *Atomostigma* is a monospecific genus originally described in Rosaceae, but that is in fact Myrtaceae. We are grateful to D. Mabberley (pers. comm.) who kindly shared this information with us. Careful study of the protologue and the type image of *Atomostigma mattogrossense* show that this specimen is indistinguishable from *M. vestita*; it was collected in the Brazilian state of Mato Grosso, where *M. vestita* is very common.

Myrcia decaisneana Glaz. (Glaziou 1908: 221) **nom. nud., synon. nov.**

NOTES. *Myrcia decaisneana* is a nomen nudum created by Glaziou and its related material match perfectly the morphology of the typical *M. vestita*.

GENERAL NOTES. *Myrcia vestita* var. *obtusifolia* DC. is a further synonym of *Myrcia vestita* (BFG 2015; Govaerts et al. 2016).

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CAPÍTULO 3

Revisão taxonômica de *Myrcia* clado Guianensis (Myrtaceae)

Taxonomic revision of *Myrcia* clade Guianensis (Myrtaceae) *

* Manuscrito formatado para ser submetido ao periódico *Phytotaxa*.

TAXONOMIC REVISION OF *MYRCIA* CLADE GUIANENSIS (MYRTACEAE) *

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Abstract

The Guianensis clade is one of the nine groups of *Myrcia* s.l. soon to be formally described as a section. This group is distributed from the Caribbean to northern Argentina, with centers of diversity in the Brazilian Cerrado and Atlantic Forest. Based on more than 4,000 plant collections, a taxonomic revision of the Guianensis clade is herein provided. We present complete descriptions, along with an identification key, images and notes on morphology, geographic distribution and conservation status. The Guianensis clade currently comprises 29 species and 332 names. Three species are new, two of which (*Myrcia* sp.1 and *Myrcia* sp.2) are *nomina nuda* of the author Glaziou soon to be validated by other authors.

Key words: *Aguava*, Atlantic Forest, *Calyptromyrcia*, Cerrado, *Myrcia guianensis*

Introduction

Myrcia s.l. or the "*Myrcia* group" is a monophyletic informal groups of the tribe Myrteae (Vasconcelos *et al.* 2017b). This group comprises nearly 800 species belonging to three currently accepted genera *Myrcia* De Candolle (1827: 401), *Marlierea* Cambessèdes (1833: 373) and *Calyptranthes* Swartz (1788: 79) (Govaerts *et al.* 2016; Lucas *et al.* 2007). These three genera correspond in part to the subtribe Myrciinae (*sensu* Berg 1855-1856, 1857-1859), except the genus *Myrceugenia* O.Berg (1855: 5) which comprises a separate lineage of Myrteae.

In this sense, *Myrcia* s.l. is exclusively distributed in the Neotropics and can be morphologically characterized by the foliaceous cotyledons, seeds with soft testa, an average of five ovules per locule with each ovule arising at a single point on the septum, usually below the mid-point, absent scalariform plates and usually paniculiform inflorescences (Lucas *et al.* 2007).

Berg (1855-1856, 1857-1859) made the most complete taxonomic treatments for *Myrcia* and allied genera, when studying American Myrtaceae. Besides *Myrcia*, *Marlierea* and *Calyptranthes*, Berg also treated other genera currently synonymized under *Myrcia* such as *Aulomyrcia* O.Berg (1855: 35), *Calyptromyrcia* O.Berg (1855: 34), *Calycampe* O.Berg (1856: 129) and *Gomidesia* O.Berg (1855: 27). Mostly based on Berg's work, many subsequent authors tried to categorize *Myrcia* s.l. in some way, generating an historically unstable subgeneric classification and number of accepted genera in *Myrcia* s.l. (see Lucas *et al.* (2011) for full discussion).

More recently, Lucas *et al.* (2011) performed the first phylogenetic studies on *Myrcia* s.l. Based on nuclear, plastid and morphological data, these authors recognized nine clades inside the large genus, which are the basis for a sectional classification of *Myrcia* s.l. (Lucas *et al.* in prep.), as well as deeper phylogenetic and taxonomic studies focusing on each clade (e.g. Santos 2014, Lourenço 2015, Staggemeier *et al.* 2015, Santos *et al.* 2016, Wilson *et al.* 2016, Lucas *et al.* 2016).

The "Guianensis clade" or "clade 4" *sensu* Lucas *et al.* (2011) was primarily characterized by the free and regular calyx lobes, hypanthium prolonged above the ovary, symmetrical, regular or cymosely branching triangular panicles, and ovaries with three or two locules. More recently, an updated molecular phylogeny of the Guianensis clade using a greater sampling allowed us to propose a more precise circumscription of the group (Chapter 1). The Guianensis clade will be soon formally described as a section of *Myrcia* s.l. (Lucas *et al.* in prep.).

In this context and after more than 150 years of taxonomic uncertainty, the Guianensis clade can be confidently studied as a cohesive and monophyletic group. We present a taxonomic revision for the species assigned to the Guianensis clade, with complete descriptions, identification key, images and discussion about morphology, geographic distribution and conservation status. *Myrcia* sp.3 is herein recognized as new. *Myrcia* sp.1 and *Myrcia* sp.2 are Glaziou's *nomina nudus* soon to be validated by other authors (P.O. Rosa, pers. comm.; see also Rosa 2015).

Materials & Methods

Taxonomic revision was based on more than 4,000 specimens, including types, from the following herbaria: ALCB, BM, BR, C, DIAM, ESA, FLOR, G, G-DC, HB, HBR, HUEFS, HUFU, K, MBM, MBML, P, R, RB, SP, SPF, U, UB, UEC, UPCB and W (acronyms follow Thiers 2017). Additionally, images from ASE, INPA, LE, M, NY and S were also analyzed through JSTOR Global Plants (http://plants.jstor.org/), speciesLink (http://www.splink.org.br/), Reflora (http://reflora.jbrj.gov.br/reflora/herbarioVirtual/) or individual herbarium websites. *Myrcia* clade numbers follow Lucas *et al.* (2011), except when explicitly cited.

Field expeditions were made throughout the distribution centers of the Guianensis clade, i.e., *Cerrado* and Atlantic Forest domains from Brazil. Collections were deposited in the herbarium UEC and duplicates in UPCB and K. Field work was especially important to observe the habitat, habit, population structure and morphological variation between individuals.

The names in each synonym list are ordered by the year of publication of the basyonym. Type-collection localities were obtained through the protologues, unless cited otherwise. Saint-Hilaire's collection numbers were copied from the herbarium sheets. Collection lists of examined material were shortened, except for those species with few collections available. Additionally, a complete collector list is presented in the Appendix.

Flowers and fruits were rehydrated in order to be morphologically analyzed. Only mature structures were used for measurements. Measures follow the format length × width. When only one measure is given, it corresponds to the length. The floral disc corresponds to the whole area of the staminal ring and inner surface of the hypanthium. General morphological terminology used herein follows mainly Radford *et al.* (1974) and Lucas *et al.* (2011).

Data about phenology, distribution, habitat and habit were obtained from both herbarium specimen labels and living plants. IUCN criteria (IUCN 2012) were used to propose conservation status for each species. Area of Occupancy (AOO) and Extent of Occurrence (EOO) were assessed through Geospatial Conservation Assessment Tool

(GeoCAT; Bachman *et al.* 2011). Distribution maps were built through QGIS 2.14 software (www.qgis.org). Images of herbarium specimens were provided by Reflora – Herbário Virtual (2017), unless explicitly specified otherwise.

SPECIES CONCEPT

Considering the phylogenetic hypotheses ‘1aaaaaaaaaaaa of the Guianensis clade available so far, species concept advocating monophyletic species are impractical for the group, as some of its species appear to be non-monophyletic (Chapter 1). Additionally, the Guianensis clade is the second youngest group in *Myrcia* s.l. (15.7–6.9 Ma; Santos *et al.* 2017), fact that can explain, at least in parts, the currently lack of genetic divergence among species. Also, there are no or only scarce information regarding population genetics, ecology and reproduction biology in *Myrcia* s.l., making biological and ecological species concepts impractical.

Morphological species concepts are still largely used in taxonomic treatments and might be the best option for poorly known plants at populational level (Reginato 2016), which is the case of the Guianensis clade. The concept based on “the presence of one or more unique characters or a unique combination of them” (Nixon & Wheeler 1990) was therefore chosen in the present work. Infraspecific taxa are not treated as accepted entities; instead, they were considered as ordinary variation at species level.

Taxonomic Treatment of *Myrcia* Clade Guianensis

The taxonomic revision of *Myrcia* clade Guianensis is presented with an updated circumscription which reflects the phylogenetic studies presented in Chapter 1. This group currently comprises 29 species and 332 names, being the fifth richest group of *Myrcia* s.l. (Lucas *et al.* in prep.). Three of these species are new to science.

TAXONOMIC HISTORY

The Guianensis clade is characterized by a combination of morphological characters that are not exclusive of this group. As a result, the Guianensis clade has never been recognized as a formal or informal taxonomic group until the first molecular phylogeny of the genus (Lucas *et al.* 2011).

Myrcia was described by De Candolle (1827), who made the first taxonomic treatment of the genus (De Candolle 1828). In this work, many species of the Guianensis clade were named, five of which are currently accepted species: *Myrcia rufipes* De Candolle (1828: 247), *M. salicifolia* De Candolle (1828: 246), *M. subalpestris* De Candolle (1828: 250), *M. variabilis* De Candolle (1828: 254) and *M. vestita* De Candolle (1828: 248). De Candolle also transferred to *Myrcia* some species previously subordinated to other genera, e.g. *Eugenia guianensis* Aublet (1775: 506) to *M. guianensis* (Aublet 1775: 506) De Candolle (1828: 245). These species, together with many others non-Guianensis clade species, were placed within *Myrcia* sect. *Sphaerocarpae*, diagnosed by the globose fruits.

The following *Myrcia* taxonomic treatment was made by Cambessèdes (1832), who described three currently accepted Guianensis clade species, *Myrcia hypericoides* Cambessèdes (1832: 317), *M. laxiflora* Cambessèdes (1832: 319) and *M. nivea* Cambessèdes (1832: 332), besides some other synonyms. Cambessèdes did not split *Myrcia* into sub-groups.

The most expressive taxonomic works for *Myrcia* clade Guianensis are the Berg's treatments of American Myrtaceae (1855–1856, 1857–1859). Most the basionyms in the Guianensis clade were created by Berg under the genus *Aulomyrcia* O. Berg (1855: 35) that was recognized by the 5-merous calyx with free lobes, hypanthium prolonged beyond the ovary and globose fruits. Berg separated species of *Aulomyrcia* bearing 2-locular ovaries from those with 3-4-locular ovaries in two informal groups and, despite minor mistakes, Guianensis clade species known at that moment were placed in the group ‘Germen tri-quadriloculare’, together with other non-Guianensis clade species (mainly species from clade 6). Inside this last group, 11 informal sub-groups were created based on the differences in the inflorescence type, leaf-shape and general indument; Guianensis clade species were spread through nine of these sub-groups.

Berg also created the genus *Calyptromyrcia* O.Berg (1855: 34) and six of its nine species are placed in the Guianensis clade, including the type-species *C. cymosa* O.Berg (1857: 58) (= *Myrcia laxiflora*). Other species are *Calyptranthes paniculata* O.Berg (1859: 544) (= *Myrcia laxiflora*), *C. cordata* O.Berg (1857: 56) (= *Myrcia cordiformis* Mattos (2009: 3)), *C. elegans* O.Berg (1855: 34) , and *C. spixiana* O.Berg (1855: 35) (both = *M. guianensis*). *Calyptromyrcia* was poorly recognized by the 3-locular ovaries and very short and nearly indistinguishable calyx-lobes partially tearing at anthesis, characters that can be seen in the Guianensis clade. The calyx morphology seems to be constant in the closely related *Myrcia laxiflora* and *M. cordiformis*, but also appears in individuals of *M. guianensis*. McVaugh (1969: 92) presented a detailed discussion on the synonymization of *Calyptromyrcia* under *Myrcia*.

Kiaerskou (1893) transferred many names from *Aulomyrcia* to *Myrcia*. He treated all clade Guianensis species inside *Myrcia* subg. *Aulomyrcia* group C (‘*Ramificatio monopodialis*’), but again many other non-Guianensis clade species were placed in this group. Within group C, he separated species in three informal sub-groups based on inflorescence type: the first one with panicles, the second with racemiform inflorescences and the third with dichasia. Guianensis clade species appear in all these sub-groups and indeed panicles, racemes and dichasia can be found in the group. Kiaerskou did not use locularity to segregate species at any level.

McVaugh (1968) recognized three sections in *Myrcia*: sect. *Myrcia,* sect. *Aulomyrcia* and sect. *Armeriela*, the latter with intermediate characters between the genera *Myrcia* and *Marlierea*. In his studies on Myrtaceae from the Guayana Highland (1969), he placed five species of the Guianensis clade in these two sections: *Myrcia guianensis* and *M. gigas* McVaugh (1969: 88) in sect. *Armeriela,* whereas *M. citrifolia* (Aublet 1775: 513) Urban (1919: 150), *M. cuprea* (O.Berg 1857: 77) Kiaerskou (1893: 95) and *M. pistrinalis* McVaugh (1969: 117) were included in sect. *Aulomyrcia*.

PHYLOGENY

More recently, phylogenetic results of Lucas *et al.* (2011) showed that the Guianensis clade is a cohesive group. Characters used to distinguish this group were the monopodial branching, leaves with flat venation and indistinct glands, symmetrical and triangular panicles regularly or cymosely branched, calyx with five free lobes, tetralocular anthers with symmetrical thecae, glabrous floral disc, thin staminal ring comprising less than 40% of the total disk width, hypanthium extended beyond the ovary, tri-locular ovaries with two ovules per locule, and globose fruits crowned by persistent hypanthium and calyx lobes (Lucas *et al.* 2011). In this work, the Guianensis clade was composed by eight specimens: *Myrcia guainensis*, *M. vestita*, *M. rufipes*, *M. variabilis*, *M. obtecta* (O.Berg 1857: 157) Kiaerskou (1893: 89) (= *M. guianensis*), *M. subverticillaris* (O.Berg 1857: 124) Kiaerskou (1893: 88) (= *M. subalpestris*), *M. citrifolia* and *Myrcia* sp.1 (identified as *M. paracatuensis* Kiaerskou (1893: 99)).

This group was subsequently subject to new phylogenetic studies with greater sampling (Chapter 1). Relying on data from full chloroplast and partial nuclear sequences of 42 samples of *Myrcia* s.l., the Guianensis clade was reconstructed as monophyletic with strong support. *Myrcia obovata* appeared as sister to a 'core Guianensis group'. The same work also performed analyses based on five DNA markers for 118 terminals of *Myrcia* s.l. (Chapter 1). With this sampling, the Guianensis clade was recovered as monophyletic in the Maximum Likelihood analysis, but weakly supported. Again, *Myrcia obovata* emerged as sister to the core Guianensis clade. On the other hand, the Bayesian analysis reconstructed a non-monophyletic Guianensis clade, as the three accessions of *Myrcia obovata* fell out of the group, in a polytomy with the core Guianensis clade and other clades of *Myrcia* s.l. Although the phylogenetic placement of *Myrcia obovata* remains unclear in these analysis, its morphology matches perfectly the Guianensis clade (see the comments under *M. obovata* for further discussion). In all analyses mentioned above, the core Guianensis clade was subdivided in three subgroups that correspond to geographical distribution, two of them with species from *Cerrado* and Atlantic Forest (subclades 4A and 4C) and another with Amazonic and Caribbean specimens (subclade 4B). Morphological patterns among and inside the subclades are still unclear (Chapter 1). The Guianensis clade will be soon published as a formal section of *Myrcia* s.l. (Lucas *et al.* in prep.)

DISTRIBUTION AND HABITAT

Species of *Myrcia* clade Guianensis are widely distributed in tropical South America and Caribbean, reaching almost the whole distribution of the genus (Figure 1). *Myrcia citrifolia* is the single species occurring in the Caribbean Islands, but not restricted to there. Remaining species occurs from northern South America (i.e. Colombia, Venezuela and the Guiana Shield) to southern Brazil and Paraguay. Most of the species are distributed in the Brazilian Atlantic Forest and *Cerrado* domains.

Myrcia guianensis is the most widespread species, growing in many different habitats from the Amazon, Atlantic Forest and *Cerrado*. *Myrcia gigas*, *M. macaca* Sobral & M.A.D. Souza (2015: 170), *M. pistrinalis* and *M. salicifolia* are endemic to the Amazon, from lowland to mountainous forests. *Myrcia cuprea* is restricted to *restingas* and Amazonian *campinaranas* from northern Brazil.

The Atlantic Forest domain has 12 species, nine of which endemic. These species are usually found in forests boards. They occur in sandy soils of lowlands (*restingas*; e.g. *Myrcia ovina* Proença & Landim (2014: 221) and *M. guianensis*), coastal and mountainous rainforests (e.g. *Myrcia clavata* Sobral (2012: 36), *M. cordiformis*, *M. glabra* (O. Berg 1857: 119) D. Legrand (1961: 298), *M. monoclada* Sobral (2013: 55), and *M. tumida* Sobral 2010: 342), and more rarely in highlands (e.g. *Myrcia retusa* (O.Berg 1857: 142) Niedenzu (1893: 76)). *Myrcia guianensis*, *M. laxiflora*, and *M. rufipes* can also occur in semi-deciduous forests, but less frequently.

Fourteen species can be found in the *Cerrado* domain, including ten endemic species. They occur throughout the biome in Brazil, Bolivia and Paraguay, growing in rocky and sandy soils or in riverbank forests. Some species grow in open vegetation (e.g. *Myrcia nivea*, *M. stricta* (O.Berg 1859: 548) Kiaerskou (1893: 99), *M. sp.*2), while others inhabits preferably savanna-like vegetation (e.g. *M. camapuanensis* N. Silveira (1985: 2), *M. subalpestris*, and *M. tortuosa* (O. Berg 1859: 558) N. Silveira (1985a: 67)). *Myrcia laricina* (O. Berg 1857: 61) Burret ex Luetzelburg (1926: 201)) is the only species of the group occupying *caatinga* vegetation from the interior of Bahia, Brazil, but also occurs in *cerrado*.

MORPHOLOGY

HABIT

Habit is highly variable within the Guianensis clade. Species exclusively growing in forests are trees, treelets or shrubs (Figure 2). Species occurring in *restinga*, *cerrado*, *campo rupestre* or *caatinga* can be from small sub-shrubs to trees. Some species from *cerrado* (e.g. *Myrcia guianensis*, *M. nivea*, *M. stricta*, and *M. subalpestris*) may have xylopodia, a belowground structure that works as an adaptation against fire and can also stocks water (Simon & Pennington 2012).

INDUMENT AND GLANDS

General aspects of the indument are taxonomically useful within the group. Trichomes are often simple (unbranched; Figure 3a), but dibrachiate with asymmetrical ramifications (Figure 3b) can be found in *Myrcia clavata*, *M. cordiformis*, *M. guianensis*, *M. monoclada*, *M. obovata* (O.Berg 1857: 122) Niedenzu (1893: 76), *M. retusa*, and *Myrcia* sp.3. Trichome color varies between species and sometimes between individuals. In many species, young ferruginous or reddish trichomes usually turn greyish to whitish and tend to fall with age (e.g. *M. cuprea* and *M. subalpestris*). On the other hand, young white or yellowish trichomes frequently become darker when mature (e.g. *M. nivea* and *M. ovina*). Straight or curly hairs are found in the group (Figures 3c, 3d). 'Comb-shaped' trichomes are found in *M. ovina* and *M. cuprea*. *Myrcia pistrinalis* presents exclusively prickly simple trichomes (Figure 3e, 3f), which are unusual in the Guianensis clade. Indument density and length vary greatly within the group.

Conspicuous small gland dots on leaves are often flat and visible only against the light or under magnification. Inconspicuous glands are not rare in the group. Besides the leaves, inflorescences and branches can also have visible glands; stamens may have a single apical one.

LEAVES

Leaves are the most plastic structure in the Guianensis clade. Alternate, opposite or verticillate leaves can be found, varying between species and even between conspecific individuals, especially those ones growing in *cerrado* vegetation. Petioles can be sulcate, semi-terete or terete. *Myrcia clavata* and *M. monoclada* have very short petioles that can be seen only abaxially. Sessile leaves are also found in some species. Leaf texture when mature is chartaceous or coriaceous; membranaceous leaves are not found in any species. Leaf venation is brochidodromous, as usual in *Myrcia* s.l., with secondary veins forming a distinct marginal vein; sometimes two marginal veins can be seen. The midvein is usually adaxially raised or plane, but can be sulcate in *Myrcia pistrinalis* and some individuals of *M. camapuanensis*, *M. gigas, M. monoclada* and *M. vestita*. Tertiary venation is conspicuous or not, but never prominent.

INFLORESCENCES

The pattern in *Myrcia* clade Guianensis appears to be the triangular, three or rarely four times ramified panicle with symmetrical, opposite branching (Figure 4a). Alternate branching is rarer, occurring in *Myrcia monoclada*, *M. vestita* and some individuals of *M. gigas* and *M. guianensis*. Each branchlet ends in a dichasium, i.e. a central sessile flower between two lateral pedicellate flowers, or in a single flower. The number of flowers and panicle length are taxonomically unusable.

Reduced inflorescences can also be found within the Guianensis clade, especially in species from dry habitats. Among these, racemiform inflorescences with opposite or alternate branching (Figure 4b) can be found in *M. guianensis*, *M. rufipes*, *M. laricina*, *M. nivea*, *Myrcia* sp.1, *Myrcia* sp.2, *M. stricta*, and *M. tumida*. Three-flowered inflorescences can be found in *M. nivea* and *M. stricta* as dichasia (Figure 4e), and in *M. retusa* as triads (i.e. three pedicellate flowers; Figure 4d). Inflorescences reduced to a single flower are rare, but can be seen in some individuals of *M. laricina*, *M. nivea* and *Myrcia* sp.1 (Figure 4c). Glomeruliform inflorescences characterized by many sessile flowers clustered at the tip of a peduncle are exclusive of *M. camapuanensis* (Figure 4f). This last inflorescence type is likely derived from a reduction of lateral branches and internodes of a developed panicle.

BRACTS AND BRACTEOLES

Bracts and bracteoles are usually deciduous before or after anthesis, however they can be eventually persistent in the fruits (e.g. *Myrcia vestita*). Shape, size and pubescence varies among species and can be useful for specific delimitation. As in species of *Myrcia* sect. *Sympodiomyrcia* M.F.Santos & E.Lucas (clade 7 *sensu* Lucas *et al.* 2011; Santos 2014), bracts and bracteoles are morphologically similar to each other, but the bracteoles are proportionally shorter. Within the Guianensis clade, bracteoles are usually shorter than the floral buds, but longer bracteoles can be seen in *Myrcia macaca*, *M. nivea*, *M. ovina* and *Myrcia* sp.2 (Figures 5a, 5b).

FLORAL BUDS

Floral buds are taxonomically useful in the Guianensis clade, especially regarding the shape and external pubescence that are constant characters in conspecific individuals. Buds are clavate in *Myrcia clavata*; turbinate in *M. cordiformis*, *M. gigas*, and *M. pistrinalis* (Figure 5c); and globose or obovoid in the remaining species (Figure 5b). The presence or lack of indumentum on the buds aids the distinction of some species, e.g. *M. vestita* with pubescent buds vs. *M. tortuosa* with nearly or completely glabrous ones.

HYPANTHIUM

All species have hypanthia prolonged beyond the ovary, ranging between 0.3 and 2 mm long (Figure 5d). *Myrcia glabra* has the shallowest hypanthium tube within the Guianensis clade, with ca. 0.3 mm long. This structure usually remains intact after anthesis, but can slightly tear in *Myrcia cordiformis* and *M. laxiflora*, both originally described as *Calyptromyrcia* (see "Taxonomic History" section). In *M. guianensis*, the hypanthium of some flowers can tear or not at all. Either ripped or not, the hypanthium tube and its remnants are persistent on the fruits. Trichomes are externally present or not. Internally, the hypanthium is entirely glabrous, except in *Myrcia pistrinalis* that has tiny prickly trichomes on the inner surface.

CALYX

In general, calyx morphology is taxonomically useful within the Guianensis clade. It is 5-merous with free and frequently distinct lobes (Figures 5e, 5h). Nevertheless, *M. cordiformis* and *M. laxiflora* have very short calyx lobes that are generally indistinguishable from each other in the floral buds (Figures 5f, 5g). These features were used to characterize the genus *Calyptromyrcia*, where both species were firstly placed (Berg 1857–1859; see “Taxonomic History” section). *Myrcia tumida* presents swollen calyx lobes (>1 mm width; Figure 5i).

Lobes are unequal between them, with two larger and three smaller. They are generally wider than long, rounded, depressed ovate or triangular, with rounded to acute apices. The calyx lobes can be pubescent or not externally. Internally, the lobes are moderately to densely covered with trichomes, except *Myrcia monoclada* that has entirely glabrous lobes. The type, length, color and density of these trichomes vary greatly between species.

COROLLA

The corolla is 5-merous with few morphological variations. Petals are obovate to widely obovate. Most species have white petals, but slightly pinkish to pink ones can be found in *Myrcia guianensis* and *M. stricta* from *cerrado*, when growing unprotected from the sun. Petal size varies mostly depending on the flower size (i.e., larger flowers have larger petals). In a single flower, internal petals are often smaller than external ones.

ANDROECIUM

The staminal ring comprises 30–40% of the total disc width and is always completely glabrous; this is the most important feature to distinguish the Guianensis clade from clade 6, which has always pubescent staminal rings (see “Similarities with other clades of *Myrcia* s.l.” section). Stamens are numerous and always strongly incurved before anthesis, as commonly found in *Myrcia* s.l. (Vasconcelos *et al.* 2015). The external ones are longer than the internal ones. A single apical gland between the thecae can be present. The anthers are longitudinally dehiscent and tetra-locular with symmetrical thecae. Stamens are often white or yellowish; pinkish ones can be found in individuals with pinkish petals.

GYNOECIUM

Berg (1857–1859) separated *Aulomyrcia*, the genus that historically comprised most Guianensis clade species, in two large groups based on the number of locules in the ovary. Apart from some minor mistakes, he included almost all the Guianensis clade species known at that moment in his informal group ‘Germen tri-quadriloculare’. More recently, this character appeared to be important in the distinction of *Myrcia* s.l. groups (Chapter 1). Based on molecular and morphological evidences, a comprehensive phylogenetic scheme (Chapter 1) showed that the Guianensis clade species have exclusively 3-locular ovaries, and less frequently 4-locular ovaries (*Myrcia pinifolia* Cambessèdes (1832: 333)). Species with 2-locular ovaries previously synonymized under *M. guianensis* (e.g. *M. myrtillifolia* De Candolle (1828: 250), *M. rubella* Cambessèdes (1832: 317), *M. parnahibensis* (O. Berg) Kiaerskou (1893: 89); BFG 2015) were genetically and morphologically positioned outside the Guianensis clade, in *Myrcia* sect. *Aulomyrcia* (O.Berg) Griseb. (clade 9 *sensu* Lucas *et al.* 2011; Lucas *et al.* 2016, Chapter 1).

FRUITS

Fruits are globose, crowned by the hypanthium and calyx lobes or their remnants, and frequently small (rarely >20 mm in diameter; Figure 6). Immature fruits are green or yellowish, while mature ones range from yellow to red, purple, or dark. One seed per fruit appears to be the usual feature in the group, but two seeds can also be found. Although Rosa (2015) cited up to four seeds per fruit in *Myrcia* sp.1 (as *M. depauperata* Glaziou (1908: 228)), three or more seeds per fruit were not seen by us. The seeds are rounded or somewhat reniform, usually brown, with smooth testa, and myrcioid embryos (Lucas *et al.* 2011).

SIMILARITIES WITH OTHER CLADES OF MYRCIA *S.L.*

Myrcia s.l. has nine informal groups which correspond to strongly supported clades based on molecular data (Lucas *et al.* 2011). Of these groups, the most similar to the Guianensis clade is clade 6, due to the 3-locular ovaries, symmetrical panicles, hypanthium prolonged above the ovary, and globose fruits. The main distinguishable character is the staminal ring, completely glabrous in the Guianensis clade species and densely pubescent in clade 6 species (Vasconcelos *et al.* 2017a). Besides, the Guianensis clade frequently has leaves with flat secondary venation and indistinct small glands, whereas the clade 6 has leaves with reticulate venation with prominent secondary veins and often one large gland per areole (Lucas *et al.* 2011). Despite the well-defined morphology, the phylogenetic relationships between these two clades are still unclear (Lucas *et al.* 2011, Staggemeier *et al.* 2015, Santos *et al.* 2016, Wilson *et al.* 2016).

The Guianensis clade can resemble a group of species of the clade 9, because of the well-developed panicles, glabrous hypanthium prolonged beyond the ovary, and five free calyx lobes. Some of these species were in fact previously placed as synonyms of *Myrcia guianensis* (BFG 2015), but they are currently being resurrected and treated together with species of the clade 9 (Lucas *et al.* 2016). Guianensis clade and clade 9 are mainly distinguished by the 3-locular ovaries, symmetrical inflorescences and leaves usually with raised midvein on the adaxial surface in the former and 2-locular ovaries, often asymmetrical inflorescences and leaves with flat to sulcate midvein on the adaxial surface in the latter.

More recently, a tenth strongly supported clade was retrived in *Myrcia* s.l. (Santos *et al.* 2016, Chapter 1), which will be described as a further section. This clade shares 3-locular ovaries with the Guianensis clade, but can be distinguished by larger and more robust leaves, inflorescences, buds and flowers in clade 10 (*sensu* Chapter 1). This group appears restricted to coastal forests from southern Bahia and northern Espírito Santo states, where few species of the Guianensis clade are found.

IDENTIFICATION KEY TO SPECIES OF MYRCIA *CLADE GUIANENSIS*

1. Plants from Caribbean, Amazon or restinga vegetation from Northern Brazil (states of Amazonas, Amapá, Maranhão and Pará) 2

- Plants from Atlantic Forest, cerrado, campo rupestre or caatinga vegetation.................8

2. Young and generally mature twigs, leaves abaxially and inflorescences densely covered with trichomes (the actual surface usually never visible)...................................3

- Young and mature twigs, leaves abaxially and inflorescences glabrous or sparsely to moderately covered with trichomes (the actual surface always visible) 4

3. Young structures with rufous to golden trichomes; petioles 5–11.5 mm long................ ....*Myrcia cuprea*

- Young structures with white, greyish or reddish trichomes; petioles 2–4 mm long ....*Myrcia macaca*

4. Twigs, inflorescences and/or hypanthium with prickly trichomes up to 0.1 mm long; sometimes longer trichomes (up to 0.4 mm) are also present, intermixed with the shorter ones...*Myrcia pistrinalis*

- Twigs, inflorescences and hypanthium glabrous or with trichomes 0.1–0.4 mm long (prickly trichomes never present)..5

5. Internodes 40 mm long or longer; mature leaves 10 cm long or longer.... *Myrcia gigas*

- Internodes up to 35 mm long; mature leaves up to 10.5 cm long 6

6. Leaves lanceolate or elliptic-lanceolate, 3.5–5 times longer than wide ....*Myrcia salicifolia*

- Leaves elliptic, widely elliptic, obovate, oblong-elliptic or ovate, up to 2.5 times longer than wide 7

7. Leaves generally polished adaxially; flower buds 2.5 × 2.5 mm or larger; floral disc with 1.7 mm diam. or more ....*Myrcia citrifolia*

- Leaves dull or polished adaxially; flower buds up to 2 × 2 mm; floral disc up to 1.5 mm diam..*Myrcia guianensis*

8. Young twigs densely covered with trichomes (the actual surface usually never visible)..9

- Young twigs moderately to sparsely covered with trichomes (the actual surface always visible)..21

9. Inflorescences glomeruliform (sessile flowers congested at the tip of a peduncule) .... *Myrcia camapuanensis*

- Other types of inflorescences 10

10. Leaves aciculate, linear or lanceolate (in this last case, the margins are strongly revolute and then the leaves look like linear) 11

- Other leaf-shapes or lanceolate (in this last case, without strongly revolute margins) .12

11. Trichomes brown to greyish; petioles up to 0.7 mm long .... *Myrcia laricina*

- Trichomes white, turning dark with age; petioles 1 mm long or longer ..... *Myrcia nivea*

12. Bracteoles longer than 2 mm long, frequently longer than the flower buds 13

- Bracteoles up to 2 mm long, shorter than the flower buds...15

13. Leaves adaxially moderately to densely covered with trichomes; petioles 3 mm long or more; plants from restinga vegetation of Sergipe, Brazil......................... *Myrcia ovina*

- Leaves adaxially glabrescent or with scattered trichomes (these can be denser on the midvein); petioles up to 3 mm long; plants from cerrado 14

14. Young twigs covered with white trichomes; leaves with petioles 1 mm long or more .... *Myrcia nivea*

- Young twigs covered with brown or greyish trichomes; leaves sessile or with petioles up to 1 mm long.. *Myrcia* sp.2

15. Flower buds moderately to densely covered with trichomes 16

- Flower buds glabrous or with very scattered trichomes...19

16. Trichomes predominantly dibrachiate throughout the plant; plants from inselbergs of Espírito Santo, Brazil... *Myrcia* sp.3

- Trichomes simple (not dibrachiate) throughout the plant; plants from cerrado, campo rupestre or semi-deciduous forests 17

17. Young structures with brown, rarely hialinous, trichomes; leaves with 15–21 secondary veins at each side..*Myrcia vestita*

- Young structures with rufous to ferrugineous, rarely brown, trichomes; leaves with up to 15 secondary veins at each side...18

18. Leaves with secondary and tertiary venation generally inconspicuous adaxially; trichomes on branches and leaves becoming greyish with age ....*Myrcia subalpestris*

- Leaves with secondary and tertiary venation generally conspicuous adaxially; trichomes on branches and leaves not becoming greyish with age ....*Myrcia rufipes*

19. Petioles 1.7–2 mm thick ....*Myrcia tortuosa*

- Petioles up to 1.5 mm thick...20

20. Inflorescences densely to moderately covered with trichomes .....*Myrcia subalpestris*

- Inflorescences glabrous or with scattered trichomes..........................*Myrcia guianensis*

21. Plants from Atlantic Forest of Bahia and Alagoas, Brazil, with leaves ovate-lanceolate, lanceolate, elliptic or elliptic-ovate, longer than 8 cm 22

- Plants from cerrado, campo rupestre or Atlantic Forest of other countries or Brazilian states; if from Bahia or Alagoas, then the leaves are elliptic to rounded, up to 7 cm long 24

22. Flower buds clavate; leaves with 15–20 secondary veins at each side; Plants from coastal forests of Alagoas, Brazil .... *Myrcia clavata*

- Flower buds globose or obovate; leaves with 20–30 secondary veins at each side; plants from Bahia, Brazil..23

23. Calyx lobes very short and nearly indistinguishable (Fig. 5f), partially tearing with the hypanthium at anthesis; leaves with 20–23 secondary veins at each side, leaving the midvein at angles of 80–85° ....*Mycia cordiformis*

- Calyx lobes clearly distinguishable from each other (Fig. 5e) and not tearing at anthesis; leaves with 25–30 secondary veins at each side, leaving the midvein at angles of 70–80° .... *Myrcia monoclada*

24. Leaves linear or lanceolate, 12–15 times longer than wide...................... *Myrcia* sp.1

- Leaves with other shapes, up to 6 times longer than wide..25

25. Flowers in triads .... *Myrcia retusa*

- Other types of inflorescences 26

26. Calyx lobes very short and nearly indistinguishable (Fig. 5f), partially tearing with the hypanthium at anthesis .... *Myrcia laxiflora*

- Calyx lobes clearly distinguishable from each other (Fig. 5e) and not tearing at anthesis 27

27. Calyx lobes swollen, >1 mm thick; petioles 9.8¬–13 mm long ....*Myrcia tumida*

- Calyx lobes not swollen, up to 1 mm thick; petioles up to 6 mm long.........................28

28. Leaves sessile or with petioles up to 0.7 mm long; tertiary venation inconspicuous on both leaf-surfaces...29

- Petioles usually longer than 1.5 mm; if shorter, then the tertiary venation is visibly conspicuous on both leaf-surfaces..30

29. Leaves ovate or ovate-elliptic; inflorescence paniculiform with glabrous main axis ....*Myrcia hypericoides*

- Leaves elliptic-lanceolate; inflorescence racemiform, dichasium or a single flower with main axis covered with trichomes...*Myrcia stricta*

30. Leaf-base cordate, rounded or obtuse; tertiary venation always conspicuous ....*Myrcia variabilis*

- Leaf-base attenuate to acute or obtuse to rounded, but then the tertiary venation is inconspicuous 31

31. Leaves generally obovate; leaf-base decurrent on the petiole.............*Myrcia obovata*

- Leaves usually not obovate, if so, then the base is not decurrent on the petiole...........32

32. Hypanthium ca. 0.3 mm prolonged above the ovary............................ *Myrcia glabra*

- Hypanthium ca. 1 mm prolonged above the ovary ....*Myrcia guianensis*

1. *Myrcia camapuanensis* N. Silveira (1985: 2). *Aulomyrcia capitata* O. Berg in Martius (1859: 554), non *Myrcia capitata* O. Berg in Martius (1857: 154). Figures 7 and 37.

Type:—BRAZIL. Mato Grosso do Sul: in arenosis desertis propre Camapuan prov. Mato Grosso, October 1826, *Riedel 670* (holotype LE-photo! [no barcode]; isotypes K!, G!).

Shrubs or treelets to 6 m. **Twigs** terete or flat, brown, densely covered with simple ferrugineous, cream-coloured or yellowish, rarely golden, trichomes 0.3–0.5 mm when young; mature twigs terete, cortex exfolianting, covered with trichomes turning grey to glabrescent; internode 10–36.5 mm long. **Leaves** with petioles sulcate, 2–3 × 1.2–1.6 mm, densely to moderately covered trichomes when young, glabrescent when mature; blades elliptic to oblong or oblong-lanceolate, rarely narrowly elliptic, (1.5–)2.5–9 × 0.7–5(–9) cm, 2.5–3.5(–4) times longer than wide, discolorous when dry, apices acuminate to rounded, bases acute to obtuse, margins not revolute when dry, secondary veins 12–15 at each side, 2.8–3.5 mm apart, leaving the midvein at angles of 60–70°, one marginal vein 0.4–0.7 mm from the margin; adaxial surface densely covered with trichomes or restricted to the midvein (then scattered trichomes on the blade), dull, midvein raised, rarely flat, secondary veins flat, rarely sulcate, tertiary veins conspicuous, gland dots conspicuous or inconspicuous, 3–7/mm^2; abaxial surface densely covered with trichomes when young, turning dark with age, glabrescent to glabrous when mature, midvein and secondary veins raised, tertiary veins conspicuous, gland dots conspicuous or inconspicuous, 3–10/mm^2. **Inflorescences** axillary, sub-terminal or terminal, glomeruliform (flowers congested at the top of the pecuncle), rarely triads, main axis terete or slightly flat, 10–55 × 0.4–0.7 mm, densely covered with trichomes, flowers sessile; bracts lanceolate to narrowly elliptic, ca. 3.5 × 1.5 mm, densely covered with trichomes on both sides, deciduous before anthesis; bracteoles lanceolate to linear, 1–2 × 0.5 mm, densely covered with trichomes on both sides, persistent after anthesis. **Floral buds** obovoid or globose, 2–4 × 2–3.5 mm; flowers with hypanthium not tearing at anthesis, 0.5–1.5 mm prolonged above the ovary, externally densely covered with trichomes, internally glabrous; calyx 5-merous, lobes triangular or depressed ovate, 0.6–1.6 × 0.8–1.7 mm, <1 mm thick, unequal between them, apices acute or rounded, externally and internally densely covered with trichomes; corolla 5-merous, petals 2.5–3.5 × 2.5–3.5 mm, white; floral disc 1.5–2.5 mm diam.; stamens 1.5–4 mm long, white, anthers eglandular; ovary 3-locular, with two ovules per locule, style 5–9 mm, stigma punctiform. **Fruits** globose, 5–6 × 5–6 mm, green when young, yellow when mature, covered with trichomes or glabrescent, crowned by the five calyx lobes; one seed, testa smooth, dark brown, dull.

Distribution and Habitat:—*Myrcia camapuanensis* occurs in the Brazilian states of Mato Grosso, Mato Grosso do Sul and southwestern Goiás, in sandy and rocky soils of *cerrado* vegetation, at altitudes of 350–530 m.

Etymology:—the epithet is derived from the type-collection place.

Phenology:—Flowers between June and November; fruits between September and November.

Conservation Assessment:—*Myrcia camapuanensis* is widespread in *cerrado* vegetation from central Brazil. It has an Extent of Occurrence (EOO) of ca. 195,620 km^2 and can be therefore categorized as Least Concerned (LC) according to the IUCN criteria (2012).

Comments:—*Myrcia camapuanensis* is a shrub or tree easily recognized by the glomeruliform inflorescence consisting of 5–20 flowers clustered at the tip of the peduncle; inflorescences are rarely reduced to triads. This inflorescence type is unusual in *Myrcia* s.l. and is aparentely a reduction of the lateral branchlets and internodes of a panicle; in the Guianensis clade, the glomeruliform inflorescence appears exclusively in *M. camapuanensis*. The bracteoles are persistent after anthesis and even in mature fruits. Vegetative material can be highly similar to *M. vestita*, but these species are easily distinguished through the inflorescences that are glomerules or triads in *M. camapuanensis* and developed panicles in *M. vestita*.

Selected specimens examined:—BRAZIL. Goiás: Iporá, Parque Ecológico da Cachoeirinha, 30 October 2004, *Delprete 8989* (K, RB); Jussara, 21 November 2011, *Staggemeier 318* (K, RB); Mossâmedes, 6 October 1992, *Fontella 2805* (RB); Piranhas, 27 November 2011, *Staggemeier 533* (RB). Mato Grosso: Alto Araguaia, 30 September 1963, *Maguire 56962* (RB); Chapada dos Guimarães, 9 August 1994, *Dubs 1645* (ESA, SP, U); Cuiabá-Salgadeira, 24 September 1988, *Wanderley 1069* (SP, UPCB); Nova Xavantina, 7 October 1994, *Marimon 160* (ESA); Olaria, 15 November 1968, *Harley 11285* (K); S. Anna da Chapada, 25 June 1902, *Robert 353* (BM); Santo Antônio de Leverger, 1 August 1986, *Hashimoto 17341* (SP). Mato Grosso do Sul: Rio Verde, 12 November 1973, *Hatschbach 33116* (C, MBM); 4 November 2012, *Barbosa et al. 1530* (UEC).

2. *Myrcia citrifolia* (Aubl.) Urban (1919: 150), non (Aubl.) D. Legrand (1961: 297), nom. illeg. *Myrtus cotini-folio* Plum. (Plumier 1703: 19) nom. nud. *Myrtus citrifolia* Aublet (1775a: 513 [description] 1775b: 20 [name]). *Myrtus acris* var. *b* Swartz (1788: 79), nom. illeg. *Myrtus coriacea* Vahl (1791: 59), nom. illeg. *Myrtus cotinifolia* J. F. Gmelin (1791: 792), nom. illeg., non (Jacq.) Sprengel (1825: 481), nec Poiret (1798: 410). *Myrcia coriacea* (Vahl) De Candolle (1828: 243), nom. illeg. *Aulomyrcia coriacea* (Vahl) O. Berg (1854: 70), nom. illeg. *Myrcia coriacea* var. *swartziana* Grisebach (1860: 234), nom. illeg. *Aulomyrcia citrifolia* (Aubl.) Amshoff (1948: 531). Figures 8 and 38.

Type:—MARTINIQUE. *Plumier s.n.* (specimen unknown). Plate in Pl. Amer.: 203, t. 208, fig. 2, 1759 (lectotype, selected by McVaugh [1969]).

Eugenia paniculata Jacquin (1789: 108), non Lamarck (1789:199), nom. illeg., nec Sieber ex C. Presl (1828: 274), nom. inval., nec Cambess. in Saint-Hilaire *et al.* (1832: 338), nom. illeg., nec Bello (1881: 271), nom. illeg., nec (Gaert.) Britten (1899: 247), nom. illeg. *Aulomyrcia jacquiniana* O. Berg (1855: 69), nom. illeg. *Myrcia coriacea* var. *jacquiniana* (O. Berg) Grisebach (1860: 234), nom. illeg. *Myrcia paniculata* (Jacq.) Krug & Urban (1895: 577). *Myrcia paniculata* var. *jacquiniana* (O. Berg) Duss (1896: 263). *Myrcia citrifolia* var. *jacquiniana* (O. Berg) Stehlé & Quentin (1949: 57). Type:—MARTINIQUE. *Aquart s.n.* (lectotype W! [0032556], selected by Lima *et al.* (in press.)).

Eugenia marginata Persoon (1806: 28), non W. Hill (1862: 23), nom. illeg. *Myrtus marginata* (Pers.) Sprengel (1825: 488). Type:—DOMINICAN REPUBLIC. *Poiteau s.n.* (holotype L; isotype P).

Eugenia acetosans Poiret in Lamarck (1813: 125). *Myrtus acetosans* (Poir.) Sprengel (1825: 488). *Aulomyrcia acetosans* (Poir.) O. Berg (1861: 662). Type:—FRENCH GUIANA. Cayenne, *Richard s.n.* (lectotype P! [00547167], selected by Lima *et al.* (in press.); isolectotypes P [3]!, F [fragm.]-photo!).

Myrcia coriacea var. *imrayana* Grisebach (1860: 234). *Myrcia paniculata* var. *imrayana* (Griseb.) Duss (1896: 264). *Myrcia citrifolia* var. *imrayana* (Griseb.) Stehlé & Quentin (1949: 57). Type:—DOMINICA. *Imray 364* (lectotype K! [000261747], selected by Lima *et al.* (in press.); isolectotypes GH-photo!, GOET-photo!).

Aulomyrcia coriacea var. *parvifolia* O. Berg (1861: 662). Type:—FRENCH GUIANA. Guyane, *Richard 55* (holotype P! [00547257]).

Myrcia vernicosa De Candolle (1828: 256). Type:—America meridionalis, *Unknown collector s.n.* (holotype G-DC!).

Eugenia saviifolia Alain (1963: 190). Type:—PUERTO RICO. Maricao State Forest, 800 m alt., 26 June 1962, *Alain 9206* (holotype NY-photo! [00099303]; isotype A-photo!).

Aulomyrcia triflora O. Berg (1855: 79). Type:—GUYANA. Prope Roraima, 1843, *Schomburgk 978* (holotype B†; lectotype K! [000342677], selected by Lima *et al.* (in press.)).

Trees or shrubs to 14 m. **Twigs** terete or flat, brown, moderately covered with simple brown trichomes 0.1–0.4 mm when young; mature twigs terete, cortex exfoliating, glabrescent; internode 9–15 mm long. **Leaves** with petioles semi-terete or slightly sulcate, 1.5–5 × 1–1.5 mm, sparsely to moderately covered with trichomes when young ones, glabrescent to glabrous when mature; blades elliptic to widely elliptic or obovate, 2–7.5 × 2–4.5 cm, 1–1.7 times longer than wide, concolorous when dry, apices obtuse to retuse, rarely acute, bases obtuse to attenuate, rarely cordate, margins revolute or not when dry, secondary veins 8–10 at each side, 1.5–2.5 mm apart, leaving the midvein at angles of 70°–80°, one marginal vein 0.5–1 mm from the margin; adaxial surface with trichomes restricted to the midvein, frequentely polished, midvein raised, secondary veins flat or raised, tertiary veins inconspicuous, gland dots conspicuous, 5–10/mm^2; abaxial surface moderately covered with trichomes to glabrous when young, glabrous when mature, midvein and secondary veins raised, tertiary veins conspicuous, gland dots conspicuous, 5–15/mm^2. **Inflorescences** axillary, sub-terminal or terminal, paniculiform, pyramidal with opposite branching and dichasial subunits, main axis flat, 30–90 × 0.7–1 mm, glabrous or with scattered trichomes, flowers sessile or with pedicels up to 6 mm; bracts elliptic, ca. 3 × 1.2 mm, densely covered with simple trichomes 0.5–0.6 mm on both sides, generally decidous before anthesis; bracteoles not seen, deciduous before anthesis. **Floral buds** globose to obovoid, 2.5–4.5 × 2.5–4 mm; flowers with hypanthium not tearing at anthesis, ca. 1.5 mm prolonged above the ovary, externally and internally glabrous; calyx 5-merous, lobes depressed ovate, 0.7–1 × 1.4–2.5 mm, <1 mm thick, unequal between them, apices rounded, externally glabrous, internally densely covered with light brown to white trichomes to 0.3 mm; corolla 5-merous, petals ca. 3 × 3.5 mm, white; floral disc 1.8–3 mm diam.; staminal ring glabrous, stamens 2–6 mm long, white, anthers eglandular; ovary 3-locular, 2 ovules per locule, style 7–9 mm long, glabrous, stigma punctiform. **Fruits** globose, 6–8 × 6–8.5 mm, green when young, turning dark when mature, glabrous, crowned by the five calyx lobes; one seed, testa smooth, brown, polished.

Distribution and Habitat:—*Myrcia citrifolia* is widely distributed in tropical rain forests from Dominican Republic, Puerto Rico and the Lesser Antilles to the Guiana shield in Venezuela, Guyana, Suriname and French Guiana, at altitudes of 10–1000 m. This species was reported to Cuba (Grisebach 1860), but the cited gatherings correspond to non-Guianensis clade species (Chapter 2). *Myrcia citrifolia* is the unique clade Guianensis species found in the Caribbean islands.

Etymology:—from the Latin ‘citrus-like’, alluding to the resemblance of the leaves to those of some citrus species.

Phenology:—Flowers all over the year; fruits between June and February.

Conservation Assessment:—*Myrcia citrifolia* has been registered in multiple localities in the Caribbean islands and northern South-America, with and Extent of Occurrence (EOO) of ca. 1,402,460 km^2. Many of the collections are from inside protected areas.

This species can be categorized as Least Concerned (LC), according to IUCN criteria (2012).

Comments:—*Myrcia citrifolia* is recognized by its panicles with dichasial subunits and regular branching, and large globose floral buds, reaching up to 4.5 × 4 mm. This species presents a wide variation in leaf shape, size and texture, mostly depending on the altitude; the adaxial surface is generally polished.

McVaugh (1969) stated the difficulty in separating *Myrcia citrifolia* and the widespread *M. guianensis,* even though he placed these two species in distintict sections (sect. *Aulomyrcia* and sect. *Armeriela*, respectively). These species are similar particularly in northern South-America, where they co-occur. They are distinguished through the larger floral buds and floral discs, open and few-flowered, regular panicles of the former.

The later isonym *Myrcia citrifolia* (Aubl.) D.Legrand is in fact *Myrcia glabra,* but many herbarium specimens from southern and southeastern Brazil remained incorrectly named as *M. citrifolia* (see also the notes on *M. glabra*). These species are separated mainly through the few-flowered panicles and larger floral buds of *M. citrifolia*. While *M. citrifolia* occurs in the Caribbean islands and northern South-America, *M. glabra* is limited to the Atlantic coast of southern and southeastern Brazil.

Selected specimens examined:— ANTIGUA & BARBUDA. Antigua, 14 June 1944, *Beard 275* (K, U); St. Clair, 11 September 1937, *Box 1056* (BM, K); Bellevue, 24 August 1938, *Box 1522* (BM, K). BARBADOS. Turners Hall Woods, September 1940, *Goodwip 425* (BM). BRITISH VIRGIN ISLANDS. Tortola, 13-17 February 1913, *Britton 810* (K); St. Thomas, 27 February 1913, *Britton 1403* (K); Virgin Gorda, 6 August 2003, *Hamilton 3* (K). DOMENICAN REPUBLIC. Santo Domingo: Santo Domingo Norte, 24 May 2009, *Araújo 1791* (K); Espaillat, 9 April 1985, *Gentry 50608*

(U). DOMINICA. Baiac, 12 July 1989, *Pendry 71204* (K); Windward, 30 September 1983, *Whitefoord 3818* (BM); St. Andrew, 14 April 1992, *Whitefoord 7036* (BM); St. David, 15 July 1966, *Stern 2469* (BM). FRENCH GUIANA. Réserve Naturelle de la Trinité, 15 June 1999, *Dutrêve 48* (K). GUADALOUPE. Basse-Terre, 31 July 1980, *Barrier 2425* (C, K, U); Malendure, 25 January 2004, *Bamps 9615* (BR); GUYANA. Roraima, 1842, *Schomburgck 644* (BM, W). MARTINICA. Fort de France, 1870, *Hahn 890* (BR, C, K, W); Trail ENE of Anse Couleuvre, 16 July 1987, *Daly 5266* (K); Gros Morne, 14 July 1939, *Stehle 4557* (U). MONTSERRAT. 26 February 1980, *Howard 19716* (BM); PUERTO RICO. Maricao State Forest, 26 June 1963, *Liogier 9712* (K); Arecibo, 10 May 2004, *Trejo 2666* (K); Cayey, 25 October 1885, *Morillos 2098* (K). SABA. Castle Hill, 10 August 1953, *Stoffers 4192* (C, K, U). ST. EUSTATIUS. 20 July 1953, *Stoffers* 3779 (U). ST. LUCIA. Lesser Piton, 25 September 1888, *Ramage s.n.* (BM, K); Castries, 4 April 1958, *Proctor 17919* (BM). ST. MAARTEN. 15 July 1952, *le Callo 860* (U). ST. VICENT. Near Mt. Alexander, July, *Smith 851* (K). SURINAME. Sipaliwini, 31 May 2003, *Rosário 1813* (K). TRINIDAD & TOBAGO. 9 December 1931, *Broadway 7847* (BM). U.S. VIRGIN ISLANDS. St. Thomas, November 1982, *Eggers 755* (BR); St. John, 11 November 1984, *Mori 17076* (BM). VENEZUELA. Bolívar: 28 February 1953, *Wurdack 34456* (K).

3. *Myrcia clavata* Sobral (2012: 36).

Type:—BRAZIL. Alagoas: União dos Palmares, Serra das Bananeiras, intact coastal rain forest (mata de encosta), 9°12.775' S, 35°52.480' W, 500–560 m, 3 November 2002, *Thomas et al. 13244* (holotype CEPEC, isotype NY-photo!). Figures 9 and 37.

Trees up to 30 m. **Twigs** flat, brown, glabrous or with scattered simple or dibrachiate brown, hialinous or grey trichomes to 0.3 mm when young; mature twigs flat, cortex exfoliating or not, glabrous; internode 20–60 mm long. **Leaves** sessile or with petioles sulcate, up to 3.5 mm, glabrous; blades elliptic or elliptic-ovate to elliptic-lanceolate, 9–15 × 5.5–8.5 cm, 1.5–3.2 times longer than wide, slightly discolorous when dry, apices obtuse to rounded, bases cordate or obtuse, margins revolute or not when dry, secondary vein 15–20 at each side, 6–11 mm apart, leaving the midvein at angles of 60°–75°, two marginal veins, the first one 2.5–4 mm and the second one ca. 1 mm from the margin, adaxial surface glabrous or uniformily covered with scattered trichomes, dull, midvein and secondary veins raised, tertiary veins conspicuous, gland dots conspicuous, 5–8/mm^2; abaxial surface glabrous or uniformily covered with scattered trichomes, midvein and secondary veins raised, tertiary veins conspicuous, gland dots conspicuous, 5–10/mm^2. **Inflorescences** terminal, paniculiform, pyramidal with opposite branching and dichasial subunits, main axis strongly flat, 80–150 × 1 –2.5 mm, glabrous or covered with trichomes, flowers sessile or with pedicels up to 3 mm; bracts elliptic to lanceolate, 5–10 × 3–5 mm, covered with simple or dibrachiate trichomes to 0.5 mm on both sides or only abaxially; bracteoles linear, ca. 1 × 0.3, glabrous, deciduous before anthesis. **Floral buds** clavate, 2.5–4.5 × 2.5–3 mm; flowers with hypanthium not tearing at anthesis, ca. 1 mm prolonged above the ovary, externally and internally glabrous; calyx 5-merous, lobes depressed ovate, 0.3–1 × 0.9–2 mm, <1 mm thick, unequal between them, apex rounded, externally glabrous, internally densely covered with simple brown trichomes to 0.1 mm; corolla 5-merous, petals 1.4–3 × 1.4–3 mm, white; floral disc 1.7–2 mm diam.; staminal ring glabrous, stamens 2.5–3.5 mm long, white, anthers eglandular or with an apical gland; ovary 3-locular, 2 ovules per locule, style not seen. **Fruits** globose, 8–10 × 8–10 mm, green when young, red when mature, crowned by the five calyx lobes; seed not seen.

Distribution and Habitat:—*Myrcia clavata* is endemic to the state of Alagoas, northeastern Brazil, and was registered in the municipalities of União dos Palmares, Murici, Matriz de Camaragibe and Ibateguara. This species occurs in coastal rainforests, at altiudes of 500–600 m.

Etymology:—the epithet is a reference to the clavate flower buds.

Phenology:—Flowers in October, November and March; fruits in March.

Conservation Assessment:—*Myrcia clavata* is a rare species known from five specimens collected in unprotected areas which are subject to anthropogenic action in coastal forests from the state of Alagoas. It has an Extent of Occurrence of ca. 552 km^2 and can be indicated as Endangered (EN) according to the criteria B1a, biii (IUCN 2012).

Comments:—*Myrcia clavata* is regonized by the large leaves, terminal and flat inflorescences subtended by large bracts and clavate buds. Leaves are sessile or with very short petioles usually seen only abaxially. Due to the leaf shape and size, this species is related to *Myrcia cordiformis*, but it is separated through the clavate buds (vs. turbinate in *M. cordiformis*) with five distinct and swollen calyx lobes (vs. indistinguishable or nearly so), and the obtuse to rounded leaf-tips (vs. acuminate). *Myrcia clavata* is limited to coastal forests from Alagoas, while *M. cordiformis* occurs in lowlands from Bahia.

Specimens examined:—BRAZIL. Alagoas: Ibateguara, Coimbra, 12 March 2003, *Oliveira 1319* (RB); Matriz de Camaragibe, 18 October 2003, *Lyra-Lemos 8034* (ESA);

Murici, Bananeiras, 16 March 2000, *Carvalho 7146* (CEPEC, HUEFS, RB); 18 November 2004, *Mendonça 273* (ESA).

4. *Myrcia cordiformis* Mattos (2009: 3). *Calyptromyrcia cordata* O. Berg in Martius (1857: 56), non *Myrcia cordata* Cambessèdes in Saint-Hilaire *et al.* (1832: 330). Figures 10 and 37.

TYPE:—BRAZIL. Bahia: in silvis ad urbem Cachoeira prov. Bahia, December 1818, *Martius s.n.* (holotype M [0136765]-photo!).

Myrcia neocordata E. Lucas & Sobral (2010: 55), nom. superfl.

Treelet to 3 m. **Twigs** flat, brown, glabrous or with scattered dibrachiate brown or hialinous trichomes 0.3–0.4 mm when young; mature twigs terete, cortex not exfoliating, glabrous; internode 30–80 mm long. **Leaves** sessile or with petioles semi-terete or slightly sulcate, up to 4 × 2 mm, glabrous or with scattered trichomes when young, glabrescent when mature; blades lanceolate or ovate-lanceolate, 8–18 × 4–7.5 cm, 2.5–4 times longer than wide, concolorous when dry, apices acuminate, bases cordate to rounded, margins not revolute when dry, secondary veins 20–23 at each side, 5–11 mm apart, leaving the midvein at angles of 80°–85°, two marginal veins, the first one 2.5–3 mm and the second one ca. 1 mm from the margin; adaxial surface glabrous or with scattered dibrachiate trichomes, dull, midvein and secondary veins raised, tertiary veins conspicuous, gland dots inconspicuous; abaxial surface glabrous or with scattered dibrachiate trichomes, midvein and secondary veins raised, tertiary veins conspicuous, gland dots inconspicuous. **Inflorescences** axillary or lateral, paniculiform with opposite branching and dichasial or single flower subunits, main axis strongly flat, 80–170 × 0.3–0.8 mm, glabrous, flowers sessile or with pedicels up to 5 mm; bracts not seen; bracteoles not seen. **Floral buds** turbinate, 2.5 × 1.3 mm; flowers with hypanthium partially tearing or not at anthesis, ca. 1 mm prolonged above the ovary, externally and internally glabrous; calyx lobes not distinguishable or tearing in irregular lobes at anthesis, externally glabrous, internally covered with simple brown trichomes to 0.1 mm; corolla not seen; floral disc 1.5–3 mm diam.; staminal ring glabrous, stamens 2–4 mm long, white, anthers eglandular; ovary 3-locular, 2 ovules per locule, stigma not seen. **Fruits** globose, ca. 12 × 12 mm, green when young, glabrous, crowned by the remnants of the irregular lobes; seed not seen.

Distribution and Habitat:—*Myrcia cordiformis* is endemic to the Atlantic rainforest of Bahia, Brazil, at altitudes of ca. 10 m. It was registered in the municipalities of Cachoeira, Una and Uruçuca.

Etymology:—the epithet alludes to the cordate leaf-base.

Phenology:—Flowers in December and January; fruits in April.

Conservation Assessment:—*Myrcia cordiformis* is known from a relatively well collected area under the serious environmental threat as the remainder of the Atlantic forests of Bahia. The species was registered in unprotected areas, with an Extent of Occurrence (EOO) of ca. 50 km^2. It can be categorized as Critically Endangered (CR), according to criteria B1a, biii (IUCN 2012).

Comments:—*Myrcia cordiformis* was until recently known only from the nineteenth century type collection, fact that may indicate its rareness. This species is characterized by the very short and poorly distinguishable or indistinguishable calyx lobes tearing in irregular lobes at the anthesis, long inflorescences, large leaves drying dark brown, usually sessile, with cordate bases and acuminate apices. Due to the short calyx lobes, the petal globe is very exposed in the floral buds. The fruits are crowned by very short remnants of the calyx.

Myrcia cordiformis is phylogenetically (Chapter 1) and morphologically closely related to *M. laxiflora*. They share the same calyx type (both were treated under the genera *Calyptromyrcia*, see “Taxonomic History” and “Morphology” sections) and leaf-venation. *Myrcia cordiformis* however, presents shorter or null petioles (vs. petioles >3.5 mm in *M. laxiflora*), cordate or rounded leaf-bases (vs. attenuate) and dibrachiate trichomes (vs. simple).

Myrcia cordiformis can also remind *M. clavata* due to the leaf shape and size. They are distinguished through the calyx, floral buds and leaf-tips morphology. See the notes on *Myrcia clavata*.

Specimens examined:—BRAZIL. Bahia: s.l., s.d., *Blanchet 3065* (BM); Una, 5 April 2012, *Staggemeier 762* (K); Uruçuca, 13 January 1999, *Jardim 1894* (RB).

5. *Myrcia cuprea* (O. Berg) Kiaerskou (1893: 95). *Aulomyrcia cuprea* O. Berg in Martius (1857: 77). Figures 11 and 38.

Type:—BRAZIL. In littore fluminis Amazonas prope Colares, May 1832, *Poeppig 2937* (lectotype W! [0033248], selected by McVaugh (1969); isolectotype F).

Myrcia chrysophylla (O. Berg) Mattos (2008: 4). *Aulomyrcia chrysophylla* O. Berg in Martius 1857: 125). Type:—BRAZIL. Pará: ad Capiri, juxta Pará, August 1849, *Spruce 445* (holotype M; isotypes BM!, CGE, K [2]!, P!, W!).

Trees, treelets or shrubs to 8 m. **Twigs** terete or slightly flat, brown, densely covered with simple copper coloured, rufous or golden trichomes 0.2–0.5 mm when young;

mature twigs terete, cortex not exfoliating, covered with trichomes turning grey to glabrescent; internode 12–35 mm long. **Leaves** with petioles semi-terete to sultate, 5–11.5 × 0.8–1.3 mm, densely covered with trichomes when young, glabrescent when mature; blades elliptic or elliptic-lanceolate, 6.4–9.1 × 1.8–4.2 cm, 1.5–3 times longer than wide, discolorous when dry, apices acuminate, bases acute to obtuse, margins revolute or not when dry, secondary veins 18–24 at each side, 3–4 mm apart, leaving the midvein at angles of 45°–55°, one marginal vein 0.5–1.2 from the margin; adaxial surface covered with trichomes, these denser on the midvein, dull, midvein raised or flat, secondary veins raised or flat, tertiary veins conspicuous, gland dots inconspicuous or not, 3–5/mm^2; abaxial surface densely covered with trichomes when young, turning grey with age, glabrescent when mature, midvein and secondary veins raised, tertiary veins conspicuous, gland dots conspicuous or inconspicuous, 3–5/mm^2. **Inflorescences** sub-terminal or terminal, paniculiform, pyramidal with opposite branching and dichasial subunits, the main axis flat or terete, 41–74 × 0.8–1.2 mm, densely covered with trichomes, flowers sessile or with pedicels up to 3 mm; bracts elliptic-lanceolate, 2–4 × 1–2 mm, densely covered with trichomes on both sides, deciduous before anthesis; bracteoles lanceolate or linear, ca. 1 × 0.5 mm, densely covered with trichomes on both sides, deciduous before anthesis. **Floral buds** globose to obovoid, 2.3–3.2 × 1.9–3 mm; flowers with hypanthium not tearing at anthesis, ca. 1 mm prolonged above the ovary, externally densely covered with trichomes, internally glabrous; calyx 5-merous, lobes depressed ovate, 0.9–1 × 1.5–1.7 mm, <1 mm thick, unequal between them, apices rounded to obtuse, externally and internally densely covered with trichomes; corolla 5-merous, petals ca. 3 × 3 mm, white; floral disc 1.2–2 mm in diam.; stamens 2.2–4.4 mm long, white, anthers eglandular; ovary 3-locular, with two ovules per locule, style 5–6 mm, stigma punctiform. **Fruits** globose, ca. 4 × 4 mm, green when young, turning yellow or dark when mature, moderately covered with trichomes or glabrescent, crowned by the five calyx lobes; one seed, testa smooth, brown, dull.

Distribution and Habitat:—*Myrcia cuprea* inhabits *restingas* and Amazonic *campinaranas* from northern Brazil. It grows exclusively in sandy soils, at altitudes of 0–100 m. This species has been widely registered in the Brazilian states of Amapá, Amazonas, Maranhão and Pará.

Etymology:—the epithet is a Latin word meaning ‘coppery’, allusive to the indument colour.

Phenology:—Flowers between April and November; fruits in March and between September and December.

Conservation Assessment:—*Myrcia cuprea* is widespread in northern Brazil, with a large Extent of Occurrence (EOO) of ca. 981,430 km^2. As such, this species can be considered as Least Concerned (LC) following IUCN criteria (2012).

Comments:—*Myrcia cuprea* is easily recognized through the consistently bright reddish to gold silky indumentum on young branches, leaves and inflorescences. These trichomes usually turn grey and fall with age, but some of them can be seen under lens even in mature specimens. The species always presents long petioles (5–11.5 mm) and elliptic or elliptic-lanceolate leaves with acuminate tips.

Selected specimens examined:—BRAZIL. Amapá: Macapá, 17 March 1962, *Mattos 9947* (SP); Porto Grande, 25 September 1999, *Ferreira 11656A* (INPA-photo). Amazonas: Manaus, March 1993, *Oliveira 1361* (SPF); Santa Isabel do Rio Negro, 16 August 1999, *Roosmalen 1201* (INPA-photo). Maranhão: Cururupu, August 1914, *Lisboa 56* (RB); Maracassumé, 31 August 1932, *Froes 1842* (BM); Pindaré Mirim, 6 October 1987, *Bohrer 69* (RB); Piritoró, 4 November 1965, *Prance 1956* (K); São Luis, 17 July 1992, *Muniz 141* (RB). Pará: Barbacena, 13 March 2002, *Silva 3499* (SP, SPF); Belém, 10 April 1967, *Pires 10521* (FLOR); Colares, 18 August 1913, *Ducke 12643* (RB); Guajará, 3 August 1964, *Irwin 5039* (K); Maracanã, 12 October 2012, *Staggemeier 861* (K, RB); 18 July 2011, *Giacomin 1584* (RB); Marapanim, 19 March 1965, *Silva 59723* (K, U); Oeiras do Pará, 17 August 2000, *Cid Ferreira 12085* (RB); Salvaterra, 7 February 1999, *Vasconcelos s.n.* (SP 336857); São João de Pirabas, 10 November 1976, *Prance 24233* (K); Tucuruí, 8 November 1980, *Lisboa 1489* (SPF).

6. *Myrcia gigas* McVaugh (1969: 88). Figures 12 and 38.

TYPE:—BRAZIL. Amapá: Rio Araguari, at mouth of Anicahy, above Camp 14, 8 October 1961, *Pires 51549* (holotype MICH-photo!; isotypes K!, NY-photo!, US-photo!, VEN-photo!). Figures 11, 15.

Trees or treelets to 20 m. **Twigs** strongly flat, brown to dark, covered with scattered simple brown trichomes to 0.1–0.4 mm or glabrous when young; mature twigs flat, cortex exfoliating, glabrous; internode 40–80 mm long. **Leaves** with petioles semi-terete to strongly sulcate, 7–15 × 1–2 mm, glabrous or sparsely covered with trichomes when young and mature; blades elliptic, 10–20 × 5.5–8 cm, 2–3 times longer than wide, concolorous when dry, apices acuminate to obtuse, bases acute to obtuse, margins not revolute when dry, secondary veins 14–20 at each side, 5–13 mm apart, leaving the midvein at angles of 65–80°, one or two marginal veins, the first one 2–4.2 mm and the second one 0.5–1 mm from the margin; adaxial surface glabrous or with scattered trichomes, these generally restricted to the leaf-base, slightly polished, midvein raised or flat, rarely sulcate, secondary veins flat or raised, tertiary veins conspicuous, gland dots conspicuous, 5–10/mm^2; abaxial surface glabrous or with scattered trichomes, these generally restricted to the leaf-base, midvein and secondary veins raised, tertiary veins conspicuous, gland dots conspicuous, 7–15/mm^2. **Inflorescences** axillary, lateral, sub-terminal or terminal, paniculiform, pyramidal with opposite or rarely alternate branching and dichasial or single flower subunits, main axis strongly flat, 80–220 × 1.4–2.2 mm, glabrous or with scattered trichomes, flowers sessile or with pedicels up to 3.5 mm; bracts not seen, deciduous before anthesis; bracteoles not seen, deciduous before anthesis. **Floral buds** turbinate, rarely obovate, 2.8–3.5 × 2–2.5 mm; flowers with hypanthium not tearing at anthesis, rarely partially tearing, ca. 1 mm prolonged above the ovary, externally with scattered trichomes to glabrous, internally glabrous; calyx 5-merous, lobes depressed ovate, 0.6–0.9 × 1–1.3 mm, <1 mm thick, unequal between them, apices rounded, externally glabrous, internally densely covered with light brown to rufous or whitish trichomes 0.3–0.5 mm; corolla 5-merous, petals 1.5 × 2 mm, white or yellowish; floral disc 2–3 mm diam.; staminal ring glabrous, stamens 2–6 mm long, white, anthers eglandular; ovary 3-locular, 2 ovules per locule, style 4–6 mm long, glabrous, stigma punctiform. **Fruits** globose, 6.5–12 × 6.5–12 mm, green when young, turning pink, red, purple or dark when mature, glabrous, crowned by the five calyx lobes or remnants of these; one seed, testa smooth, brown, dull.

Distribution and Habitat:—*Myrcia gigas* is found in upland moist forest from French Guiana to Amazonian Brazil and Bolivia, at altitudes between 100–400 m. In Brazil, the species occurs in the states of Amapá, Pará, Amazonas, Rondônia and Mato Grosso. This species is newly recorded from Bolivia and from the Brazilian states of Mato Grosso and Rondônia.

Etymology:—from the Greek ‘giga’ meaning ‘giant’, a reference to the large leaves and inflorescences.

Phenology—Flowers between July and October; fruits in May and between July and January.

Conservation Assessment:—*Myrcia gigas* is a widespread species known from many localities in the Amazon region. It has an Extent of Occurrence (EOO) >1,615,000 km^2 and can be considered as Least Concern (LC), according to IUCN criteria (2012).

Comments:—*Myrcia gigas* is distinguished by its long leaves (to 20 cm), petioles (to 1,5 cm) and inflorescences (to 22 cm). Some individuals can present accessory-branches on the first ramification of the inflorescences. *Myrcia gigas* presents the largest leaves and inflorescences among the Guianensis clade species occurring in the Amazon forest.

McVaugh (1969) suggests this to be a gigantic form of *M. guianensis*; however, the inflorescences of *M. gigas* have a tendency for regular branching quite different from the often irregular branching of *M. guianensis*. They can also be separated through the floral bud shape: turbinate in *M. gigas* and obovate in *M. guianensis*.

Selected specimens examined:—BOLIVIA. Beni: Vaca Diez, 25 September 1981, *Solomon* 6438 (U). BRAZIL. Amazonas: Boca do Curuquete, 9 July 1971, *Prance 14052* (K, U); Cachoeira Santo Antônio, 17 July 1971, *Prance 14401* (U); Manaus-Itacoatiara, 9 December 1996, *Sothers 950* (K, RB, SP). Mato Grosso: Cláudia, 13 July 1997, *Nave 1593* (ESA, SP); Colíder, 20 October 2014, *Sardelli 6-101* (RB); Feliz Natal, 3 November 2002, *Amorim Neto 3007* (INPA); Itaúba, 3 October 2014, *Zanin 11-73* (RB); Nova Canaã do Norte, 16 October 2014, *Antoniazzi 10-60* (RB). Pará: Belém, 14 August 1967, *Pires 10705* (FLOR). Rondônia: margem do Rio Urupá, 10 August 1975, *Cordeiro 511* (RB); Nova Mamoré, 10 May 2013, *Bigio 979* (RB). FRENCH GUIANA. Saül, La Fumée Mountain Trail, 5 January 1996, *Mori 24278* (SP); ca. 10 km NW from Eaux Claires, 14 August 1993, *Mori 23277* (SP).

7. *Myrcia glabra* (O. Berg) D. Legrand (1961: 298). *Aulomyrcia glabra* O. Berg in Martius (1857: 119). Figures 13 and 39.

Type:—BRAZIL. São Paulo: in fruticetis prov. S. Pauli, *Sellow s.n.* (holotype B†; lectotype BR! [0000002580605], selected by Lima *et al.* (in press.); isolectotypes F [fragm.]-photo!, K!, LE-photo!, P [2]!, W!).

Aulomyrcia acrantha O. Berg in Martius (1857: 71). Type:—BRAZIL: Rio Grande do Sul: ad ripas prope Santo-Antonio-da-Patrulha in prov. Rio Grande do Sul, *Sellow s.n.* (holotype B†). BRAZIL: Rio Grande do Sul: Porto Alegre, May 1899, *Reineck & Czermak 393* (neotype P! [05291402], designated by Lima *et al.* (in press.); isoneotype P! [05291403]).

Aulomyrcia laxiflora var. *latifolia* O. Berg in Martius (1857: 114). Type:—BRAZIL: São Paulo: prope villam Mogi das Cruzes in prov. S. Pauli, *Saint-Hilaire 654* (lectotype P! [00161408], selected by Lima *et al.* (in press.); isolectotype P!).

Myrcia citrifolia (Aubl.) D. Legrand (1961: 297), non (Aubl.) Urb. (Urban 1919: 150).

Trees or shrubs to 30 m. **Twigs** terete or flat, brown, glabrous or with very scattered simple brown trichomes to 0.3 mm when young; mature twigs terete, cortex not exfoliating, glabrous; internode 1.5–3.6 mm long. **Leaves** with petioles semi-terete or sulcate, 3–8 mm, glabrous; blades elliptic to oblong, 4–9 × 2–5.3 cm, 2–2.5 times longer than wide, concolorous or slightly discolorous when dry, apices obtuse to rounded, rarely acute or retuse, bases acute or attenuate, sometimes decurrent on the petiole, margins strongly revolute when dry, secondary vein 11–15 at each side, 3–7 mm apart, leaving the midvein at angles of 45°–50°, one or two marginal veins, the first one 1.5–2.5 mm and the second one ca. 1 mm from the margin; adaxial surface glabrous, polished, midvein raised, secondary veins raised or flat, tertiary veins conspicuous or not, gland dots conspicuous, 10–12/mm^2; abaxial surface glabrous or with scattered trichomes, midvein and secondary veins raised, tertiary veins conspicuous, gland dots conspicuous, 10–15/mm^2. **Inflorescences** sub-terminal or terminal, paniculiform, pyramidal with opposite branching and dichasial subunits, main axis strongly flat, 33–100 × 0.8 –2.1 mm, glabrous, flowers sessile or with pedicels up to 3 mm; bracts not seen; bracteoles lanceolate, ca. 1.5 × 0.9, glabrous, deciduous before anthesis. **Floral buds** globose, 2.5–3 × 2.5–2.8 mm; flowers with hypanthium not tearing at anthesis, ca. 0.3 mm prolongued above the ovary, externally and internally glabrous; calyx 5-merous, lobes depressed ovate, 0.7–0.9 × 1.5–1.7 mm, <1 mm thick, unequal between them, apices rounded, externally glabrous, internally densely covered with simple brown trichomes 0.1–0.2 mm; corolla 5-merous, petals 2.7 × 2.5 mm, white; floral disc 1.7–2 mm diam.; staminal ring glabrous, stamens 2–4.2 mm long, white, anthers eglandular; ovary 3-locular, 2 ovules per locule, style 6–7 mm long, glabrous, stigma punctiform. **Fruits** globose, 3.5–6.5 × 3.5–6.5 mm, green when young, red to dark when mature, crowned by the five calyx lobes; two seeds, teste smoth, dark brown, dull.

Distribution and Habitat:—*Myrcia glabra* is restricted to the Atlantic forests from southern and southeastern Brazil. It occurs from Rio de Janeiro to Rio Grande do Sul, in *restingas* and dense forest with altitude ranging between 5–600 m. This species is newly recorded from Rio de Janeiro.

Etymology:—the epithet is a reference to the absence of trichomes.

Phenology—Flowers in September and between February and May; fruits between June and October.

Conservation Assessment:—*Myrcia glabra* is widespread in southern and southeastern Brazil with an Extent of Occurrence (EOO) >194,400 km^2. Several of the available collections of *M. glabra* are from inside protected areas. This species can be assessed as Least Concerned (LC) following IUCN criteria (2012).

Comments:—*Myrcia glabra* is a tree or shrub easily recognized by the smooth brown and usually thicker young twigs, nearly to completely glabrous; leaves, inflorescences and flowers are also glabrous, except the interior of the calyx lobes. Some individuals, mainly from Rio Grande do Sul, can present very scattered trichomes on the branches and leaves, representing the morphotype of the synonym *Aulomyrcia acrantha* (see Chapter 2 for further details). Leaf margins are strongly revolute in dried specimens and the sub-terminal or terminal inflorescences are multiflorous with more than 30 small flowers. The hypanthium of *M. glabra* is shallower (ca. 0.3 mm) than the usual in the Guianensis clade (> 0.5 mm).

Legrand (1961) created the later isonym *Myrcia citrifolia* (Aubl.) D.Legrand and named many specimens from southern Brazil as such. These specimens are morphologically quite distinguishable from *Myrcia citrifolia* (Aubl.) Urb. from Caribbean and northern South America. In 1969, Legrand synonymized his *Myrcia citrifolia* (Aubl.) D.Legrand under *Myrcia glabra*, but many collections remained bearing the name *M. citrifolia* in herbaria. Likely due to the name misapplication, Kawasaki (2000) also identified collections from São Paulo as *M. citrifolia*. Indeed, all those gatherings match perfectly *M. glabra* and are here considered as such. See also the notes on *Myrcia citrifolia*.

Myrcia glabra can remind *M. obovata* or the widespread *M. guianensis*. The two latter however, never present smooth and thicker twigs as the former. *Myrcia obovata* has obovate leaves and occurs only in *cerrado* domain, while *M. glabra* has elliptic leaves and occurs in Atlantic forest. In turn, *Myrcia guianensis* has smaller leaves compared to *M. glabra*, when occurring in the Atlantic forest.

Selected specimens examined:—BRAZIL. Paraná: Antonina, 8 March 1968, *Hatschbach 18674* (C, MBM); Guaraqueçaba, 20 March 2010, *Snak 375* (UPCB); Guaratuba, 21 March 1964, *Hatschbach 11131* (MBM, UPCB); Paranaguá, 25 April 1987, *Britez 7450* (UPCB). Rio de Janeiro: Lídice, 18 August 1998, *Cunha s.n.* (ESA 87058). Rio Grande do Sul: Capão do Leão, 28 April 1987, *Jarenkow 710* (UEC); Itapuã, 23 May 1983, *Sobral* 2060 (UEC); Osório, 4 March 1983, *Sobral 1512* (UB); Pelotas, 27 May 1959, *Costa 1291* (HBR); São Leopoldo, March 1941, *Leite 1694* (U); Tramandaí, 6 March 1950, *Rambo 46116* (BR, HBR, W); Viamão, 1954, *Mattos 3372* (HBR). Santa Catarina: Blumenau, 23 April 1953, *Reitz 552* (UPCB); Brusque, 8 April 1953, *Reitz 491* (HBR); Florianópolis, 19 April 1967, *Klein 7365* (FLOR, HBR); Garuva, 3 October 1957, *Reitz 4928* (HBR); Ibirama, 1 March 1954, *Reitz 1579* (HBR); Itajaí, 17 April 1954, *Klein 708* (HBR); Orleans, 13 March 1992, *Zanette 1388* (UPCB); Palhoça, 12 March 1953, *Reitz 352* (UPCB); Paulo Lopes, 9 May 1973, *Bresolin 723* (FLOR, HBR); São Pedro de Alcântara, 30 August 1994, *Reis 2358* (FLOR, UPCB); Sombrio, 8 May 1945, *Reitz 1042* (HBR). São Paulo: Barra do Turvo, 10 May 1983, *Hatschbach 46281* (C, MBM); Iguape, 24 June 1992, *Lohmann 37* (SPF, SP, UPCB); Mogi das Cruzes, 13 April 1999, *Nicolau 2292* (SP, UPCB); Sete Barras, 13 February 1995, *Leitão-Filho 33422* (UEC).

8. *Myrcia guianensis* (Aubl.) De Candolle (1828: 245). *Eugenia guianensis* Aublet (1775: 506). *Myrtus guianensis* (Aubl.) Hamilton (1825: 45). *Aguava guianensis* (Aubl.) Rafinesque (1838: 107). Figures 14, 15 and 40.

Type:—GUYANA. *Aublet s.n.* (holotype BM! [000953654]; isotype LINN-photo!).

Myrtus pyrifolia J. Saint-Hilaire in Duhamel (1803: 208). Type:—FRENCH GUIANA: Cayenne, 1792, *Leblond s.n.* (lectotype P, selected by McVaugh (1969); isolectotypes G-2!).

Myrcia cassinioides De Candolle (1828: 249). *Aulomyrcia cassinioides* (DC.) O. Berg in Martius (1857: 129). *Aulomyrcia cassiniodes* var. *velutina* O. Berg in Martius (1857: 129). Type:—BRAZIL. Minas Gerais: prov. Minarum, *Martius s.n.* (holotype M-photo! [0136768]; isotype G-DC!).

Myrcia daphnoides De Candolle (1828: 246). *Aulomyrcia daphnoides* (DC.) O. Berg (1857: 132). Type:—BRAZIL. Prope Camapuao (Camabuao), *Martius s.n.* (holotype M-photo! [0136879]; isotype G-DC!).

Myrcia elaeodendra De Candolle (1828: 250). *Aulomyrcia elaeodendra* (DC.) O. Berg (1855: 75). Type:—BRAZIL. Ad Vao de Paranan, in Tabuleiro et Catingas, *Martius s.n.* (holotype M-photo! [0136869]; isotype G-DC!).

Myrcia elegans De Candolle (1828: 251). *Calyptromyrcia elegans* (DC.) O. Berg (1855: 34). *Myrcianthes elegans* (DC.) Mattos (2009: 2). Type:—BRAZIL. Pará: prov. Paraensi, *Martius s.n.* (lectotype M-photo! [0136868], selected by Lima *et al.* (in press.); isolectotype M-photo! [0136867]).

Myrcia exsucca De Candolle (1828: 247). *Aulomyrcia exsucca* (DC.) O. Berg (1855: 79). *Myrcia queimadensis* Mattos (2006: 4), nom. superfl. Type:—BRAZIL. Minas Gerais: campestribus desertis prov. Minarum, *Martius s.n.* (lectotype M-photo! [0136858], selected by Lima *et al.* (in press.); isolectotypes G-DC!, M-photo! [0136859]).

Myrcia lauriflora De Candolle (1828: 252). *Aulomyrcia lauriflora* (DC.) O. Berg (1855: 64). Type:—BRAZIL. Pará, *Martius s.n.* (lectotype M-photo! [0136962], selected by Lima *et al.* (in press.); isolectotypes G-DC!, M [2]-photo!).

Myrcia leucadendron De Candolle (1828: 251). *Aulomyrcia leucadendron* (DC.) O. Berg in Martius (1857: 115). Type:—BRAZIL. São Paulo: prov. S. Paulo, Serra do Mar, *Martius s.n.* (lectotype M-photo! [0136958], selected by Lima *et al.* (in press.); isolectotypes M [2]-photo!).

Myrcia myoporina De Candolle (1828: 246). *Aulomyrcia glandulosa* var. *obovata* O. Berg in Martius (1857: 139), nom. illeg. *Myrcia glandulosa* var. *obovata* (O. Berg) N. Silveira (1985a: 67), nom. illeg. Type:—BRAZIL. Brasilia, *Martius s.n.*, p.p. (lectotype W-Rchb.! [1889-0342000], selected by Lima *et al.* (in press.); isolectotypes P!).

Myrcia pallens De Candolle (1828: 252). *Aulomyrcia pallens* O. Berg in Martius (1857: 122). *Aulomyrcia pallens* var. *ovalis* O. Berg in Martius (1857: 122). *Myrcia pallens* var. *ovalis* (O. Berg) Kiaerskou (1893: 83). Type:—BRAZIL. Minas Gerais: interioribus prov. Minarum, *Martius s.n.* (holotype M-photo! [0136917]; isotype G-DC!).

Myrcia schrankiana De Candolle (1828: 247). *Aulomyrcia schrankiana* O. Berg (1855: 79). *Myrcia andaiaensis* Mattos (2008: 3), nom. superfl. Type:—BRAZIL. Minas Gerais: desertis prov. Minarum, *Martius s.n.* (holotype M-photo! [0137028]; isotype G-DC!).

Myrcia spixiana De Candolle (1828: 251). *Calyptromyrcia spixiana* (DC.) O. Berg (1855: 35). *Myrcianthes spixiana* (DC.) Mattos (2009: 2). Type:—BRAZIL. Ad flumen Amazonum, *Martius s.n.* (holotype M-photo! [0137015]; isotype G-DC!).

Myrcia torta De Candolle (1828: 250). *Aulomyrcia torta* (DC.) O. Berg (1855: 78). Type:—BRAZIL. Minas Gerais: prov. Minarum, Monte Serra Branca, *Martius s.n.* (holotype M-photo! [0136986]; isotype G-DC!).

Myrcia crassicaulis Cambessèdes in Saint-Hilaire *et al.* (1832: 311). *Aulomyrcia crassicaulis* (Cambess.) O. Berg (1855: 74). Type:—BRAZIL. Minas Gerais: in campis prope pagum Curaçao de Jesus in parte accidentali desertaque, *Saint-Hilaire 1944* (lectotype MPU-photo! [011015], selected by Lima *et al.* (in press.); isolectotypes F [fragm.]-photo!, P! [2]).

Myrcia hiemalis Cambessèdes in Saint-Hilaire *et al.* (1832: 332). Type:—BRAZIL. Minas Gerais: in campis prope praedium S. Bento in parte deserta occidentalisque, *Saint-Hilaire 1935* (lectotype P! [00161436], selected by Lima *et al.* (in press.); isolectotypes F [fragm.] -photo!, MPU-photo!, P! [00161437]).

Myrcia microcarpa Cambessèdes in Saint-Hilaire *et al.* (1832: 324). *Aulomyrcia microcarpa* (Cambess.) O. Berg in Martius (1857: 81). Type:—BRAZIL. São Paulo: in campis prope Capivarhy, *Saint-Hilaire 1336* (lectotype P! [00161401], selected by Lima *et al.* (in press.); isolectotypes F [fragm.]-photo!, MPU-photo!, P [2]!).

Myrcia suaveolens Cambessèdes in Saint-Hilaire *et al.* (1832: 315). *Aulomyrcia suaveolens* (Cambess.) O. Berg (1855: 78). Type:—BRAZIL. Prov. Minas Geraes et Goyaz, in campis, *Saint-Hilaire 908* (lectotype MPU-photo! [010967], selected by Lima *et al.* (in press.); isolectotypes F [fragm.]-photo!, P [5]!).

Myrcia obtusa Schauer (1848: 273). *Aulomyrcia obtusa* (Schauer) O. Berg (1855: 66). *Aulomyrcia obtusa* var. *tenuifolia* O. Berg (1855: 67). Type:—SURINAME. In arenosis prope Mariepasion Guianao, *Kegel 1308* (holotype GOET-photo! [008250]).

Myrcia alternifolia Miquel (1849: 534). *Aulomyrcia alternifolia* (Miq.) O. Berg in Martius (1857: 121). *Myrcia obtecta* var. *alternifolia* (O. Berg) D. Legrand (1969: 283). Type:—BRAZIL. Minas Gerais: Caldas, *Regnell 139* (holotype U! [0005131]; isotypes P [3]!, SP-photo!).

Myrcia surinamensis Miquel (1849: 170). *Aulomyrcia surinamensis* (Miq.) O. Berg (1855: 64). *Aulomyrcia obtusa* var. *surinamensis* (Miq.) Amshoff (1942: 154). Type:—SURINAME. In silvis prope Bergendaal, *Focke 1152* (holotype U! [0005133]; isotypes HAL-photo!, K!).

Aulomyrcia conduplicata O. Berg (1855: 76). Type:—GUYANA. In savannis, *Schomburgk 393* (holotype B†). British Guiana, Basin of Rupununi River, Yupukari, lat. about 3°40' N, 15 Oct. 1937, Smith 2274 (neotype K! [000343168], selected by Lima *et al.* (in press.)).

Aulomyrcia cuneata O. Berg (1855: 72). *Myrcia cuneata* (O. Berg) Niedenzu in Engler & Prantl (1895: 76). *Myrcia guianensis* var. *cuneata* McVaugh (1969: 93). Type:—VENEZUELA. Coloniam Tovar, in regione alpine, 1852, *Moritz 1745* (holotype B†; lectotype BM! [000953659], designated by McVaugh (1969); isolectotypes P!, W!).

Aulomyrcia dichroma O. Berg. (1855: 65). Type:—GUYANA. Ad ripas fluminis Moracca, *Schomburgk 1491* (holotype B†; lectotype LE-photo! [00007052], selected by Lima *et al.* (in press.)).

Aulomyrcia obtusa var. *grandifolia* O. Berg (1855: 66). Type:—SURINAME. Guiana Batava, in umbrosis, May 1838, *Splitgerber s.n.* (holotype W! [0032516]).

Aulomyrcia obtusa var. *pauciflora* O. Berg (1855: 67). Type:—SURINAME. In arenosis prope Mariepasion Guianao, *Kegel s.n.* (lectotype GOET-photo! [008249], selected by Lima *et al.* (in press.)).

Aulomyrcia obtusa var. *panicularis* O. Berg (1855: 67). Type:—SURINAME. In arenosis prope Mariepasion Guianao, *Kegel s.n.* (lectotype GOET-photo! [008251], selected by Lima *et al.* (in press.)).

Aulomyrcia obtusa var. *longipes* O. Berg (1855: 67). Type:—SURINAME. In arenosis prope Mariepasion Guianao, *Kegel s.n.* (lectotype GOET-photo! [008252], selected by Lima *et al.* (in press.)).

Aulomyrcia roraimensis O. Berg (1855: 68). *Myrcia roraimensis* (O. Berg) D. Legrand (1967: 151). Type:—GUYANA. Roraima, 1843, *Schomburgk 737* (lectotype W! [0033311], selected by McVaugh (1969); isolectotypes BM!, G!, K!, MICH-photo!, P [3]!).

Aulomyrcia schomburgkiana O. Berg (1855: 75). *Myrcia obtusa* var. *schomburgkiana* (O. Berg) Amshoff (1951: 79). Type:—GUYANA. Roraima, 1843, *Schomburgk 701* (lectotype W! [0033312], selected by McVaugh (1969); isolectotypes BM!, K!, MICH-photo!, P [2]!).

Aulomyrcia alagoensis O. Berg in Martius (1857: 120). *Myrcia vattimoi* Mattos (2008: 1). Type:—BRAZIL. Alagoas, March 1838, *Gardner 1299* (holotype W! [0028188]; isotypes F [fragm.]-photo!, K [2]!, P!).

Aulomyrcia angustifolia O. Berg in Martius (1857: 135). *Myrcia angustifolia* (O. Berg) Niedenzu in Engler & Prantl (1893: 76), non Glaziou (1908: 210), nom. illeg. Type:—BRAZIL. Minas Gerais: prov. Minarum, prope S. João del Rey, ad montes Serra do Lenheiro, *Sellow s.n.* (holotype B†; lectotype K! [000342611], selected by Lima *et al.* (in press.); isolectotypes BR!, LE-photo!, P [2]!, W!).

Aulomyrcia biformis O. Berg in Martius (1857: 141). Type:—BRAZIL. Minas Gerais: in montibus Serra de Itambé prov. Minarum, *Pohl s.n.* (holotype BR! [no barcode]).

Aulomyrcia bimarginata O. Berg in Martius (1857: 115). Type:—BRAZIL. Minas Gerais: ad Piedade prov. Minarum, *Pohl 1031* (lectotype W! [0032578], selected by Lima *et al.* (in press.); isolectotypes F-photo!, K [2]!, W!].

Aulomyrcia botrys O. Berg in Martius (1857: 116). *Myrcia botrys* (O. Berg) N. Silveira (1987: 1). Type:—BRAZIL. Brasilia, *Buek s.n.* (holotype HAL-photo! [0089799]).

Aulomyrcia cassinioides var. *glabrata* O. Berg in Martius (1857: 129). Type:—BRAZIL. Minas Gerais: prov. Minarum, ad flumen Rio S. Francisci, *Martius s.n.* (lectotype M-photo! [0136770], selected by Lima *et al.* (in press.); isolectotype M-photo!).

Aulomyrcia clausseniana O. Berg in Martius (1857: 118). Type:—BRAZIL. Rio de Janeiro: in M. Serra de Tinguá, *Schott 1032* (lectotype W! [0032558], selected by Lima *et al.* (in press.); isolectotypes F [fragm.]-photo!, K [2]!, W!).

Aulomyrcia decrescens O. Berg in Martius (1857: 135). *Myrcia decrescens* (O. Berg) Mattos (2008: 4). Type:—BRAZIL. Minas Gerais: prov. Minarum, Rio Preto et Caldas do Rey Ronaldo, *Pohl 2003* (lectotype W! [0032618], selected by Lima *et al.* (in press.); isolectotype F [fragm.]-photo!, W!).

Aulomyrcia emarginata O. Berg in Martius (1857: 134). *Myrcia emarginata* (O. Berg) Niedenzu in Engler & Prantl (1895: 76). Type:—BRAZIL. Brasilia, *Anonymous collector s.n.* (holotype W! [0032548]).

Aulomyrcia fragilis O. Berg in Martius (1857: 117). Type:—BRAZIL. Bahia: prov. Bahiensis, urbem Jacobina, *Blanchet 3587* (lecotype LE-photo! [00007063], selected by Lima *et al.* (in press.); isolectotypes BM [2]!, BR!, F-photo!, G [2]!, K!, MICH-photo!, NY [2]-photo!, P [6]!, U!, W [2]!).

Aulomyrcia gardneriana O. Berg in Martius (1857: 129), non *Myrcia gardneriana* O. Berg in Martius (1857: 184). *Aulomyrcia gardneriana* var. *virescens* O. Berg in Martius (1857: 130). *Myrcia renatoana* (O. Berg) Mattos (1966: 62). Type:—BRAZIL. Prov. Ceará et Piauhi, *Gardner 1625* (lectotype W! [0032530], selected by Lima *et al.* (in press.); isolectotypes BM!, BR!, F [2]-photo!, G!, GH-photo!, K [2]!, MICH-photo!, NY-photo!, P [2]!, S-photo!, W [2]!).

Aulomyrcia gardneriana var. *caerulescens* O. Berg in Martius (1857: 130). Type:—BRAZIL. Prov. Ceará et Piauhi, *Gardner 1621* (lectotype W! [0032529], selected by Lima *et al.* (in press.); isolectotypes F [2]-photo!, G [2]!, GH-photo!, NY-photo!, P [3]!, S-photo!, US-photo!, W-Rich!).

Aulomyrcia glandulosa O. Berg in Martius (1857: 139). *Aulomyrcia glandulosa* var. *elliptica* O. Berg in Martius (1857: 139). *Myrcia glandulosa* (O. Berg) Kiaerskou (1893: 83). Type:—BRAZIL. Minas Gerais: prov. Minarum, Morro da Tapanhoacanga, *Sellow s.n.* (lectotype K! [000343097], selected by Lima *et al.* (in press.); isolectotypes LE-photo!, P!).

Aulomyrcia glandulosa var. *longifolia* O. Berg in Martius (1857: 139). Type:—BRAZIL. Minas Gerais: prov. Minarum, Montes Claros, S. Luzia, Meiaponte, *Pohl 5764* (lectotype W! [0032600], selected by Lima *et al.* (in press.)).

Aulomyrcia hepatica O. Berg in Martius (1857: 132). *Myrcia hepatica* (O. Berg) Kiaerskou (1893: 86). Type:—BRAZIL. Minas Gerais: prov. Minarum, ad villam do Presidio de S. João Baptista, 1837, *Pohl 1074* (lectotype W! [0032526], selected by Lima *et al.* (in press.); isolectotypes F-photo!, K [2]!, W!).

Aulomyrcia jequitinhonhensis O. Berg in Martius (1857: 137). *Aulomyrcia jequitinhonhensis* var. *parvifolia* O. Berg in Martius (1859: 559). *Myrcia torta* var.

jequitinhonhensis (O. Berg) Kiaerksou (1893: 79). Type:—BRAZIL. Minas Gerais: prov. Minarum, ad praesidium S. Miguel da Jequitinhonha. Pohl 5774 (holotype W! [0032483]).

Aulomyrcia lingua O. Berg in Martius (1857: 130). *Aulomyrcia lingua* var. *glabrata* O. Berg in Martius (1857: 130). Type:—BRAZIL. Minas Gerais: in campis ad Colonel Gerealdo in prov. Minarum, *Sellow s.n.* (holotype B†). BRAZIL. Minas Gerais, Jardim, 13 Nov. 1845, *Widgren* 795 (neotype BR! [no barcode], selected by Lima *et al.* (in press.)).

Aulomyrcia lingua var. *rufa* O. Berg in Martius (1857: 130). Type:—BRAZIL. Minas Gerais: in prov. Minarum, *Widgreen 555* (holotype S-photo! [no barcode]; isotypes C!, SP-photo!).

Aulomyrcia mansoni O. Berg in Martius (1857: 121). *Myrcia mansoni* (O. Berg) N. Silveira (1985b: 1). Type:—BRAZIL. Mato Grosso: prope urbem Cuyabá in prov. Matto Grosso, *Manso & Lhotzki 46* (holotype B†; lectotype HAL-photo! [0089700], selected by Lima *et al.* (in press.); isolectotype G!).

Aulomyrcia martiana O. Berg in Martius (1857: 138), non *Myrcia martiana* O. Berg in Martius (1857: 159). Type:—BRAZIL. Bahia: prov. Bahiensis, *Martius s.n.* (holotype M).

Aulomyrcia nigropunctata O. Berg in Martius (1857: 116). *Myrcia nigropunctata* (O. Berg) N. Silveira (1895: 1). Type:—BRAZIL. Rio de Janeiro: prope Fazenda Lopez, *Pohl 1029* (lectotype W! [0032474], selected by Lima *et al.* (in press.); isolectotype W!).

Aulomyrcia obscura O. Berg in Martius (1857: 132). *Myrcia obscura* (O. Berg) N. Silveira (1985a: 66). Type:—BRAZIL. Brasilia meridionali, *Sellow s.n.* (holotype B†).

BRAZIL, s.d., Claussen 163A (neotype BR! [no barcode], selected by Lima *et al.* (in press.)).

Aulomyrcia obtecta O. Berg in Martius (1857: 117). *Myrcia obtecta* (O. Berg) Kiaerskou (1893: 89). Type:—BRAZIL. São Paulo: prov. S. Pauli, in campis et fruticetis ripariis, *Sellow s.n.* (holotype B†; lectotype BR! [0000005236961], selected by Lima *et al.* (in press.)).

Aulomyrcia pallens var. *ovata* O. Berg in Martius (1857: 123). Type:—BRAZIL. Minas Gerais: prov. Minarum, *Martius s.n.* (holotype M-photo! [0136916]).

Aulomyrcia plumbea O. Berg in Martius (1857: 142). *Myrcia plumbea* (O. Berg) Mattos (2008: 4). Type:—BRAZIL. Minas Gerais, *Pohl 1085* (lectotype W! [0037137], selected by Lima *et al.* (in press.); isolectotypes BR!, F-photo!, K [2]!, W [2]!).

Aulomyrcia poeppigiana O. Berg in Martius (1857: 123). *Myrcia poeppigiana* (O. Berg) Hieronymus (1865: 65), nom. illeg., non O. Berg in Martius (1857: 157). Type:—BRAZIL. Amazonas: prov. do alto Amazonas, silvis densis ad urbem Ega, 1831, *Poeppig 2834* (lectotype MICH-photo!, selected by McVaugh (1969); isolectotypes F [2 fragm.]-photo!, G!, P-2!, W [3]!, W-Rich!).

Aulomyrcia pruinosa O. Berg in Martius (1857: 114). Type:—BRAZIL. Pará: prov. Paraensis, in vicinia urbis Santarém, Nov. 1849, *Spruce s.n.* (holotype M-photo! [0136899]; isotypes BM!, K [2]!, P!, W-Rchb.!).

Aulomyrcia pusilla O. Berg in Martius (1857: 140). *Myrcia pusilla* (O. Berg) Mattos (2008: 2). Type:—BRAZIL. Minas Gerais: prov. Minarum, inter Rio Jequetahi et Munda Fonza, *Pohl 1084* (lectotype W! [0027991], selected by Lima *et al.* (in press.); isolectotypes F-photo!, K!, W!).

Aulomyrcia scrobiculata O. Berg in Martius (1857: 137), non *Myrcia scrobiculata* O. Berg (1861: 668). Type:—BRAZIL. Rio Grande do Sul: in campis, *Sellow s.n.* (lectotype K!, selected by Sobral *et al.* [2010]).

Aulomyrcia suffruticosa O. Berg in Martius (1857: 136), non *Myrcia suffruticosa* O. Berg (1857: 189). *Myrcia paracatuensis* Kiaerskou (1893: 99). Type:—BRAZIL. Goiás: ad montem Serra dos Cristaes in prov. Goyaz, *Pohl 817* (holotype W! [0040179]).

Aulomyrcia vacciniifolia O. Berg in Martius (1857: 140). *Myrcia vacciniifolia* (O. Berg) Niedenzu in Engler & Prantl (1893: 76). Type:—BRAZIL. Minas Gerais: prov. Minarum, in montibus Serra de Itambé, *Martius s.n.* (holotype M-photo! [0136984]).

Aulomyrcia uaupensis O. Berg in Martius (1858: 518). Type:—BRAZIL. Amazonas: prov. do Alto Amazonas, prope Panure, ad Rio Uaupes, Oct. 1852 – Jan. 1853, *Spruce 2703* (holotype BR! [0000005269945]; isotypes K [2]!, P!).

Aulomyrcia bracteata O. Berg in Martius (1859: 554). *Myrcia didrichseniana* Kiaerskou (1893: 82). Type:—BRAZIL. Rio de Janeiro: in collibus siccis prope S. Domingo, Feb. 1822, *Riedel 749* (lectotype LE-photo! [00007028], selected by Lima *et al.* (in press.); isolectotypes F [2 fragm.]-photo!, G-2!, K!, LE [3]-photo!, M-photo!, P [2]!, S-photo!, U!, W!).

Aulomyrcia cymosa O. Berg in Martius (1859: 552). *Myrcia cymosa* (O. Berg) Niedenzu in Engler & Prantl (1893: 76), non (O. Berg) Niedenzu in Engler & Prantl 1893: 76), nom. illeg. [= *Calyptromyrcia cymosa*]. Type:—BRAZIL. Minas Gerais: prov. Minarum, ad ripam rivulorum in montibus Serra da Lapa, Nov. 1824, *Riedel 973* (lectotype LE-photo! [00007045], selected by Lima *et al.* (in press.); isolectotypes F [fragm.]-photo!, G!, GH-photo!, K!, LE [2]-photo!, NY-photo!, P [3]!, U!, W!).

Aulomyrcia desertorum O. Berg in Martius (1859: 556). *Myrcia desertorum* (O. Berg) N. Silveira (1985: 1). Type:—BRAZIL. Minas Gerais: in deserto inter Alegres et Andrequecé prov. Minarum, Sep. 1834, *Riedel 2575* (lectotype LE-photo! [00007049], selected by Lima *et al.* (in press.); isolectotype G!, LE-photo!).

Aulomyrcia jequitinhonhensis var. *glauca* O. Berg in Martius (1859: 560). Type:—BRAZIL. Minas Gerais: prov. Minarum, in campis siccis prope S. Luzia, Oct. 1824, *Riedel s.n.* (lectotype LE-photo! [0007077], selected by Lima *et al.* (in press.)).

Aulomyrcia jequitinhonhensis var. *grandifolia* O. Berg in Martius (1859: 559). Type:—BRAZIL. Goiás: prov. Goyazensis, in campis graminosis arenosisque super Chapada de S. Marcos, *Riedel s.n.* (holotype LE).

Aulomyrcia maritima O. Berg in Martius (1859: 553). Type:—BRAZIL. Rio de Janeiro: in silvaticis arenosis maritimis, Oct. 1832, *Riedel 1019* (lectotype LE [00007096], selected by Lima *et al.* (in press.); isolectotypes F [fragm.]-photo!, G!, K!, LE-photo!, P [2]!, U!).

Aulomyrcia obscura var. *genuina* O. Berg in Martius (1859: 556). Type:—BRAZIL. Minas Gerais: prov. Minarum, in silvis prope Barra do Jequitiba, *Riedel 828* (lectotype LE-photo! [00007105], selected by Lima *et al.* (in press.); isolectotypes G!, K!, LE-photo!, P [2]!, U!).

Aulomyrcia obscura var. *longipes* O. Berg in Martius (1859: 556). *Myrcia obscura* var. *longipes* (O. Berg) N. Silveira (1985: 66). Type:—BRAZIL. Minas Gerais: prov. Minarum, in collibus siccis umbrosis prope Caetité, Oct. 1824, *Riedel 617* (lectotype LE-photo! [00007008], selected by Lima *et al.* (in press.); LE [2]-photo!, P!).

Aulomyrcia pallens var. *subcordata* O. Berg in Martius (1859: 553). *Myrcia pallens* var. *subcordata* (O. Berg) Kiaerskou (1893: 83). Type:—BRAZIL. Minas Gerais: prov.

Minarum, in campis editis siccisque prope Alegres, *Riedel 2584* (holotype LE; isotypes K!, P [2]!, U!).

Aulomyrcia regeliana O. Berg in Martius (1859: 557). *Aulomyrcia regeliana* var. *oppositifolia* O. Berg in Martius (1859: 557). *Myrcia camapuana* Mattos (2006: 2). Type:—BRAZIL. Mato Grosso do Sul: in campis arenosis prope Camapuan, prov. Mato Grosso, Oct. 1826, *Riedel 634* (lectotype LE-photo! [no barcode], selected by Lima *et al.* (in press.)).

Aulomyrcia regeliana var. *sparsifolia* O. Berg in Martius (1859: 557). Type:—BRAZIL. Mato Grosso do Sul: in campis arenosis prope Camapuan, prov. Mato Grosso, Oct. 1826, *Riedel 634* (lectotype LE-photo! [no barcode], selected by Lima *et al.* (in press.)).

Aulomyrcia velhensis O. Berg in Martius (1859: 560). *Myrcia velhensis* (O. Berg) N. Silveira (1987: 1). *Myrcia velhensis* (O. Berg) Mattos (2009: 4), nom. superfl. Type:—BRAZIL. Goiás: prov. Goyazensis, in campis inter Rio das Velhas et Parnahyba, Aug. 1834, *Riedel 2458* (holotype LE; isotypes F [fragm.]-photo!, GH, K!, MICH-photo!, P [3]!, S-photo!, U!, W!).

Aulomyrcia androsaemoides O. Berg (1861: 661). *Myrcia androsaemoides* (O. Berg) Krug & Urban (1895: 579). Type:—FRENCH GUIANA. Insula Cayenne, *Richard s.n.* (lectotype P! [00163123], selected by Lima *et al.* (in press.); isolectotype P!).

Aulomyrcia buxizans O. Berg (1861: 664). Type:—BRAZIL. GUYANA. Guyanae Gallicae, in ripis inundatis fluvii Kourou, *Richard 50* (lectotype P! [00163121], selected by Lima *et al.* (in press.); isolectotypes F [2 fragm.]-photo!, P!).

Myrcia roraimae Oliver in Thurn (1886: 192). *Aulomyrcia roraimae* (Oliv.) Steyermark (1957: 1007). Type:—GUYANA. Roraima, 3500 ft., 3 Dec. 1884, *Thurn 74* (holotype K!; isotype BM!, US-photo!).

Myrcia adpressepilosa Kiaerksou (1893: 75). Type:—BRAZIL. Rio de Janeiro: Morro do Corcovado, 10 Dec. 1877, *Glaziou 10834* (holotype C!; isotypes K!, P!).

Myrcia cymosopaniculata Kiaerksou (1893: 90). Type:—BRAZIL. Rio de Janeiro: Corcovado, 26 Sep. 1880, *Glaziou 11986* (lectotype C! [10015838], selected by Lima *et al.* (in press.); isolectotypes ASU-photo!, BR [2]!, C!, G!, K [2]!, LE-photo!, P [3]!, R!).

Myrcia dermatophylla Kiaerskou (1893: 97). Type:—BRAZIL. Rio de Janeiro: Restinga da Tijuca, 25 Nov. 1866, *Glaziou 885* (holotype C! [10015840]; isotypes BR [2]!, P!).

Myrcia diaphanosticta Kiaerksou (1893: 91). Type:—BRAZIL: Minas Gerais: Serra do Caraça, 8 Feb. 1884, *Glaziou 14812* (holotype C! [10015841]; isotypes G!, K!, LE-photo!, P [2]!, R!).

Myrcia fastigiata Kiaerksou (1893: 92). Type:—BRAZIL. Rio de Janeiro: Alto Macahé, 22 Sep. 1888, *Glaziou 17677* (lectotype C! [10015842], selected by Lima *et al.* (in press.); isolectotypes C!, F [3]-photo!, G!, LE-photo!, P [2]!).

Myrcia fastigiata var. *coriacea* Kiaerksou (1893: 93). Type:—BRAZIL. Rio de Janeiro: Floresta da Tijuca, 4 Aug. 1888, *Glaziou 17669* (holotype C! [10015844]; isotypes BM!, K [2]!, LE-photo!, P [2]!, R!).

Myrcia rhabdoides Kiaerksou (1893: 99). Type:—BRAZIL. Rio de Janeiro: Alto Macahé, 18 March 1889, *Glaziou 17660* (holotype C! [10015888]; isotypes G!, K!, LE-photo!, P [2]!, R!).

Myrcia yungasensis Rusby (1893: 27). Type:—BOLIVIA. Yungas, 1890, *Bang 293* (lectotype NY-photo! [00405494], selected by Lima *et al.* (in press.); isolectotypes BM!, BR!, E-photo!, G!, GH-photo!, M-photo!, MIN-photo!, NY-photo!, PH-photo!, US [2]-photo!, WIS-photo!).

Myrcia androsaemoides var. *parvifolia* Krug & Urban (1895: 579). Type:—LESSER ANTILLES. Trinidad and Tobago, in sylvis ad Caroni, Nov. 1883, *Eggers & Rensch 1137* (lectotype P! [00161252], selected by Lima *et al.* (in press.); isolectotypes K!, P [2]!).

Myrcia lehmannii Hieronymus (1895: 65). Type:—COLOMBIA. Columbia: crescit in silvis camporum sabanas dictorum prope Frontino, civitatis Antioquia, alt. s.m. 1200-1700 m., *Lehmann 7241* (lectotype K! [000261046], selected by Lima *et al.* (in press.); isolectotypes K!, F-photo!, US-photo!, GH-photo!, S-photo!, PH-photo!).

Calycorectes maracayuensis Barbosa Rodrigues in Chodat & Hassler (1907: 807) nom. nud.

Myrcia divaricata Barbosa Rodrigues in Chodat & Hassler (1907: 803) nom. nud., nom. illeg., non (Lamark 1789: 202) De Candolle (1828: 243), nec (O. Berg 1855: 58) Lemmé (1954: 146), nom. illeg.

Myrcia cochleata Barbosa Rodrigues in Chodat & Hassler (1907: 803) nom. nud.

Myrcia daphnoides var. *nervosa* Glaziou (1908: 218) nom. nud.

Myrcia arimensis Britton (1921: 334). Type:—LESSER ANTILLES. Trinidad and Tobago, Arima, 10 Feb. 1905, *Dannouse s.n.* (holotype NY-photo! [00405384]).

Myrcia incisa D. Legrand (1961: 290). Type:—BRAZIL. Santa Catarina: Campo Alegre, Morro do Iqueririm, 5 Feb. 1958, *Reitz & Klein 6427* (holotype MVM; isotypes HBR!, US-photo!).

Myrcianthes terminalis Mattos & D. Legrand (1975: 12). Type:—BRAZIL. Roraima: Serra da Lua, 24 Jan. 1969, *Prance 9426A* (holotype MVM; isotypes F-photo!, K!, S-photo!, SI-photo!, NY-photo!, US-photo!).

Myrcia stemmeriana D. Legrand (1977: 4). Type:—BRAZIL. Santa Catarina: Paulo Lopes, Mata 500 m de Bom Retiro, 14 Jan. 1974, *Bresolin 1086* (holotype MVM; isotypes FLOR!, HBR!).

Sub-shrubs, shrubs, treelets or trees to 10 m. **Twigs** flat or terete, brown or greyish, glabrous or sparsely to moderately, rarely densely, covered with simple or dibrachiate brown, greyish or hialinous, rarely rufous, trichomes 0.1–0.4 mm, rarely longer ca. 0.7 mm, when young; mature twigs terete, cortex exfolianting or not, glabrescent to glabrous; internode 5–35 mm long. **Leaves** with petioles sulcate or semi-terete, 2–6 × 0.6–1 mm, glabrous or sparsely to moderately covered with trichomes; blades elliptic, widely elliptic, oblong-elliptic, obovate, ovate, rounded, narrowly elliptic or lanceolate, 2–10.5 × 0.6–5 cm, 1–6 times longer than wide, concolorous or discolorous when dry, apices acuminate, acute, obtuse or rounded, bases attenuate, acute, obtuse or rounded, margins slightly revolute or not at all when dry, secondary veins 6–15 at each side, 2–5 mm apart, leaving the midvein at angles of 50–80°, one marginal vein 1–2 mm from the margin; adaxial surface glabrous or sparsely covered with trichomes when young, glabrescent to glabrous when mature, sometimes the trichomes are restricted to the midvein, polished or dull, midvein raised or flat, rarely sulcate, secondary veins flat or inconspicuous, tertiary veins generally inconspicuous, gland dots conspicuous or not, 4–7/mm^2; abaxial surface glabrous or sparsely to moderately covered with trichomes when young, glabrescent to glabrous when mature, midvein raised, secondary veins raised or flat, tertiary veins conspicuous or not, gland dots conspicuous, 5–12/mm^2. **Inflorescences** axillary, sub-terminal or terminal, paniculiform, pyramidal with opposite or alternate branching and dichasial subunits, or racemiform with opposite branching, main axis flat or terete, 25–90 × 0.5–1.1 mm, glabrous or with scattered trichomes, flowers sessile or with pedicels up to 5 mm; bracts elliptic to lanceolate, 0.7–3 × 0.2–1 mm, glabrous or covered with trichomes on both sides, generally deciduous before anthesis; bracteoles linear, 0.5–1 × 0.2–0.3 mm, glabrous or covered with trichomes on both sides, generally deciduous before anthesis. **Floral buds** obovoid, 1.8–2 × 1.8–2 mm (Amazonian and northern South America specimens) or 2–4 × 3–4 mm (other specimens); flowers with hypanthium generally not tearing at anthesis, 1–1.5 mm prolonged above the ovary, externally glabrous or with scattered trichomes, internally glabrous; calyx 5-merous, lobes depressed ovate or rounded, rarely triangular, 0.5–2 × 0.6–1.5 mm, <1 mm thick, unequal between them, apices rounded to obtuse, rarely acute, externally glabrous or with very scattered trichomes, internally densely covered with simple brown trichomes 0.1–0.3 mm; corolla 5-merous, petals 1.5–3 × 1–3.5 mm, white, yellowish or pinkish; floral disc 1.3–1.5 mm diam. (Amazonian and northern South America specimens) or 1.3–2.5 mm diam. (other specimens); staminal ring glabrous, stamens 1.2–5 mm long, white or pinkish, anthers eglandular; ovary 3-locular, 2 ovules per locule, style 3–6 mm long, glabrous, stigma punctiform. **Fruits** globose, 2.5–10 × 3–10 mm, green or yellowish when young, turning reddish to dark or yellow when mature, glabrous, crowned by the five calyx lobes or its remnants; one or two seeds, testa smooth, light brown to yellowish, polished or dull.

Distribution and Habitat:—*Myrcia guianensis* is widespread throughout tropical America, reaching almost the whole distribution of *Myrcia* s.l., from northern South-

America and Andes to southern Brazil and Paraguay. This species has not been registered from Caribbean and Central America. In Brazil, it has been recorded from all states and here newly recorded from Paraná, Distrito Federal, Piauí, Maranhão, Roraima and Rondônia. *Myrcia guianensis* is found in dry and wet habitats, such as the Guiana Shield, Amazon and Atlantic forests, *cerrado*, *campos* and *restingas*, at altitudes of 10–2000 m.

Etymology:—the epithet is a reference to the type-collection locality.

Phenology:—Flowers and fruits all over the year.

Conservation Assessment:—*Myrcia guianensis* is a widespread species occupying several vegetation types. It has been widely collected in many protected and unprotected areas, usually growing in large populations. Its Extent of Occurrence (EOO) is greater than 13,400,000 km^2. This species must be considered as Least Concerned (LC), following IUCN criteria (2012).

Comments:—'The application of the name *M. guianensis* is not difficult, but more difficult is the circumscription of the taxon to which it applies' (McVaugh 1969: 91). *Myrcia guianensis* is historically one of the most complex species of *Myrcia* s.l., due to its immense morphological plasticity and wide geographical distribution. This species comprises multiple morphotypes that were previously described as new species by many authors, generating a long and uncommon list of synonyms. As an example, 46 of 213 species treated under the genus *Aulomyrcia* in *Flora Brasiliensis* (Berg 1857–1859) are currently synonymized under *Myrcia guianensis*. Most of these names were created based on few or only one specimen and few morphological characters that can be considered as ordinary variation at species level when analyzing the whole distribution of *Myrcia guianensis*. Also, there is great morphological overlapping among morphotypes and many intermediate individuals can be easily found. As other Guianensis clade species, *Myrcia guianensis* appears to be non-monophyletic (Chapter 1), but any morphological pattern can be explained so far, highliting the complexity of the species. In this sense, we choose to treat *Myrcia guianensis* in its simplest way, preventing the use of many unnecessary names in herbaria. Future genetic, ecological and reproductive studies at populational level is needed and will undoubtedly help to improve the understanding of *Myrcia guianensis*.

Myrcia guianensis is highly variable mainly in respect to its habit and vegetative branches. Leaves are always visible petiolate, alternate, opposite or verticillate, rounded to lanceolate, generally with raised midvein. Branches and leaves are glabrous or sparsely to moderately, rarely densely, covered with trichomes. The reproductive structures of *Myrcia guianensis* are more constant and taxonomically useful to distinguish this species from others of the Guianensis clade. Inflorescences are always glabrous or with very scattered trichomes, paniculiform or much less frequentely racemiform. Floral buds are obovoid, also glabrous or nearly so, with five distinct lobes that normally do not at tear at anthesis. *Myrcia guianensis* constantly has tri-locular ovaries, as demonstrated by molecular data (Chapter 1). Species with 2-locular ovaries previously included as synonyms of *Myrcia guianensis* are now placed within clade 9 (Lucas *et al.* 2016; but see also Chapter 2).

Individuals representing the typical morphotype, i.e. elliptic, lustrous, coriaceous leaves, 2–6 cm long, panicles with scattered pubescence and young branches also pubescent, can be more easily found in the northernmost distribution of the species, in the Guiana Shield, Venezuela, Amazon and northeastern Brazil. This morphotype is similar to *Myrcia citrifolia*, but can be distinguished through the constant smaller floral buds (1.8–2 × 1.8–2 mm in *M. guianensis* vs. 2.5 × 2.5 mm or larger in *M. citrifolia*) and floral disc (up to 1.5 mm diam. in *M. guianensis* vs. 1.7 mm diam. or more in *M. citrifolia*). A detailed discussion regarding morphology of *Myrcia guianensis* in this geographic area is presented by McVaugh (1969). Other morphotypes are found southwards in Cerrado and Atlantic Forest biomes. Some of these morphotypes are discussed below and, although they seem primarily distinguishable from the typical *Myrcia guianensis*, overlapping characters and some degree of morphological continuum can always be seen when analyzing numerous materials. Floral buds can be larger than the usual for the species in some individuals from *cerrado* vegetation.

Glabrous individuals with rounded or widely-elliptic leaves, rounded apices and obtuse to rounded bases (=*M. rotundifolia*) inhabit *restingas* from northeastern Brazil. More elongated, elliptic-lanceolate leaves with acuminate apices and attenuate bases (=*M. fastigiata*, *M. rhabdoides*) are found in specimens from Rio de Janeiro. In turn, obovoid leaves with attenuate bases and acute to acuminate apices (=*M. obtecta*) is quite common in southern Brazil. Glabrous plants with very narrow lanceolate young leaves, 4–5 × 2 cm (=*M. angustifolia*, *M. cymosa*) are found in highlands of Minas Gerais, but an unique individual can present wider leaves (to 5 cm wide) at the base of the shrub (pers. observ.). Another morphotype presenting plasticity between leaves at the bases and apices of branches (=*M. decrescens*) is found in Goiás; this has also strongly flattened terminal inflorescences (see also Rosa 2015).

Selected specimens examined:—BOLIVIA. Beni: Ballivian, 13 October 1980, *Beck 5027* (K); Vaca Diez, 18 October 1991, *Beck 20487* (K). Cochabamba: Chapare, 2 March 2006, *Thomas 2147* (K). La Paz: Frans Tamayo, 4 November 2003, *Wood 19867* (K); Nor Yungas, 13 November 1982, *Solomon 8896* (K). Santa Cruz: Chiquitos, 10 October 2007, *Wood 23460* (K); German Bush, 23 November 2008, *Wood 25521* (K); Nuflo de Chavez, 8 October 1993, *Toledo 229* (K); Velasco, 3 December 2010, *Wood*

27011 (K). Oruro: Yungas, 1890, *Bang 293* (NY-photo). Pando: Nicolas Soarez, 19 October 1988, *Beck 17164* (K). BRAZIL. Acre: Brasiléia, 1 November 1980, *Lowrie 664* (RB); Bujari, 14 July 1995, *Pardo 110* (K); Cruzeiro do Sul, 29 February 2011, *Bovini 3528* (RB); Estrada Rio Branco-Porto Velho, 9 October 1980, *Nelson 640* (K); Rio Branco, 6 December 2001, *Croat 86089* (RB); Sena Madureira, 1 October 1968, *Prance 7713* (K). Alagoas: Marechal Deodoro, 7 Februart 2003, *Souza 21* (SP); Piaçabuçu, 17 March 1982, *Rocha 188* (K); Pilar, 7 November 2002, *Lyra-Lemos 7100* (ESA); São Luis de Quitunde, 12 April 2005, *Cavalcanti 120* (ALCB). Amapá: Macapá, 31 July 1983, *Mori 15737* (K). Amazonas: Barcelos, 30 September 2011, *Forzza 6579* (RB); Manaus, 1 October 2012, *Staggemeier 845* (K, UB); Lábrea, 25 June 1971, *Prance 13691* (U); Lago Preto, 25 June 1971, *Prance 13691* (K); Rio Uatumã, 12 August 1979, *Cid 223* (K). Bahia: Abaíra, 10 January 1991, *Harley H50707* (K); Camaçari, 9 April 1995, *Melo 1135* (K); Correntina, 7 November 1990, *Rezende 33* (UB); Entre Rios, 25 February 1986, *Bautista 1038* (FLOR); Ilhéus, 25 April 1985, *Voeks 109* (K); Mucugê, 13 February 2014, *Lima 426* (K, UEC, UPCB); Olivença, 14 June 2010, *Daneu 341* (SPF); Salvador, 22 October 2014, *Lima 512* (K, UPCB); Seabra, 31 May 1984, *Brazão 340* (RB); Una, 13 September 1995, *Carvalho 6091* (UPCB). Ceará: Barbalha, 4 November 2011, *Ferreira 288* (UB); Crato, 29 July 1997, *Braga 4252* (RB); Fortaleza, 26 November 1954, *Bezerra 1027* (FLOR); Parazinho, 13 March 1978, *Jordy Filho 14* (RB); São Benedito, 8 August 1942, *Bezerra 504* (FLOR). Distrito Federal: Brasília, 5 September 1989, *Silva 817* (K). Espírito Santo: Afonso Cláudio, 23 May 2007, *Kollmann 9807* (MBML); Santa Leopoldina, 23 October 2007, *Demuner 4339* (MBML); Santa Teresa, 25 October 2000, *Demuner 1491* (MBML); Venda Nova do Imigrante, 17 January 1995, *Hatschbach 61594* (MBM, MBML). Goiás: Alvorada do Norte, 9 September 2014, *Lima 481* (K, UPCB); Alto Paraíso, 8

November 1991, *Hatschbach 55929* (C, MBM); Cristalina, 10 September 1998, *Souza 21455* (ESA); Luziania, 11 October 1978, *Heringer 16139* (UEC); Niquelândia, 12 September 1998, *Souza 21580* (ESA); Pirenópolis, 12 September 2014, *Lima 503* (K, UEC, UPCB); Teresina de Goiás, 10 September 2014, *Lima 488* (K, UEC, UPCB). Maranhão: Barra do Corda, 2 March 1983, *Schatz 797* (K); Mirador, 5 February 1999, *Conceição 532* (RB); Santa Quitéria, 9 December 1991, *Paula 3328* (K); Timon, 28 January 1981, *Mayo 513* (K). Mato Grosso: Chapada dos Guimarães, 17 September 1988, *Pereira 353* (RB); Nova Xavantina, 25 November 2011, *Staggemeier 417* (K, UB); Novo Mundo, 20 August 2008, *Sasaki 2285* (K); Paranatinga, 29 October 1990, *Macedo 2968* (SP); Rondonópolis, 12 November 2005, *Assis 1133* (SPF); Sinop, 22 September 1985, *Thomas 3966* (K). Mato Grosso do Sul: Bataguassu, 15 October 1996, *Bicudo 185* (UPCB); Caracol, 11 July 2006, *Barbosa 1493* (K, MBM); Coxim, 7 November 1996, *Hatschbach 65369* (K, MBM); Naviraí, 23 October 1986, *Pastore 117* (FLOR); Nova Andradina, 24 October 1986, *Pastore 131* (FLOR); Rio Verde, 3 December 2012, *Azevedo 56* (RB). Minas Gerais: Buenópolis, 17 November 2014, *Lima 542* (K, UPCB); Cardeal Mota, 13 November 2014, *Lima 526* (K, UEC, UPCB); Grão-Mogol, 16 November 2014, *Lima 541* (K, UEC, UPCB); Joaquim Felício, 17 November 2014, *Lima 545* (K, UEC, UPCB); Perdizes, 23 August 2002, *Mendes 265* (HUFU); Prados, 22 October 2013, *Lima 362* (UEC, UPCB); Presidente Kubitschek, 14 November 2014, *Lima 528* (K, UEC, UPCB); Santana do Riacho, 13 November 2014, *Lima 517* (K, UEC, UPCB); São Roque de Minas, 1 September 2014, *Lima 461* (K, UEC, UPCB); Uberlândia, 20 November 2013, *Lima 371* (K, UEC, UPCB). Pará: Alenquer, 4 November 1987, *Cid Ferreira 9441* (K); Belterra, 7 May 2011, *Rosário 88* (RB); Cumaru do Norte, 13 January 1983, *Gottsberger 121-13183* (K); Monte Alegre, 5 November 1987, *Cid Ferreira 9453* (K); Novo Progresso, 22 August 2013, *Bonadeu*

744 (RB); Oriximiná, 2 July 1980, *Cid Ferreira 1247* (K); Santarém, 27 December 1991, *Ferreira 27* (K); Vitória do Xingu, 23 June 2014, *Souza PSACF_EX03422* (RB). Paraíba: João Pessoa, 2 January 1981, *Fevereiro M518* (K); Santa Rita, 25 March 1992, *Agra 1453* (K). Paraná: Amaporã, 22 October 1987, *Goetzke 158* (UPCB); Balsa Nova, 27 October 2003, *Lucas 141* (K); Bocaiúva do Sul, 46 January 2004, *Ribas 5779* (MBM, UPCB); Campina Grande do Sul, 2 September 2010, *Lozano 448* (UPCB); Campo Mourão, 25 August 2011, *Lima 298* (UPCB); Guarapuava, 12 December 1973, *Hatschbach 33478* (C, MBM); Jaguariaíva, 21 October 1999, *Souza s.n.* (UPCB 43211); Mangueirinha, 19 September 2011, *Hatschbach 72395* (MBM, UPCB); Palmas, 16 November 1998, *Hatschbach 68716* (MBM, UPCB); Palmeira, 18 November 1962, *Hatschbach 11094* (MBM, UPCB); Piên, 27 November 1990, *Poliquesi 16* (MBM); Piraquara, 3 February 2004, *Ribas 5849* (MBM, UPCB); Telêmaco Borba, 10 November 1994, *Filipaki s.n.* (UPCB 33134). Pernambuco: Agrestina, 21 March 2005, *Melo 19* (SPF); Cabo de Santo Agostinho, 14 March 1995, *Siqueira 82* (RB); Igarassu, 18 July 2008, *Lins 354* (UPCB); Jatauba, 15 March 1996, *Moura 440* (K); Recife, 16 April 1990, *Guedes 2411* (ALCB). Piauí: Brasileia, 29 December 2002, *Alencar 1619* (UEC); Francisco Ayres, 23 January 2012, *Harley 56428* (K); Piracuruca, 30 August 1998, *Alencar 323* (UEC); Piripiri, 5 August 2012, *Guedes 19668* (ALCB). Rio de Janeiro: Armação dos Búzios, 20 November 1996, *Farag 260* (SPF); Arraial do Cabo, 1 November 2009, *Carvalho 110* (RB); Itatiaia, 13 January 1942, *Barros 552* (RB); Nova Friburgo, 13 September 1990, *Correia 216* (K); Rio de Janeiro, 8 March 2012, *Carvalho AC007* (RB). Rio Grande do Norte: Extremoz, 12 March 2011, *Jardim 5908* (RB); Natal, 15 Decemeber 2008, *Silva 55* (SPF). Rio Grande do Sul: Caxias do Sul, 27 November 2011, *Crizzon 62* (MBML); Itaimbezinho, 14 November 1972, *Lindeman s.n.* (U45250). Rondônia: 20 August 1971, *Maas 406* (K); Ariquemes, 17 August 1968, *Forero 7155* (K); Pimenta Bueno, 19 August 1999, *Ratter R8239* (SPF); Porto Velho, 1 October 2011, *Lima 3* (RB). Roraima: Caracaraí, 8 October 2009, *Batista 44* (SPF); Serra Tepequem, 12 February 1967, *Prance 4358* (K). Santa Catarina: Mafra, 12 December 1962, *Klein 3898* (FLOR); Palhoça, 5 April 1972, *Bresolin 557* (FLOR); Ponte Serrada, 8 November 1964, *Smith 13050* (C, FLOR); Santo Amaro da Imperatriz, 4 October 2006, *Falkenberg s.n.* (FLOR0039143); São José, 15 October 1960, *Reitz 10245* (HBR, K). São Paulo: Avaré, 24 January 1996, *Souza 10395* (ESA); Bom Sucesso de Itararé, 13 November 2003, *Lucas 199* (K); Botucatu, 14 December 2010, *Lima 119* (UPCB); Campinas, 31 October 1994, *Maglio 662* (SPF); Campos do Jordão, 25 August 1993, *Barreto 1094* (ESA); Itapetininga, 13 November 1961, *Mattos 9575* (SPF); São Paulo, 16 December 1931, *Handro s.n.* (K000565675); Presidente Epitácio, 14 October 1988, *Bicudo 141* (UPCB); Teodoro Sampaio, 2 December 1986, *Tamashiro 18798* (UEC). Sergipe: Barra dos Coqueiros, 27 January 1992, *Farney 2931* (K); Indiaroba, 25 June 2003, *Hatschbach 75656* (MBM, W); Pirambu, 12 December 2014, *Ibrahim 286* (UPCB). Tocantins: Araguatins, 25 November 2003, *Salles 2804* (RB); Dianópolis, 5 December 1991, *Pereira 1987* (UEC); Conceição do Tocantins, 6 December 2003, *Forzza 2601* (SPF); Mateiros, 21 September 2014, *Antar 544* (SPF). COLOMBIA. Caquetá: 7 December 1990, *Estrada 64* (K); Serra de Chiribiquete, 7 December 1990, *Franco 663* (K). Vaupes: Mitu, 5 July 1975, *Zarucchi 1385* (K); Rio Kuduyari, 11 November 1952, *Schultes 18466* (K). Vichada: Las Gaviotas, 26 December 1973, *Davidse 5184* (RB). ECUADOR. Napo: El Chaco, 12 October 1992, *Edwards 568* (K). Orellana: Estacion Cientifica Yasuni, 29 May 2004, *Villa 3073* (K). FRENCH GUIANA. Montagne Boroukin, 28 November 2007, *Tostain 968* (K); Organabo, 22 August 1973, *Granville 1949* (K); Rive gauche de l'Oyapock, 8 April 1970, *Oldeman T-484* (K); Saut Nacibo, 23 May 1994, *Bordenave 885* (K). GUYANA.

No locality, s.d., *Schomburgk s.n.* (K00343162); East Berbice-Corentyne, January 1980, *Thurn s.n.* (K000343141); Paramacutoi Savannah, May 1926, *Alston 515* (RB); Potaro-Siparuni, May 1926, *Alston 515* (K); Upper Takutu-Upper Essequibo, November 1948, *Forest Departament of British Guiana 519* (K); Yupukari, 15 October 1937, *Smith 2274* (K). PARAGUAY. Canindeyú: Lagunita, 7 September 1996, *Jiménez 1493* (BM); Sierra de Maracayu, s.d., *Hassler 5862* (K); s.d., *Hassler 5038* (K). PERU. Coronel Portillo: Padre Abad, 20 October 1972, *Schunke 5424* (U); Huanuco: Monzon, 14 September 1964, *Vigo 6600* (K); Loreto: Neshuya, 24 November 1964, *Vigo 6624* (K); Rio Nanay, 7 April 1977, *Gentry 19101* (SP); San Martín: Zepelacio, October 1933, *Klug 3289* (K). SURINAME. Aruak, 18 October 1944, *Maguire 24961* (K); Fleuve Lawa, 29 August 1986, *Sastre 8130* (K); Marowijne, 23 November 2004, *Jansen-Jacobs 6715* (K); Sipaliwini, 31 May 2003, *Rosario 1813* (K); Zanderij, 31 May 1916, *Samuels 266* (K). TRINIDAD AND TOBAGO. No locality, October 1883, *Eggers 1096* (BR); Bora Forest, 21 October 1927, *Willians 11862* (K). VENEZUELA. No locality, December 1861, *Pearce s.n.* (K000330148). Amazonas: Orinoco, 22 November 1965, *Breteler 4788* (K). Anzoategui: Los Torres, 7 January 1987, *Grifo 312* (K). Aragua: Tovar, 1855, *Fendler 387* (K). Bolivar: Cedeno, 24 January 1984, *Cuello 597* (K); Gran Sabana, 26 April 1988, *Liesner 23857* (K).

9. *Myrcia hypericoides* Cambessèdes in Saint-Hilaire (1832: 317). *Aulomyrcia hypericoides* (Cambess.) O. Berg (1854: 62). Figures 16 and 39.

Type:—BRAZIL. Minas Gerais: in campis prope Campo Alegre, in parte deserta occidentalique provinciae Minas Geraes, *Saint-Hilaire 536* (lectotype P! [00161434], selected by Lima *et al.* (in press.); isolectotypes F [fragm.]-photo!, P!).

Myrcia orthophylla (O. Berg) Kiaerskou (1893: 90). *Aulomyrcia orthophylla* O. Berg in Martius (1859: 549). Type:—BRAZIL. Goiás: in campis editis graminosis siccis super Chapada de S. Marcos prov. Goyazensis, August 1834, *Riedel 2492* (lectotype LE-photo! [00007111], selected by Lima *et al.* (in press.); isolectotypes G!, K!, LE [2]-photo!, P [3]!, S-photo!, U!, W!).

Shrubs to 1 m. **Twigs** flat, brown or whitish, glabrous when young and mature; internode 10–17 mm long. **Leaves** sessile or with petioles semi-terete, up to 0.5 mm, glabrous; blades ovate to ovate-lanceolate, 1.3–3 × 0.6–1.8 cm, 1.5–2 times longer than wide, concolorous or slightly discolorous when dry, apices acute to obtuse, bases cordate to rounded, margins revolute or not when dry, secondary veins 8–10 at each side, 1–2.5 mm apart, leaving the midvein at angles of 50°–40°, one marginal vein 0.3–0.5 mm from the margin; adaxial surface glabrous, midvein raised, secondary veins flat, tertiary veins inconspicuous, gland dots inconspicuous; abaxial surface glabrous, midvein and secondary veins raised, tertiary veins inconspicuous, gland dots conspicuous, up to 3/mm^2. **Inflorescences** subterminal or terminal, paniculiform with opposite branching and dichasial subunits, main axis flat, 22–45 × 0.5–0.9 mm, glabrous, flowers sessile or with pedicels up to 1.5 mm; bracts elliptic to lanceolate, 1.5–2.3 × 1.5 mm, glabrous, persistent after anthesis; bracteoles lanceolate, to 1.3 × 0.4 mm, glabrous, persistent after anthesis. **Floral buds** globose, 2.3–3.3 × 2–4 mm; flowers with hypanthium not tearing at anthesis, ca. 0.5 mm prolonged above the ovary, externally and internally glabrous; calyx 5-merous, lobes depressed ovate to triangular, 1–1.6 × 1.5–2.2 mm, <1 mm thick, unequal between them, apices rounded or obtuse, externally glabrous, internally densely covered with white trichomes 0.3–0.5 mm; corolla 5-merous, petals ca. 3.5 × 3.5 mm, white or purplish; floral disc 2–2.7 mm diam.; staminal ring glabrous, stamens 2–4 mm long, white, anthers eglandular; ovary

3-locular, 2 ovules per locule, style 3.6–5 mm long, glabrous, stigma punctiform. **Fruits** globose, green when young, mature ones not seen; seed not seen.

Distribution and Habitat:— The type specimen of *Myrcia hypericoides* was collected in '*Campo Alegre, in parte deserta occidentalique provinciae Minas Geraes*', which is nowadays a neighborhood in the municipality of Uberlândia, state of Minas Gerais. Four other collections are from southeastern Goiás, in the municipalities of Campo Alegre de Goiás and Catalão (including *Riedel 2492*, the type of the synonym *Aulomyrcia orthophylla*, registered as 'Chapada S. Marcos'). The species occurs in open *cerrado* vegetation and grows in rocky soils at altitudes of ca. 800 m.

Etymology:—the epithet alludes to the resemblance of the dried leaves arrangement to that of *Hypericum connatum* Lamarck (1797: 168; Hypericaceae).

Phenology:—Flowers in August and October; fruits in September.

Conservation Assessment:—Altough *Myrcia hypericoides* is found in an historically well collected area in Brazil, the species is presently known from only six gatherings, strongly indicating its rareness. None of these are inside protected areas; furthermore, the region where *Myrcia hypericoides* inhabits is highly susceptible to human action. Precise collection localities are not available, but an estimated Extent of Occurrence (EOO) using coordinates of the municipality's center resulted in ca. 525,000 km^2, suggesting an Endangered (EN) species following criteria B2a, biii (IUCN 2012).

Comments:—*Myrcia hypericoides* is a rare species which was until very recently known only from the nineteenth century type collection. Four addicional gatherings housed in C, HUFU, MBM, RB herbaria are now identified as such. Despite our fieldwork efforts, the species was not recollected. *Myrcia hypericoides* is an entirely glabrous shrub, except by the calyx-lobes, which is internally densely covered with white trichomes. The most diagnostic feature of *M. hypericoides* is the straight coriaceous leaves arranged in such a way that mostly cover the internodes in dried material. This species may resemble *Myrcia variabilis*, especially due to the leaf shape and absence of indumentum; they are distinguished by the straight leaves with inconspicuous secondary and tertiary venetion and few-flowered inflorescences of *M. hypericoides*. In general, *M. hypericoides* has smaller dimensions than *M. variabilis*.

Specimens examined:—BRAZIL. Goiás: Campo Alegre de Goiás, 6 October 1976, *Hatschbach 38975* (C, MBM); Catalão, Estrada para Fazenda do Segredo, 22 August 2007, *Arantes et al. s.n.* (HUFU 50518); Região do Córrego da Anta Gorda, 25 September 2007, *Arantes et al. s.n.* (HUFU 50517). Minas Gerais: no precise locality, s.d., *Schwacke 8112a* (RB).

10. *Myrcia laricina* (O. Berg) Burret ex Luetzelburg (1926: 201). *Aulomyrcia laricina* O. Berg in Martius (1857: 61). Figures 17 and 39.

Type:—BRAZIL. Piauí: in prov. Piauhy, Nov. 1939, *Gardner 2875* (lectotype W! [0032527], selected by Lima *et al.* (in press.); isolectotypes BM!, F [fragm.]-photo!, G!, GH-photo!, K [2]!, P!, W!).

Trees or shrubs to 2 m. **Twigs** terete, brown to greyish, densely covered with simple brown trichomes 0.3–0.5 mm when young; mature twigs terete, cortex exfoliating, covered with trichomes to glabrescent; internode 2–7 mm long. **Leaves** with petioles semi-terete, 0.5–0.7 × 0.2 mm, moderadely to densely covered with trichomes when young, glabrescent when mature; blades acicular or linear, 1–3.7 × 0.1–0.3 cm, 10–37 times longer than wide, concolorous when dry, apices obtuse to rounded, bases obtuse to rounded, margins strongly revolute when dry, secondary veins inconspicuous, marginal vein inconspicuous; adaxial surface moderately to densely covered with trichomes when young, glabrescent to glabrous when mature, polished, midvein raised, secondary and tertiary veins inconspicuous, gland dots conspicuous in young leaves, less than 5/mm^2; abaxial surface uniformly covered with trichomes, midvein and secondary veins raised, tertiary veins inconspicuous, gland dots conspicuous in young leaves, less than 5/mm^2. **Inflorescences** axillary, racemiform or reduced to a single flower, main axis terete, 19–23 × 0.4–0.6 mm, densely covered with trichomes, flowers with pedicels 0.8–3 mm; bracts linear, ca. 2 × 0.3 mm, covered with trichomes on both sides, generally decidous before anthesis; bracteoles linear, 1.5–2.5 × 0.2–0.3 mm, covered with trichomes on both sides, deciduous before anthesis. **Floral buds** globose to obovoid, 2.5–3 × 2.5–3 mm; flowers with hypanthium not tearing at anthesis, ca. 1 mm prolonged above the ovary, externally densely covered with trichomes, internally glabrous; calyx 5-merous, lobes triangular, 0.7–1.3 × 1.1–1.5 mm, <1 mm thick, unequal between them, apices obtuse, externally and internally covered with trichomes, but denser internally; corolla 5-merous, petals ca. 2 × 2.5 mm, white; floral disc 1.9–2.2 mm diam.; staminal ring glabrous, stamens 2–6 mm long, white, anthers eglandular; ovary 3-locular, 2 ovules per locule, style 4–5 mm long, glabrous, stigma punctiform. **Fruits** globose, 3–6 × 4–7 mm, green when young, turning red or purple when mature, covered with trichomes to glabrescent, crowned by the five calyx lobes; seed not seen.

Distribution and Habitat:—*Myrcia laricina* is found in dry habitats such as *caatinga* and *cerrado* from Bahia, Tocantins and northern Minas Gerais, Brazil. The type specimen was recorded as from Piauí, but without precise locality. No further collections from Piauí were found so far. Rosa (2015) cited the species to Goiás, but the related specimen (*Haidar et al. 1506* in UB) is a sterile material that does not match *M.*

laricina. This species occurs in sandy and rocky soils at altitudes of 450–1050 m. *Myrcia laricina* is a single Guianensis clade species occurring in *caatinga* vegetation.

Etymology:—the epithet alludes to the similarity of the leaf shape and arrangement to those of *Larix* Miller (1754, s.p.; Pinaceae).

Phenology:—Flowers between July and October; fruits in February, March and between August and November.

Conservation Assessment:—*Myrcia laricina* occurs in a relatively large area which is historically threatened by human action. Few collections were made inside protected areas. These facts allied to the species' Area of Occupancy (AOO) of 76 km^2 indicate *Myrcia laricina* as Endangered (EN), according to criteria B2a, biii, iv (IUCN, 2012).

Comments:—*Myrcia laricina* is singular in respect to its aciculate or linear leaves, which can be alternate, opposite, verticillate or mixed, covered with erect trichomes underneath and strongly revolute margins. Inflorescences are reduced to racemes or even to single flowers, always hairy. Due to the narrow leaves, some forms of *Myrcia laricina* can resemble *Myrcia* sp.1. The latter however, is a glabrous plant with longer leaves.

Specimens examined:— BRASIL. Bahia: Barreiras, 4 February 2000, *Fonseca 1271* (SPF); Brotas de Macaúba, 24 October 2010, *Moraes 3096* (HUEFS); Cristópolis, 29 November 2011, *Miranda 6438* (HUEFS, RB); Formosa do Rio Preto, 13 November 2011, *Faria 2173* (UB); Ibotirama: 7 July 1983, *Coradin 6604* (K, UB); São Desidério, 7 November 1997, *Alvarenga 1030* (UB). Minas Gerais: Francisco Sá, 25 July 2002, Meirelles et al. 1107 (UEC); Grão Mogol, 14 October 1988, *Harley 25008* (SPF). Tocantins: Dianópolis, 27 September 2003, *Scariot 916* (UB); Mateiros, 2 August 2010, *Caxambu 3217* (HCF).

11. *Myrcia laxiflora* Cambessèdes in Saint-Hilaire *et al.* (1832: 319). *Aulomyrcia laxiflora* (Cambess.) O. Berg in Martius (1857: 114). *Aulomyrcia laxiflora* var. *angustifolia* O. Berg in Martius (1857: 114). Figures 18 and 41.

Type:—BRAZIL. Rio de Janeiro: in sylvis primaevis ad ripas flimunis Parahyba in provincia Rio de Janeiro, *Saint-Hilaire C-14* (lectotype P! [0161412], selected by Lima *et al.* (in press.); isolectotypes F [fragm.]-photo!, MPU-photo!, P [3]!).

Calyptromyrcia costata O. Berg in Martius (1857: 56). *Myrcia batistana* Mattos (2009: 3). Type:—BRAZIL. Minas Gerais: ad Praesidio de S. João Baptista in montibus Serra do Mar in prov. Minas Geraes, *Sellow s.n.* (holotype B†; lectotype LE-photo! [no barcode], selected by Lima *et al.* (in press.).

Calyptromyrcia cymosa O. Berg in Martius (1857: 58). *Aulomyrcia cymosa* var. *major* O. Berg in Martius (1857: 58). *Myrcia cymosa* (O.Berg) Niedenzu in Engler & Prantl (1893: 76), nom. illegit., non (O.Berg) Niedenzu in Engler & Prantl (1893: 76) [= *Aulomyrcia cymosa* O.Berg]. *Myrcianthes cymosa* (O. Berg) Mattos (2000: 1). Type:—BRAZIL. São Paulo: prov. S. Pauli, *Sellow s.n.* (lectotype BR! [0000005239191], selected by Lima *et al.* (in press.).

Calyptromyrcia cymosa var. *minor* O. Berg in Martius (1857: 58). Type:—BRAZIL. São Paulo: prov. S. Pauli, *Sellow s.n.* (lectotype K! [000913130], selected by Lima *et al.* (in press.).

Calyptromyrcia paniculata O. Berg in Martius (1857: 57). *Myrcia paniculata* (O. Berg) Mattos (2009: 3), nom. illeg. Type:—BRAZIL. Rio de Janeiro: in silvis prope Mandioca, prov. Rio de Janeiro, Aug. 1822, *Beyrich 689* (lectotype BR! [0000008552112], selected by Sobral *et al.* [2010]).

Calyptromyrcia paniculata var. *opaca* O. Berg in Martius (1859: 544). Type:—BRAZIL. Rio de Janeiro: prope Mandiocca praedium prov. Rio de Janeiro, *Riedel & Langsdorff s.n.* (holotype LE-photo! [no barcode]; isototype P!).

Myrcia lateriflora Kiaerskou (1893: 77). Type:—BRAZIL. Rio de Janeiro: Cachoeira, 14 Jan. 1870, *Glaziou 3979* (holotype C! [10015859]; isotypes P [2]!).

Trees to 18 m. **Twigs** flat, brown to dark, glabrous when young; mature twigs terete, cortex exfoliating, reddish, glabrous; internode 13–52 mm long. **Leaves** with petioles semi-terete to sulcate, 3.5–11 × 1–1.3 mm, glabrous; blades elliptic, 3.4–12 × 2.5–5.5 cm, 1.3–2.2 times longer than wide, concolorous when dry, apices acuminate, rarely acute, bases attenuate, margins slightly revolute when dry, secondary veins 13–16 at each side, 2.5–6.5 mm apart, leaving the midvein at angles of 70°–80°, one or two marginal veins, the first one 1.5–5 mm and the second one ca. 0.5 mm from the margin; adaxial surface glabrous, dull, midvein raised, secondary veins flat, tertiary veins conspicuous, gland dots conspicuous, 10–20/mm^2; abaxial surface glabrous, midvein and secondary veins raised, tertiary veins conspicuous, gland dots conspicuous, 10–20/mm^2. **Inflorescences** axillary or lateral, paniculiform, pyramidal with opposite branching and dichasial subunits, main axis flat, 22–32 × 0.5–0.7 mm, glabrous, flowers sessile or with pedicels up to 6 mm; bracts lanceolate, ca. 1.5 × 0.5 mm, glabrous, deciduous or not before anthesis; bracteoles elliptic, ca. 0.2 × 0.1 mm, glabrous, deciduous before anthesis. **Floral buds** globose, 1.8–2.5 × 1.8–2.5 mm; flowers with hypanthium partially tearing at anthesis, ca. 1 mm prolonged above the ovary, externally and internally glabrous; calyx not distinguishable or tearing in irregular lobes at anthesis, externally glabrous, internally densely covered with light brown to whitish trichomes 0.1–0.3 mm; corolla 5-merous, petals 2–3.5 × 2–3.5 mm, white; floral disc 1.7–2 mm diam.; staminal ring glabrous, stamens 3–6 mm long, white, anthers eglandular; ovary 3-locular, 2 ovules per locule, style 5–9 mm long, glabrous, stigma punctiform. **Fruits** globose, 4–9 × 4–9 mm, green when young turning red or dark, glabrous, crowned by the remnant of the calyx lobes; one seed, testa smooth, brown, dull.

Distribution and Habitat:—*Myrcia laxiflora* is commonly found in southeastern Brazil from Espírito Santo to São Paulo in Atlantic forests at altitudes of 400–1050 m. This species also occurs in semi-decuduous forest from eastern Minas Gerais. A single specimen from the state of Pernambuco (*Andrade-Lima 57-2832*) shows that the species can present a wider distribution in northeastern Brazil.

Etymology:—from the Latin ‘laxus’ meaning ‘loose’, allusive to the pauciflorous inflorescences with open arrangement.

Phenology:—Flowers between August and April; fruits along all the year.

Conservation Assessment:—*Myrcia laxiflora* has been widely collected inside protected areas and presents an Extent of Occurrence (EOO) of ca. 565,000 km^2. The disjoint single gathering from Pernambuco may indicate a wider distribution of *Myrcia laxiflora*. This species is assessed as Least Concerned (LC) following the IUCN criteria (2012).

Comments:—*Myrcia laxiflora* is a tree characterized by open and pauciflorous inflorescences (frequentelly less than 15 flowers), short calyx lobes almost indistinguishable from each other, large leaves with acuminate and long petioles. Calyx and hypanthium are partially ripped at the anthesis.

Myrcia laxiflora can remind *M. gigas* due to the large leaves and open inflorescences, but they are distinguished mainly through the shorter calyx lobes of the former and the geographical distribution: *M. laxiflora* occurs in Atlantic forests while *M. gigas* inhabits Amazon forests.

Selected specimens examined:—BRAZIL. Espírito Santo: Cariacica, 15 February 2008, *Amorim 7103* (RB, UPCB); 12 April 2009, *Meirelles 307* (RB); Santa Teresa, 23 March 1999, *Kollmann 2228* (MBML). Minas Gerais: Faria Lemos, 24 November 2006, *Lucas 682* (ESA, K). Pernambuco: Vicência, 29 November 1957, *Andrade-Lima 57-2832* (RB). Rio de Janeiro: Guapimirim, 7 June 1995, *Braga 2454* (RB, UPCB); Itatiaia, 13 January 1996, *Braga 3781* (ESA, SPF, UEC); Macaé, 4 February 2004, *Lucas 228* (K, RB); Magé, 31 March 2010, *Barros 68* (RB); Mendes, 10 September 1993, *Konno 276* (RB); Nova Iguaçu, 20 February 2008, *Jesus s.n.* (RB 556283); Paraty, 20 March 1992, *Marques 257* (RB); Petrópolis, 16 October 2009, *Ribeiro 1312* (RB); Rio Bonito, 23 March 1992, *Sucre 11421* (RB); Rio de Janeiro, 10 August 1987, *Ribeiro 960* (RB); Teresópolis, 26 June 2007, *Nadruz 1841* (RB). São Paulo: Miracatu, 13 July 1985, *Martuscelli 155* (SP, UPCB); Salesópolis, 14 July 2007, *Costa 45* (ESA); São Paulo, 14 November 1977, *Jung 200* (SP); Suzano, 30 January 1996, *Sugiyama 1393* (SP, UPCB); Ubatuba, 15 December 1995, *Pedroni 178* (SP).

12. *Myrcia macaca* Sobral & M.A.D. Souza (2015: 170). Figures 19 and 42.

Type:—BRAZIL. Roraima: Pacaraima, BR-174, a 15 km de BV-8 em direção norte, Cachoeira dos Macacos, 13 May 1998, *Cid et al. 11603* (holotype INPA-photo!).

Shurbs to 3 m. **Twigs** terete, brown, densely covered with simple white, greyish or reddish trichomes 0.8–1 mm when young; mature twigs terete, cortex exfoliating, covered with trichomes turning dark to glabrescent; internode 20–30 mm long. **Leaves** with petiole semi-terete, 2–4 × 1.5–2 mm, densely covered with trichomes; blades elliptic to widely-elliptic, 2,5–7 × 2–4,7 cm, 1.4–1.8 times longer than wide, discolorous when dry, apices obtuse to emarginate, bases rounded, margins strongly revolute when dry, secondary veins 8–14 at each side, 3–8 mm apart, leaving the midvein at angles of 70°–80°, one marginal vein 1–2.5 mm from the margin; adaxial surface with trichomes to 0.5 mm restricted to the midvein, polished, midvein and secondary veins raised, tertiary veins conspicuous, gland dots conspicuous, 5–10 mm^2; abaxial surface densely covered trichomes to 0.5 mm when young, turning grey and falling when mature, midvein and secondary veins raised, tertiary veins conspicuous, gland dots conspicuous or not, 5–10 mm^2. **Inflorescences** sub-terminal or terminal, paniculiform, pyramidal with opposite branching and dichasial subunits, main axis flat, 30–40 × 0.8–1 mm, densely covered with trichomes to 1 mm, flowers sessile; bracts linear, 3–4.5 × 0.8–1 mm, covered with trichomes on both sides, persistent after anthesis; bracteoles linear, ca. 3 × 1 mm, covered with trichomes on both sides, deciduous after anthesis. **Floral buds** globose to obovoid, 2–4 × 3–3.5 mm; flowers with hypanthium not tearing at anthesis, ca. 1 mm prolongued above the ovary, externally densely covered with trichomes, internally glabrous; calyx 5-merous, lobes ovate, 1.2–1.8 × 1.8–2.5 mm, <1 mm thick, unequal between them, apices obtuse, externally and internally densely covered with trichomes 0.5–0.8 mm; corolla 5-merous, petals ca. 4 × 3 mm, white; floral disc 1.8–2 mm in diam.; stamens 4–5 mm long, white, anthers eglandular; ovary 3-locular, with two ovules per locule, style 6-7 mm, stigma punctiform. **Fruits** not seen.

Distribution and Habitat:—*Myrcia macaca* is known from Amazonic forests of the state of Roraima, Brazil. It was registered in the municipalities of Pacaraima and Uiramutã. This species grows in rocky soils; its precise altitude is unknown.

Etymology:—the epithet is a reference to the type-collection locality, 'Cachoeira dos Macacos'.

Phenology:—Flowers in May; fruits unknown.

Conservation Assessment:—As stated in the protologue, *Myrcia macaca* is known from only two specimens in a poorly collected area. Precise coordinates are unknown; as such, the species is scored as Data Deficient (DD) following the IUCN criteria (2012).

Comments:—*Myrcia macaca* was recently described based in only two specimens. It is a shrub with elliptic leaves covered with whitish, greyish or reddish trichomes underneath, pauciflorous and relatively short inflorescences (3–4 cm) also covered with trichomes, and long bracts (3–4.5 mm) and bracteoles (ca. 3 mm).

Myrcia macaca is morphologically similar to *M. ovina* due to the leaf shape, size and general indumentum. The former however, presents longer trichomes on the young branches and inflorescences (up to 1 mm) than the latter (up to 0.5 mm). They are also distinguished through their disjunct geographical distribution: while *M. macaca* occurs in Amazonic forests from Roraima, *M. ovina* is restricted to *restingas* from Sergipe.

Specimens examined:—BRAZIL. Roraima: Uiramutã, 15 April 2007, *Batista 1601* (INPA-photo!).

13. *Myrcia monoclada* Sobral (2013: 55). Figures 20 and 41.

Type:—BRAZIL. Bahia: Una, 20 km N along road from Una to Ilhéus, 39°02’W, 15°11’S, 23 January 1977, *Harley 18204* (holotype CEPEC; isotype K!, RB!).

Tree to 5 m. **Twigs** flat, brown, glabrous when young and mature, cortex not exfoliating; internode 20–50 mm. **Leaves** sessile or with petioles semi-terete, up to 3 × 4 mm, glabrous; blades ovate-lanceolate, 18–20 × 7–8 cm, 2.5–2.7 times longer than wide, concolorous when dry, apices acute to obtuse, bases cordate, margins not revolute when dry, secondary veins 25–30 at each side, 6–11 mm apart, leaving the midvein at angles of 70°–80°, one or two marginal veins, the first one 2.5–3 mm and the second one 0.7–0.9 mm from the margin; adaxial surface glabrous, polished, midvein flat or slightly sulcate, secondary veins raised, tertiary veins conspicuous, gland dots conspicuous, 8–10/mm^2; abaxial surface glabrous, midvein and secondary veins raised, tertiary veins conspicuous, gland dots conspicuous, 8–10/mm^2. **Inflorescences** axillary or lateral, paniculiform, pyramidal with alternate branching and with dichasial subunits, main axis strongly flat, 90–200 × 2–5 mm, covered with dibrachiate brown trichomes 0.2–0.3 mm, flowers sessile or with pedicels up to 1 mm; bracts not seen; bracteoles not seen, deciduous before anthesis. **Floral buds** obovate or globose, 2–3 × 2–3 mm; flowers with hypanthium not tearing at anthesis, 0.6–1 mm prolonged above the ovary, externally glabrous or with scattered trichomes, internally glabrous; calyx 5-merous, lobes depressed ovate, 0.4–0.8 × 1–1.2 mm, >1 mm thick, unequal between them, apex rounded, externally and internally glabrous; corolla 5-merous, ca. 2 × 2 mm, pinkish; floral disc 1.5–2 mm diam.; staminal ring glabrous, stamens 2–4 mm long, white, anthers eglandular; ovary 3-locular, 2 ovules per locule, style 3–5 mm long, glabrous, stigma punctiform. **Fruits** not seen.

Distribution and Habitat:—*Myrcia monoclada* is known from a single gathering from the municipality of Una, southern Bahia, Brazil. It was collected in Atlantic forest, at altitude of ca. 15 m.

Etymology:—from the Greek ‘mono’ and ‘cladus’, meaning respectively ‘one’ and ‘branch’, in reference to the unbranched habit.

Phenology:—Flowers in January; fruits unknown.

Conservation Assessment:—*Myrcia monoclada* is known from a single specimen from a well collected region in the state of Bahia, demonstrating its rareness. The gathering is from an unprotected and highly threatened area. As there is no additional information regarding *Myrcia monoclada*, this species is better placed as Data Deficient (DD), according IUCN criteria (2012).

Comments:—*Myrcia monoclada* was described based on a single collection characterized by the unbranched habit (as detailed in the type label), glabrous and large leaves with short petioles visible only abaxially, cordate leaf base, large and multi-florous (>30 flowers) inflorescences covered with dibrachiate trichomes. Calyx lobes are consistently glabrous within, an unusal feature among the Guianensis clade species.

Specimens examined:—BRAZIL. Bahia: Una, 23 January 1977, *Harley 18204* (CEPEC, K, RB).

14. *Myrcia nivea* Cambessèdes in Saint-Hilaire *et al.* (1832: 332). *Aulomyrcia nivea* (Cambess.) O. Berg in Martius (1857: 103). *Aulomyrcia nivea* var. *andromedaefolia* O. Berg in Martius (1857: 103). Figures 21 and 43.

Type:—BRAZIL. Minas Gerais: in dumetis vulgo Carrascas prope praedium vulgo Fazenda do Riberão in parte provinciae Minas Geraes dicta Minas Novas, *Saint-Hilaire 1751* (lectotype P! [00161393], selected by Lima *et al.* (in press.); isotypes F [fragm.]-photo!, MPU-photo!, P [2]!)

Aulomyrcia nivea var. *rosmarinifolia* O. Berg in Martius (1857: 103). *Myrcia nivea* var. *rosmarinifolia* (O. Berg) Mattos (1975: 3). Type:—BRAZIL. *Helmreichen s.n.* (lectotype BR! [0000005236992], selected by Lima *et al.* (in press.)).

Myrcia cambessedesiana O. Berg in Martius (1857: 202). Type:—BRAZIL. Minas Gerais: inter Estrema vicum et Vieira do Mattos praedium in prov. Minarum, *Pohl 1002* (lectotype W! [0032624], selected by Lima *et al.* (in press.); isolectotypes K!, W!).

Myrcia tomentosa Glaziou (1908: 213) nom. nud., non (Aublet 1775: 504) De Candolle (1828: 245).

Shrubs or sub-shrubs to 1 m. **Twigs** terete, rarely flat, light brown or greyish, densely covered with simple white trichomes 0.3–1 mm when young; mature twigs terete, cortex exfoliating or not, covered with trichomes turning dark or glabrescent; internode 1.5–35 mm long. **Leaves** with petioles sulcate, 1–3.5 × 1–1.7 mm, densely covered with trichomes; blades elliptic to lanceolate, 2–5 × 0.2–1.7 cm, 2.5–5 times longer than wide, discolorous when dry, apices acute to acuminate, bases obtuse or acute, rarely cordate, margins strongly revolute (then the leaves look like linear) or not at all, secondary veins 9–11 at each side, 2.2–3.5 mm apart, leaving the midvein at angles of 50°–70°, one marginal vein ca. 0.7 mm from the margin; adaxial surface glabrous or covered with scattered trichomes, frequentely dull, midvein raised, secondary veins flat or inconspicuous, tertiary veins inconspicuous, gland dots conspicuous or not, 1–5/mm^2; abaxial surface densely covered with trichomes, midvein raised, secondary veins flat or raised, gland dots conspicuous or not 2–5/mm^2. **Inflorescences** axillary, sub-terminal or terminal, racemiform, dichasial or reduced to one flower, rarely a small panicle with opposite branching and dichasial subunits, main axis flat or terete, 7–36 × 0.5–0.6 mm, densely covered with trichomes, flowers sessile or with pedicels up to 3.7 mm; bracts linear or lanceolate, 5–6.5 × 1–1.5, densely covered with trichomes on both sides, frequentely persistent after anthesis; bracteoles linear, 3.2–4 × 0.5–0.8, densely covered with trichomes on both sides, frequentely persistent after anthesis. **Floral buds** obovoid or globose, 3–5 × 3–5 mm; flowers with hypanthium not tearing at anthesis, ca. 0.6 mm prolongued above the ovary, externally densely covered with trichomes, internally glabrous; calyx 5-merous, lobes triangular, 1.3–1.6 × 1.1–1.3 mm, <1 mm thick, unequal between them, apices acute to acuminate, externally and internally densely covered with trichomes; corolla 5-merous, petals ca. 3 × 2.5 mm, white or pinkish; floral disc 2.5–2.8 mm diam.; stamens 1.8–4 mm long, white, anthers eglandular; ovary 3-locular, with two ovules per locule, style 6.3–7 mm, stigma punctiform. **Fruits** globose, 4–10 × 4–9 mm, green when young, reddish to dark when mature, densely to moderately covered with trichomes or glabrescent, crowned by the five calyx lobes; two seeds, testa smooth, dark brown, dull.

Distribution and Habitat:—*Myrcia nivea* is found in open *cerrado* vegetation and *campo rupestre* from the states of Goiás, Distrito Federal and Minas Gerais, Brazil. This species occurs in rocky and sandy soils at altitudes of 850–1100 m.

Etymology:—from the Latin 'nivens', meaning 'white like snow', referring to the white indument.

Phenology:—Flowers between June and January; fruits all over the year.

Conservation Assessment:—*Myrcia nivea* is distributed in a wide area and many of the available collections are from inside protected areas. This species usually grows in large populations and has an Extent of Occurrence (EOO) of 250,503 km^2. *Myrcia nivea* is assessed as Least Concerned (LC) according to IUCN criteria (2012).

Comments:—*Myria nivea* is a shrub densely covered with white long trichomes on young structures; these trichomes can turn dark and fall with age. Leaves are coriaceous and vary greatly in width depending on how revolute are the margins, i.e. leaves with strongly revolute margins are generally narrow, looking like linear. Rosa (2015) cited 3–4-locular ovaries for *Myrcia nivea*.

This species is phylogenetically (Chapter 1) and morphologically related to *Myrcia stricta*. They are distinguished primarily through the hairs on the buds and flowers that are dense in *M. nivea* and abscent or very sparse in *M. stricta.*

Selected specimens examined:—BRAZIL. Distrito Federal: Brasília, 24 September 1979, *Coradin* 2360 (HUEFS, UB); Catetinho, 2 October 1973, *Heringer 12903* (UB); Chapada da Contagem, 4 September 1965, *Irwin 7952* (UB); Planaltina, 14 October 1990, *Hatschbach 54504* (C, MBM); Sobradinho, 21 October 2007, *Correia 121* (UB). Goiás: Alto Paraíso de Goiás, 23 October 1996, *Marquete 2764* (RB); Cavalcante, 11 November 2014, *Lima 492* (K, UEC, UPCB); entre Olho d'Agua et Paranana, *Glaziou 21556* (P); São João da Aliança, 13 October 1980, *Martinelli 7492* (RB); Teresina de Goias, 21 November 2014, *Faria 4313* (RB). Minas Gerais: Botumirim, 29 September 1997, *Kawasaki 1030* (SPF); Delfinópolis, 3 September 2014, *Lima 471* (K, RB, UEC, UPCB); Diamantina, 15 November 2014, *Lima 538* (K, RB, UEC, UPCB); Grão-Mogol, 11 November 1981, *Salgado 233* (RB); Itacambira, 12 February 2011, *Santos 652* (K, SPF); Sacramento, 16 March 1995, *Romero 1894* (HUFU); São Roque de Minas, 14 September 1994, *Romero 1224* (HUFU).

15. *Myrcia obovata* (O. Berg) Niedenzu in Engler & Prantl (1893: 761). *Aulomyrcia obovata* O. Berg in Martius (1857: 122). *Eugenia crassifolia* Miquel (1846: 439), nom. illeg., non De Candolle (1828: 266), nec Ant. Molina (1853: 169), nom. illeg., nec Viellard ex & Gris (1865: 469), nom. illeg. *Myrcia crassifolia* (Miq.) Kiaerskou (1893: 89). Figures 22 and 43.

Type:—BRAZIL. In Brasilia, 1840, *Claussen 1526* (lectotype U! [0005127], selected by Lima *et al.* (in press.); isolecotypes BM [2]!, MO-photo!, P!, W!).

Aulomyrcia atrovirens O. Berg in Martius (1857: 121). Type:—BRAZIL. Minas Gerais: prov. Minarum, *Pohl 1060* (holotype B†, lectotype W! [0032513], selected by Lima *et al.* (in press.); isolectotypes BR!, K!).

Aulomyrcia pallens var. *petiolaris* O. Berg in Martius (1857: 123). Type:—BRAZIL. Minas Gerais: prov. Minarum, *Saint-Hilaire s.n.* (lectotype P! [133128], selected by Lima *et al.* (in press.); isolectotypes P [2]!).

Trees or shrubs to 5 m. **Twigs** flat, light brown to greyish, glabrous or covered with scattered simple or dibrachiate brown trichomes 0.2–0.5 mm when young; mature twigs terete or slightly flat, cortex exfoliating or not, glabrescent to glabrous; internode 10–60 mm long. **Leaves** with petiole sulcate, (1.5)3–5.5 × 1.2–2.2 mm, glabrous or with scattered trichomes; blades obovate to elliptic-obovate, rarely elliptic or rounded, (1.2)2.8–6 × 1–4 cm, 1.2–2 times longer than wide, concolorous or discolorous when dry, apices rounded or retuse, rarely obtuse, bases obtuse to attenuate and decurrent on the petiole, margins slightly revolute or not when dry, secondary veins 9–14 at each side, 3.2–4.5 mm apart, leaving the midvein at angles of 45°–70°, one or two marginal veins, the first one 0.6–2 mm and the second one ca. 0.5–1 mm from the margin; adaxial surface glabrous, dull, midvein raised, secondary veis flat and frequentely inconspicuous, tertiary veins inconspicuous, gland dots conspicuous, 2–7 mm^2; abaxial surface glabrous, midvein raised, secondary veins flat or raised, tertiary veins conspicuous or not, gland dots conspicuous, 5–9 mm^2. **Inflorescences** axillary, paniculiform, pyramidal with opposite branching and dichasial subunits, main axis flat, 40–90 × 0.7–1.3 mm, glabrous or sparsely covered with trichomes, flowers sessile or with pedicels up to 2.5 mm; bracts elliptic, ca. 2 × 1 mm, glabrous or with simple trichomes 0.1–0.3 mm adaxially, deciduous before anthesis; bracteoles elliptic to lanceolate, ca. 0.5 × 1.5 mm, glabrous, deciduous before anthesis. **Floral buds** obovate or globose, 1.9–3 × 1.6–2 mm; flowers with hypanthium not tearing at anthesis, 0.8–1 mm prolonged above the ovary, externally and internally glabrous; calyx 5-merous, lobes rounded or depressed ovate, 0.5–0.8 × 1.3–1.7 mm, <1 mm thick, unequal between them, apices rounded or truncate, externally glabrous, internally densely covered with light brown or whitish trichomes to 0.3 mm; corolla 5-merous, petals ca. 2.5 × 2.5, white; floral disc 1.8–2.4 mm diam.; staminal ring glabrous, stamens 2–6 mm long, white, anthers eglandular; ovary 3-locular, 2 ovules per locule, style 5–6 mm long, glabrous, stigma punctiform. **Fruits** globose, 4–8.5 × 4–9 mm, green when young, turning red to dark when mature, glabrous, crowned by the five calyx lobes; one or two seeds, testa smooth, dark brown, dull.

Distribution and Habitat:—*Myrcia obovata* occurs in the Brazilian states of Minas Gerais and, less frequently, São Paulo and Bahia. Peron (1994), Kawasaki (1989) and Morais & Lombardi (2006) cited *M. obovata* to Paraná, but no records in herbaria were found. This species occurs in *cerrado, campo rupestre* and riparian forests, at altitudes of 750–1970 m.

Etymology:—the epithet alludes to the obovate leaf-shape.

Phenology:—Flowers between August and January; fruits between October and March.

Conservation Assessment:—*Myrcia obovata* is recorded from many collections and presents an Extent of Occurrence (EOO) greater than 580,000 km^2; this species can be therefore categorized as Least Concerned (LC) according to IUCN criteria (2012).

Comments:—*Myrcia obovata* is recognized by the consistently obovate or elliptic-obovate, glabrous and coriaceous leaves frequentely presenting inconspicuous secondary venation, and obtuse to attenuate bases always decurrent on the sulcate petioles. Most of the individuals are completely glabrous and present large visible glands throughout the branches, inflorescences and leaves. Some specimens from Bahia (e.g. *Ligia 922*) present simple or dibrachiate trichomes on the branches and inflorescences, smaller floral buds, and longer and narrower leaves; these differences were interpreted by us as ordinary variation of *M. obovata*, considering the wide morphological variation found in several Guianensis clade species.

Myrcia obovata can remind *Myrcia guianensis*, but differs through the leaf morphology cited above. Many materials from Bahia with large elliptic leaves, sulcate midvein adaxially and bi-locular ovaries were widely misidentified as *Myrcia obovata* in herbaria. These characters match the morphology of *Myrcia coelosepala* Kiaerskou (1893: 81), which is currently included in *Myrcia* sect. *Aulomyrcia* (Lucas *et al.* 2016).

Phylogenetic molecular data show *Myrcia obovata* as sister-species of the remaining Guianensis clade and the inclusion of this species within the group is weakly supported in the Maximum Likelihood analysis (Chapter 1). However, the general morphology of *Myrcia obovata* is quite characteristic of the Guianensis clade and there is no morphological or geographical evidence to treat *Myrcia obovata* as a separate lineage of *Myrcia* s.l. Phylogenetic studies with a greater sampling of the Guianensis clade, as well as *Myrcia* s.l. as a whole, can help to improve our phylogenetic understanding of *Myrcia obovata*.

Selected specimens examined:—BRAZIL. Bahia: Lençóis, 19 December 1984, *Lewis CFCR7140* (SPF, UPCB); Palmeiras, 20 January 2005, *Fonseca 2* (HUEFS). Minas Gerais: Alto Caparaó, 21 February 2000, *Souza 23604* (SPF); Barroso, 9 November 2002, *Assis 616* (SPF); Belo Horizonte, 23 November 2003, *Mazine1051* (ESA); Bom Jardim de Minas, 10 October 1988, *Krieger 24312* (ESA); Brumadinho, 28 November 1990, *Martens 514* (SPF); Caldas, 28 November 1850, *Regnell 557* (C); Carrancas, 10 November 1998, *Simões 378* (UEC); Diamantina, 9 November 2010, *Faria 930* (UB);

Itabirito, 28 October 1971, *Krieger 10936* (ESA); Itamonte, 10 October 1982, *Hatschbach 45585* (C, MBM); Itatiaiuçu, 15 November 2011, *Saddi 560* (RB); Itutinga, 30 March 2002, *Chaddah 97* (RB); Jaboticatubas, 28 October 1973, *Semir4690* (UEC); Jacuí, 11 November 1978, *Stubblebine 8919* (UEC); Joaquim Felício, 22 October 2007, *Santos 494* (HUFU, UPCB); Lima Duarte, 26 October 2004, *Forzza 3569* (SPF); Moeda, 8 August 1993, *Semir 28808* (UEC); Morro do Ferro, 29 September 1981, *Leitão-Filho 1176* (UEC); Olaria, 6 September 1979, *Krieger 16487* (SPF); Ouro Branco, 23 October 2013, *Lima 368* (K, RB, UEC, UPCB); Ouro Preto, 12 November 2014, *Lima 515* (K, RB, UEC, UPCB); Passa Quatro, 12 September 2006, *Meirelles 2540* (UEC); Prados, 22 October 2013, *Lima 360* (K, UPCB); Sacramento, 1 October 1999, *Mello-Silva 1699* (SPF, UPCB); Santana de Pirapama, 24 November 2009, *Zappi 2580* (SPF, UPCB); Santana do Riacho, 30 October 1981, *Sajo CFSC7620* (SPF, UPCB); São Roque de Minas, 1 September 2014, *Lima 459* (K, UEC, UPCB); São Tomé das Letras, 18 September 2003, *Verola 34* (UEC); Serro, 24 November 1997, *Hatschbach 67461* (C, MBM). São Paulo: Cunha, 17 November 2006, *Lucas 419* (ESA, K); Itapeva, 12 November 1994, *Souza 7077* (ESA); São João da Boa Vista, 7 October 1995, *Rodrigues 369* (SPF).

16. *Myrcia ovina* Proença & Landim (2014: 221). Figures 23 and 43.

Type:—BRAZIL. Sergipe: Pirambu, 10 December 1981, *Carneiro 264* (holotype ASE [6331]-photo!, isotype UB).

Treelets or shrubs to 2.5 m. **Twigs** terete, brown, densely covered with simple white or light brown trichomes 0.5–0.8 mm when young; mature twigs terete, cortex exfoliating or not, glabrescent or covered with trichomes turning dark grey; internode 30–50 mm long. **Leaves** with petioles terete or semi-terete, 3–4.5 × 1–1.5 mm, densely covered with trichomes when young, glabrescent to glabrous when mature; blades elliptic to widely elliptic, 2.5–4.5 × 1.5–2.5 cm, 1.4–1.6 times longer than wide, discolorous when dry, apices obtuse to rounded, rarely retuse, bases obtuse, margins revolute when dry, secondary veins 10–12 at each side, 1.5–3.2 mm apart, leaving the midvein at angles of 60°–80°, one marginal vein 0.5–0.7 mm from the margin; adaxial surface moderately to densely covered with trichomes, these generally denser on the midvein, polished, midvein raised, secondary veins flat, tertiary veins conspicuous, gland dots inconspicuous; abaxial surface densely covered with trichomes when young, turning dark grey, glabrescent or glabrous when mature, midvein and secondary veins raised, tertiary veins inconspicuous, gland dots conspicuous, 5–10/mm². **Inflorescences** sub-terminal or terminal, paniculiform, pyramidal with opposite branching and dichasial subunits, main axis terete or slightly flat, 23–66 × 0.4–0.7 mm, densely covered with trichomes, flowers sessile or with pedicels up to 1 mm; bracts ca. lanceolate, 4.5 × 1.5, densely covered with trichomes on both sides, generally persistent after anthesis; bracteoles linear, 2–8 × 0.5–1 mm, densely covered with trichomes on the abaxial surface, persistent after anthesis. **Floral buds** obovate to turbinate, 2.5–3.5 × 2–3 mm; flowers with hypanthium not tearing at anthesis, 1.5–2 mm prolonged above the ovary, externally densely covered with trichomes, internally glabrous; calyx 5-merous, lobes triangular, 0.6–1 × 0.5–1 mm, <1 mm thick, unequal between them, apex acute to obtuse, externally and internally densely covered with trichomes 0.3–0.4 mm; corolla 5-merous, petals ca. 3 × 3 mm, white; floral disc 1.7–2.2 mm diam.; staminal ring glabrous, stamens 3–7 mm long, white, anthers eglandular; ovary 3-locular, 2 ovules per locule, style 5–7 mm long, glabrous, stigma punctiform. **Fruits** globose, ca. 5 × 5 mm, green or orange when young, turning dark when mature, glabrous, crowned by the five calyx lobes; seed not seen.

Distribution and Habitat:—*Myrcia ovina* is endemic from the state of Sergipe, northeastern Brazil. It is known to the municipalities of Japaratuba, Pirambu and Riachão do Dantas, growing on white sandy soils of *restingas* and coastal *tabuleiros* at altitudes of 10–100 m.

Etymology:—the epithet honours Elicene Morais Carneiro, who largely collected in Sergipe. The surname ‘Carneiro’ and the word ‘ovino’ also mean ‘sheep’ in Portuguese, alluding to the white trichomes on the leaf abaxial surface (Proença *et al.* 2014).

Phenology:—Flowers between September and January, fruits in January, April, May and September.

Conservation Assessment:—The Atlantic forest in northeastern Brazil is severaly threatened by anthropogenic action, including the *restingas*. In the past, the Atlantic forest covered 40% of the area of Sergipe, but this number is currently reduced to only 10% (Farias 2013). *Myrcia ovina* is known from few localities, with an Extent of Occurrence (EOO) of ca. 58 km^2, and must be categorized as Critically Endangered (CR), according to the criteria B1a, biii (IUCN 2012).

Comments:—*Myrcia ovina* was recently described based on few gatherings with uniform morphology. This species is characterized by the white and soft indument on the leaf abaxial surface, inflorescences and flowers. These trichomes usually look like combed and become dark grey with age. Panicles are regular, symmetric and generally few-flowered (< 30 flowers), with bracteoles generally exceeding the floral buds length. *Myrcia ovina* can remind the Amazonian *M. macaca* in respect to the leaf morphology and general indument. See notes on *Myrcia macaca*.

Selected specimens examined:—BRAZIL. Sergipe: Japaratuba, Povoado São José, 24 April 2012, *Farias 75* (HUEFS); Pirambu, 14 September 1995, *Landim 608* (UB); 17 November 2009, *Miranda 6104* (RB); 12 December 2014, *Ibrahim 277* (UPCB); 18 March 2012, *Oliveira 401* (ASE-photo); Riachão do Dantas, 4 April 2013, *Farias 489* (ASE-photo).

17. *Myrcia pistrinalis* McVaugh (1969: 117). Figures 24 and 42.

Type:—SURINAME. Wilhelmina Mts. Julianatop, rather open vegetation of shrubs and small trees on top; common. Small tree, elev. 1230 m, 3 August 1963, *Schulz 10309* (holotype MICH-photo! [1109497]; isotype U! [97201]).

Trees to 8 m. **Twigs** flat, brown, glabrous, rarely sparsely covered with prickly simple brown trichomes up to 0.1 mm and longer trichomes up to 0.4 mm when young; mature twigs terete or flat, cortex exfoliating, glabrous; internode 30–70 mm long. **Leaves** with petioles semi-terete to sulcate, 6–17 mm × 1.5–2 mm, with scattered trichomes; blades elliptic, 8–15 × 3.7–6.1 cm, 2–2.5 times longer than wide, concolorous when dry, apices acuminate, bases acute to obtuse, margins slightly revolute when dry, secondary veins 6–12 at each side, 3–13 mm apart, leaving the midvein at angles of 70°–80°, one marginal vein 1–3 mm from the margin; adaxial surface glabrous or covered with trichomes restricted to the midvein, polished or dull, midvein raised or sulcate, secondary veins raised, tertiary veins conspicuous, gland dots conspicuous or not, 3–6/mm^2; abaxial surface sparsely covered with trichomes, these often restricted to the midvein and the leaf-base, midvein and secondary veins raised, tertiary veins conspicuous, gland dots conspicuous, 3–8/mm^2. **Inflorescences** lateral or axillary, paniculiform, pyramidal with opposite branching, main axis flat, 27–70 × 0.7–1.2 mm, moderately covered with prickly trichomes up to 0.2 mm, rarely glabrous, flowers sessile or with pedicels up to 2 mm; bracts not seen, deciduous before anthesis; bracteoles elliptic-lanceolate, ca. 0.6 × 0.3, covered with prickly trichomes on both sides, deciduous before anthesis. **Floral buds** turbinate, 3.4–4.5 × 2.4–3.2; flowers with hypanthium not tearing at anthesis, 0.7–1.5 mm prolonged above the ovary, externally and internally sparsely to moderately covered with prickly trichomes up to 0.1 mm; calyx 5-merous, lobes triangular, 0.6–1.5 × 0.9–1.5 mm, <1 mm thick, unequal between them, apices acute to obtuse, externally and internally covered with prickly brown trichomes up to 0.1 mm, these denser internally; corolla 5-merous, petals ca. 3 × 3 mm, white; floral disc 2–3 mm diam.; staminal ring glabrous, stamens 3–8 mm long, white, anthers eglandular; ovary 3-locular, with two ovules per locule, style 3–5 mm, stigma punctiform. **Fruits** globose, ca. 10 × 10 mm, green when young, turning reddish when mature, corevered with scattered prickly trichomes, crowned by the five calyx lobes; seeds not seen.

Distribution and Habitat:—*Myrcia pistrinalis* is mostly found in moist moutaneous forests from the Sipaliwini department, Suriname. A single collection has been registered from the state of Amazonas, Brazil, approximately 670 km from the Surinamese collection sites. This is the first record of *Myrcia pistrinalis* from Brazil. This species occurs at altitudes of 140–1230 m.

Etymology:—unknown.

Phenology:—Flowers in March, July, August and September; fruits in March and June.

Conservation Assessment:—*Myrcia pistrinalis* in known from few gatherings from the interior of Suriname and a single collection from a partially protected area in Brazil. The mountaneus region where this species occurs in Suriname still appears to be intact

(Google Inc. 2016), but only few and isolated protected areas exist. *Myrcia pistrinalis* has an Area of Occupancy (AOO) of only 24 km^2 and can be categorized as Endangered (EN), according to criteria B2a, biv (IUCN 2012).

Comments:—*Myrcia pistrinalis* is a poorly known tree with large leaves and inflorescences. This species is distinguished from the other Guianensis clade species by its prickly hairs, visible only under magnification, frequentely covering inflorescences and flowers. The protologue cited flowers internally glabrous; however, all the type collection was analized by us and indeed present tiny prickly trichomes on the inner hypanthium-wall, top of the ovary and base of the style. Indument inside the flowers is completely unusual within the Guianensis clade, but the tri-locular ovaries, glabrous staminal ring and regular and symmetrical inflorescences allowed us to include *M. pistrinalis* in the group. Sampling this species in molecular phylogenies will be useful to confirm this scenario.

Myrcia pistrinalis can resemble the Amazonian *M. gigas* due to the large leaves with open venation, flat branches, and turbinate floral buds. *Myrcia gigas* however, is nearly glabrous and has never prickly trichomes.

Specimens examined:—BRAZIL. Amazonas: Presidente Figueiredo, 29 March 2008, *Stancik 342* (INPA); SURINAME. Sipaliwini, Emmaketen, 14 September 1959, *Daniels 1102* (U); Bakhuis Mountains, 3 March 1965, *Florschütz 3107* (U); *Florschütz 3113* (U); Tafelberg, 10 September 1944, *Maguire 24693* (RB, U); 4 July 2001, *Evans 3294* (K, RB); Vicinity of camp W bank of Zuid River, 12 June 2003, *Herrera* 9892 (ESA).

18. *Myrcia retusa* (O. Berg) Niedenzu in Engler & Prantl (1893: 76). *Aulomyrcia retusa* O. Berg in Martius (1857: 142). Figures 25 and 44.

Type:—BRAZIL. [São Paulo]: Prov. Minarum, in campis ad Rio das Pedras, *Sellow s.n.* (holotype B†; lectotype BR! [0000005232475], selected by Lima *et al.* (in press.); isolectotypes F [fragm.]-photo!, K!, P [2]!, W!).

Myrcia obcordata Mattos (1964: 1). Type: BRAZIL— São Paulo: Santo André, Paranapiacaba, 5 December 1961, *Mattos 10588* (holotype SP! [001367]; isotypes C!, HAS, RB [2]!, SPF!).

Shrubs to 3 m. **Twigs** terete or flat, brown or greyish, moderately covered with simple or dibrachiate brown trichomes 0.1–0.3 mm when young; mature twigs terete, cortex exfoliating, glabrescent to glabrous; internode 4–18 mm long. **Leaves** with petioles sulcate, 1.4–4 × 0.5–0.7 mm, covered with trichomes; blades obovate or elliptic-obovate, 0.9–2.5 × 0.8–1.5 cm, 1–1.6 times longer than wide, concolorous or slightly discolorous when dry, apices retuse, rarely rounded, bases acute or obtuse, margins slightly revolute when dry, secondary veins 7–11 at each side, 0.8–2 mm apart, leaving the midvein at angles of 50°–40°, one marginal vein 0.6–0.8 mm from the margin; adaxial surface glabrous, rarely with trichomes on the midvein and/or on the leaf-base, midvein raised, secondary veins flat or inconspicuous, tertiary veins inconspicuous, gland dots conspicuous or not, 9–12/mm^2; abaxial surface glabrous or with scattered trichomes, these denser on the leaf-base, midvein raised, secondary veins raised, flat or inconspicuous, tertiary veins inconspicuous, gland dots conspicuous or not, 8–12 mm^2. **Inflorescences** axillary, triads with alternate or rarely opposite branching, main axis flat, 7–12 × 0.2–0.5 mm, glabrous or with scattered trichomes, flowers with pedicles up to 2.7 mm; bracts not seen, deciduous before anthesis; bracteoles linear, ca. 0.3 × 0.1, glabrous, deciduous before anthesis. **Floral buds** globose, 1.7–2 × 1.8–2 mm; flowers with hypanthium not tearing at anthesis, ca. 0.5 mm prolonged above the ovary, internally and externally glabrous; calyx 5-merous, lobes depressed ovate, 0.4–0.6 × 0.8–1.3 mm, <1 mm thick, unequal between them, apex rounded, externally glabrous, internally densely covered with trichomes to 0.1 mm; corolla 5-merous, petals to 2 × 2 mm, white; floral disc 1.6–1.8 mm in diam.; staminal ring glabrous, stamens 2–5 mm long, white, anthers eglandular; ovary 3-locular, with two ovules per locule, style 2–3 mm, stigma punctiform. **Fruits** globose, 4–6 × 4–6 mm, green when young, turning dark when mature, glabrous, crowned by the five calyx lobes; one seed, testa smooth, dark, dull.

Distribution and Habitat:—*Myrcia retusa* is endemic to Atlantic montaneous forests and highlands from the state of São Paulo, southeastern Brazil, at altitudes of 680–1300 m.

Etymology:—the epithet alludes to the retuse leaf tips.

Phenology:—Flowers in February, April and December; fruits in April, May, July, September and October.

Conservation Assessment:—*Myrcia retusa* occurs in a well collected region of eastern São Paulo, but only few gatherings are available suggesting a relatively rare species with small and restrict populations. Although most of the collections are from inside protected areas, *Myrcia retusa* has an Extent of Occurrence (EOO) of ca. 4,900 km^2 and must be assessed as Endangered (EN) according to criteria B1a, biii (IUCN 2012).

Comments:—*Myrcia retusa* was until very recently treated as synonym of *M. guianensis* (see Chapter 2 for further discussion). Indeed, *M. retusa* can look like a specific morphotype of *M. guianensis* (= *M. obtecta*), but the former is a shrub easily identified through the consistently delicate triads inflorescences and small obovate leaves with retuse apices, while the latter has panicles or racemes with more than ten flowers and rarely presents retuse leaf tips. See Chapter 2 for explanation about the type-collection locality of *Myrcia retusa*.

Specimens examined:—BRAZIL. São Paulo: Biritiba Mirim, Estação Ecológica de Boracéia, 17 April 1986, *Custódio Filho 2540* (ESA, SP); Caraguatatuba, 20 October 2000, *Guedes 2767* (NY-photo); Eldorado, Parque Estadual de Jacupiranga, 4 September 1995, *Souza 9069* (ESA, SP); Paranapiacaba, Estação Biológica, 4 July 1946, *Kuhlmann 3334* (SP, UPCB); 15 April 1966, *Handro 1139* (SPF); Salesópolis, Estação Ecológica de Boracéia, 27 April 1966, *Mattos 13506* (SP); Santo André, 15 April 1966, *Handro 1139* (SPF); São Bernardo do Campo, 17 April 1958, *Kuhlmann 4382* (SP); São Caetano, 7 May 1922, *Kuhlmann s.n.* (RB 89530); São Paulo, 15 February 2002, *Garcia 2137* (SPF); 11 April 2001, *Meirelles 73* (ESA, SPF, UEC).

19. *Myrcia rufipes* De Candolle (1828: 247). *Aulomyrcia rufipes* (DC.) O. Berg in Martius (1857: 131). *Aulomyrcia rufipes* var. *bracteata* O. Berg in Martius (1857: 131). Figures 26 and 44.

Type:—BRAZIL. Minas Gerais: in Brasiliae prov. Minarum, *Martius s.n.* (holotype M-photo! [0137031], isotype G-DC!).

Myrcia campestris De Candolle (1828: 247). *Aulomyrcia campestris* (DC.) O. Berg in Martius (1857: 128). *Aulomyrcia campestris* var. *rufa* O. Berg in Martius (1857: 128). Type:—BRAZIL. Minas Gerais: campis prov. Minarum, *Martius s.n.* (lectotype M-photo! [0136772], selected by Lima *et al.* (in press.); isolectotypes G-DC!, M-photo! [0136771]).

Myrcia rimosa Cambessèdes in Saint-Hilaire *et al.* (1832: 333). Type:—BRAZIL. Minas Gerais: in pascuis partis desertae occidentalisque provinciae Minas Geraes dictae Sertão, *Saint-Hilaire s.n.* (lecotype P! [00798917], selected by Lima *et al.* (in press.); isolectotypes F [fragm.]-photo!, MPU-photo!, P [2]!).

Aulomyrcia campestris var. *brunnea* O.Berg (in Martius 1857: 128). Type—BRAZIL. Minas Gerais: prov. Minarum, Engenho do Mato, s.d., *Pohl 5769* (lectotype W! [0032628], selected by Lima *et al.* (in press.); isolectotypes F [fragm.]-photo!, W [2]!).

Aulomyrcia crassifolia O. Berg in Martius (1857: 128), non *Myrcia crassifolia* Kiaerskou (1893: 89). *Myrcia irwinii* Mattos & D. Legrand (1975: 4). Type:—BRAZIL. Minas Gerais: inter Viera do Mattos et Calumbão prov. Minarum, 1837, *Pohl 1075* (lectotype W! [0032565], selected by Lima *et al.* (in press.); isolectotypes K!, W!).

Aulomyrcia rufipes var. *angustifolia* O. Berg in Martius (1857: 131). Type:—BRAZIL. Minas Gerais: Prov. Minarum, 1840, *Claussen 1314* (holotype BR! [0000005233540]; isotype W!).

Aulomyrcia rufipes var. *dives* O. Berg in Martius (1857: 131). *Myrcia rufipes* var. *dives* (O. Berg) N. Silveira (1987: 2). Type—BRAZIL. Minas Gerais: prov. Minarum, 1840, *Claussen 1524* (holotype BR! [000000523934]; isotypes BM!, G!, P!, W!).

Aulomyrcia rufipes var. *grandiflora* O. Berg in Martius (1857: 131). *Myrcia rufipes* var. *grandiflora* Kiaerskou (1893: 95). *Aulomyrcia pilantha* var. *grandiflora* O. Berg in Martius (1859: 556). Type:—BRAZIL. Minas Gerais: inter Arrayal Nossa Senhora da Piedade et Villa do Fanado v. Cidade de Minas Novas prov. Minarum, *Pohl 1082* (lectotype W! [0037119], selected by Lima *et al.* (in press.); isolectotypes K [2]!, W!).

Aulomyrcia rufipes var. *latifolia* O. Berg in Martius (1857: 131). Type:—BRAZIL. Minas Gerais: Prov. Minarum, 1840, *Claussen 308* (lectotype BR! [0000005233212], selected by Lima *et al.* (in press.); isolectotype BM!, G!).

Aulomyrcia ternifolia O. Berg (in Martius 1857: 134). Type:—BRAZIL: Minas Gerais: Prov. Minarum, July 1840, *Gardner 4659* (lectotype W! [0042738], selected by Lima *et al.* (in press.); isolectotypes BM!, G!, K [2]!, W-Rich!).

Aulomyrcia crenulata O. Berg (in Martius 1857: 141). *Aulomyrcia crenulata* var. *hirta* O. Berg in Martius (1857: 141). *Myrcia crenulata* (O. Berg) Mattos (2008: 3). Type:—BRAZIL. Minas Gerais, *Martius s.n.* (holotype M-photo! [0136756]).

Aulomyrcia crenulata var. *glabrata* O.Berg (in Martius 1857: 141). Type: BRAZIL. Minas Gerais: inter Calumbao et Barreiros in prov. Minaum, s.d., *Pohl 1086* (lectotype W! [0033203], selected by Lima *et al.* (in press.); isolectotypes F [fragm.]-photo!; K [2]!, W [2]!).

Aulomyrcia pilantha O. Berg in Martius (1859: 555). *Aulomyrcia pilantha* var. *parvifolia* O. Berg in Martius (1859: 555). *Myrcia rufipes* var. *pilantha* (O. Berg) Kiaerskou (1893: 95). Type:—BRAZIL. Minas Gerais: in fruticetis silvaticis inter Sabará et Caete prov. Minarum, Nov. 1834, *Riedel 2574* (holotype LE; isotypes K!, P [2]!, S-photo!, U!).

Aulomyrcia pilantha var. *longifolia* O. Berg in Martius (1859: 555). Type:—BRAZIL. Minas Gerais: in fruticetis inter Rio do Sono et Rio S. Francisco prov. Minarum, Oct. 1834, *Riedel 1383* (holotype LE; isotype P!).

Aulomyrcia pilantha var. *latifolia* O. Berg in Martius (1859: 555). Type:—BRAZIL. Minas Gerais: in campis prope Villa Rica prov. Minarum, *Riedel s.n.* (holotype LE).

Sub-shrubs, shrubs or trees to 5 m. **Twigs** flat, brown, densely covered with simple rufous, rarely brown trichomes 0.2–0.8 mm when young; mature twigs terete, cortex exfoliating, glabrescent; internode 5–37 mm long. **Leaves** with petioles sulcate or semi-terete, 1–5 × 0.8–2.4 mm, densely covered with trichomes when young, glabrescent when mature; blades elliptic, elliptic-lanceolate or widely elliptic, 1.6–9 × 0.8–3.3 cm, 2–3 times longer than wide, concolorous when dry, apices acute to rounded, rarely acuminate, bases acute to attenuate, margins moderately to strongly revolute when dry, secondary veins 8–15 at each side, 2.5–5.6 mm apart, leaving the midvein at angles of 50–80°, one or two marginal veins, the first one 0.5–1.5 mm and the second one ca. 0.5 mm from the margin; adaxial surface moderately to densely covered with trichomes or glabrescent when young and mature, dull, midvein raised, secondary veins flat or slightly raised, tertiary veins conspicuous or not, gland dots conspicuous, 1–6/mm^2; abaxial surface densely covered with trichomes when young, glabrescent when mature, midvein raised, secondary veins raised or flat, tertiary veins conspicuous or not, gland dots conspicuous, 2–8/mm^2. **Inflorescences** axillary, sub-terminal or terminal, paniculiform, pyramidal with opposite branching and dichasial subunits, rarely racemiform, main axis flat, 28–70 (–150) × 0.7–2 mm, moderately to densely covered with trichomes, flowers sessile or with pedicels up to 6 mm; bracts elliptic to lanceolate, 3.5–5 × 0.6–2.7 mm, covered with trichomes on both sides, generally deciduous before anthesis; bracteoles lanceolate, 0.5–1.5 × 0.2–0.5 mm, covered with trichomes on both sides, generally deciduous before anthesis. **Floral buds** obovoid, 2–4.5 × 2–4 mm; flowers with hypanthium not tearing at anthesis, 0.7–1.7 mm prolonged above the ovary, externally moderately to densely covered with trichomes, internally glabrous; calyx 5-merous, lobes triangular, rarely rounded, 0.6–1.5 × 1–2 mm, <1 mm thick, unequal between them, apices acute, rarely obtuse to rounded, externally densely covered with trichomes, internally densely covered with simple brown trichomes 0.1–0.4 mm; corolla 5-merous, petals 2–4 × 2.4 mm, white; floral disc 1.5–2.6 mm diam.; staminal ring glabrous, stamens 2–6 mm long, white, anthers eglandular; ovary 3-locular, 2 ovules per locule, style 4–7 mm long, stigma punctiform. **Fruits** globose, 4–9 × 4–9 mm, green when young, red to dark when mature, crowned by the five calyx lobes; one or two seeds, testa smooth, light or dark brown, polished.

Distribution and Habitat:—*Myrcia rufipes* is commonly found in *campo rupestre*, *cerrado* and associated forests from the Brazilian states of Alagoas, Bahia, Mato Grosso, Mato Grosso do Sul, Goiás, Minas Gerias and São Paulo, but also occurs less frequently in the semi-deciduos forest from western Espírito Santo and eastern Minas Gerais. *Myrcia rufipes* has been recorded from altitudes of 230–1400 m. This species is here newly recorded from Mato Grosso and Mato Grosso do Sul.

Etymology:—the epithet alludes to the rufous indument.

Phenology:—Flowers and fruits all over the year.

Conservation Assessment:—*Myrcia rufipes* is widespread and frequentely occurs in large populations. Numerous gatherings are from inside protected areas. This species has an Extent of Occurrence greater than 2,000,000 km^2 and can be assessed as Least Concerned (LC) following IUCN criteria (2012).

Comments:—*Myrcia rufipes* is a shrub or tree highly variable. Leaves can be opposite, verticillate or alternate, elliptic-lanceolate to widely elliptic, generally coriaceous with revolute margins. Most of the individuals from *campo rupestre* vegetation present smaller leaves and inflorescences, a morphology quite dissimilar to the typical *Myrcia rufipes*, but still acceptable within the large variation of the species.

Many morphotypes of *Myrcia rufipes* are similar to *M. guianensis*. The main difference between these two species is the presence of rufous, rarely brown trichomes in *M. rufipes*, at least in young parts, while *M. guianensis* has fewer trichomes, hialinous to yellowish or light brown; besides, *M. rufipes* has often coriaceous leaves with revolute margin.

Several accessions of *Myrcia rufipes* were included in phylogenetic studies and, as well as other widespread species, appear to be non-monophyletic (Chapter 1). At least two populations from Minas Gerais (*Lima et al. 523* and *Lima et al. 548*) may be assigned as segregated species in the future. These morphotypes however, share overlapping characters with typical *M. rufipes*, preventing any conclusion based only on morphology and geography. Population genetic studies will certainly support any future taxonomic decision.

Selected specimens examined:—BRAZIL. Alagoas: Pilar, 28 July 2001, *Souza 26674* (ESA). Bahia: Abaíra, 15 October 1992, *Ganev 1221* (UB); Caetité, 21 August 1995, *Hatschbach 63234* (MBM, SPF); Correntina, 19 November 1991, *Machado 322* (UB); Cristópolis, 10 October 1981, *Hatschbach 44118* (HUEFS, MBM); Jaguaquara, 5 December 1999, *Melo 3197* (HUEFS); Lagedo do Tabocal, 25 February 2000, *Oliveira 327* (HUEFS); Morro do Chapéu, 25 May 2008, *Roque 1837* (ALCB); Ribeirão do Pombal, 24 February 2006, *Melo 4264* (HUEFS); Rui Barbosa, 7 January 2007, *Cardoso 1485* (HUEFS); São Félix do Coribe, 13 October 2005, *Queiroz 10986* (HUEFS); Utinga, 1 March 2003, *Senna 111* (HUEFS). Espírito Santo: Barra de São Francisco, 22 November 2000, *Kollmann 3346* (MBML, UPCB). Goiás: Anápolis, 16 November 2011, *Staggemeier 235* (UB); Cavalcante, 17 October 2009, *Faria 683* (UB); Colinas do Sul, 2 December 1992, *Hatschbach 58376* (C, FLOR, MBM); Cristalina, 30 September 2010, *Zanatta 563* (UB); Niquelândia 4 October 1997, *Fonseca 1648* (UB);

Teresina de Goiás, 17 October 1990, *Hatschbach 54679* (MBM). Mato Grosso: Chapada dos Guimarães, 29 February 1984, *Monteiro 17* (RB); Novo Mundo, 14 December 2006, *Sasaki 1228* (K); Rondonópolis, 23 July 1974, *Hatschbach 34709* (ESA, HUEFS, MBM, SP, SPF); Vale dos Sonhos, 25 August 1972, *Ratter 2206* (UEC). Mato Grosso do Sul: Corumbá, 20 October 2002, *Damasceno 2588* (UEC). Minas Gerais: Belo Horizonte, 27 September 1942, *Magalhães 2224* (UB); Botumirim, 20 November 2007, *Mello-Silva 3070* (SPF); Buenópolis, 23 October 2007, *Mello 149* (HUFU, UPCB); Cristália, 20 August 2002, *Hatschbach 73707* (ALCB, HUEFS, MBM); Diamantina, 15 November 2014, *Lima 536* (UEC, UPCB); Conceição do Mato Dentro, 23 August 2000, *Lima 127* (SPF); Jaboticatubas, 4 August 1972, *Hatschbach 29830* (MBM); Joaquim Felício, 17 November 2014, *Lima 548* (UEC, UPCB); Lagamar, 14 September 2003, *Alves 604* (HUFU, UPCB); Matozinhos, 24 October 2006, *Melo Jr. 596* (SPF); Miradouro, 12 January 2001, *Salino 5993* (SPF); Montes Claros, 18 August 2002, *Hatschbach 73663* (UPCB); Perdizes, 19 September 2002, *Amorim 167* (HUFU); Presidente Kubitschek, 14 November 2014, *Lima 530* (UEC, UPCB); Santana do Riacho, 13 November 2014, *Lima 523* (UEC, UPCB); São Gonçalo do Rio Preto, 24 February 2006, *Costa 1045* (DIAM); São Roque de Minas, 3 September 2014, *Lima 467* (UEC, UPCB); Várzea da Palma, 22 October 1999, *Hatschbach 69523* (UPCB). São Paulo: Agudos, 7 December 1995, *Montanholi 59* (SP); Araraquara, 29 November 1951, *Hoehne 3809* (SPF); Botucatu, 14 October 1971, *Gottsberger 219413R* (UB); Corumbataí, 27 September 2000, *Mechi 45* (SPF); Itirapina, 5 February 1994, *Tamashiro T426* (UEC); Luís Antônio, 20 October 1999, *Nicolau 3112* (SP); Mogi-Guaçu, 10 November 1998, *Mattos 32458* (FLOR); São Manuel, 14 January 1996, *Montanholi 90B* (SP).

20. *Myrcia salicifolia* De Candolle (1828: 246). *Aulomyrcia salicifolia* (DC.) O. Berg (1855: 78). Figures 27 and 42.

Type:—BRAZIL. Amazonas: ad Rio Tapura (Japurá), prov. Alto Amazonas, *Martius s.n.* (holotype M-photo! [barcode 137030]; isotype G-DC!).

Trees to 10 m. **Twigs** flat, brown, covered with scattered simple brown trichomes 0.2–0.4 mm when youn; mature twigs terete, cortex not exfoliating, covered with scattered trichomes or glabrescent; internode 5–13 mm long. **Leaves** with petioles sulcate, 2–4 × 0.5–0.8 mm, covered with scattered trichomes when young and mature; blades lanceolate or elliptic-lanceolate, 3.5–10 × 0.8–1.7 cm, 3.5–5 times longer than wide, concolorous when dry, apices acute to obtuse, bases acute, sometimes decurrent on the petiole, margins revolute or not when dry, secondary veins 13–21 at each side, 2–5.4 mm apart, leaving the midvein at angles of 45–60º, one marginal vein ca. 1 mm from the margin; adaxial surface glabrous, sometimes polished, midvein raised, secondary veins flat or inconspicuous, tertiary veins inconspicuous, gland dots conspicuous, ca. 5/mm^2; abaxial surface glabrous or with scattered trichomes near the base, midvein raised, secondary veins raised or flat, tertiary veins conspicuous, gland dots conspicuous, 5–7/mm^2. **Inflorescences** axillary, racemiform, rarely paniculiform, pyramidal with opposite or sub-opposite branching and dichasial subunits, main axis flat, 30–69 × 0.5–0.8 mm, glabrous, flowers with pedicels up to 5 mm; bracts lanceolate, 2–4 × 0.5–0.8 mm, covered with simple trichomes on both sides, generally deciduous before anthesis; bracteoles not seen, deciduous before anthesis. **Flower buds** globose to obovoid, 2.7–3 × 2–2.5 mm; flowers with hypanthium not tearing at anthesis, ca. 0.5 mm prolongued above the ovary, externally and internally glabrous; calyx 5-merous, lobes depressed ovate, ca. 0.5 × 1 mm, <1 mm thick, unequal between them, apices rounded, externally glabrous, internally densely covered with simple brown trichomes to 0.1 mm; corolla 5-merous, petals ca. 3 × 3 mm, white; floral disc 1–1.5 mm diam.; staminal ring glabrous, stamens 2–5 mm long, white, anthers eglandular; ovary 3-locular, 2 ovules per locule, style ca. 5 mm long, glabrous, stigma punctiform. **Fruits** globose, 0.7–1 × 0.7–1 mm, green when young, turning dark when mature, glabrous, crowned by the five calyx lobes; seed not seen.

Distribution and Habitat:—*Myrcia salicifolia* occurs in Amazonian riverbank forests from Brazil and Colombia, in lowlands of 45–250 m elevation. In Brazil, the species has been registered in the states of Amazonas, Pará and is here newly recorded from Mato Grosso. McVaugh (1958, p. 658) treated *M. salicifolia* as 'probably' occurring in Peru, as there are Brazilian and Colombian collections (*Martius s.n.* at Rio Japurá and *Schultes 16364* at Rio Caquetá, respectively) near to the borders of these three countries. A single collection (*Rimachi 4748*) from Peru identified as such was found in MO, but it does not match *Myrcia salicifolia*.

Etymology:—the epithet refers to the similarity of the leaf shape with that of *Salix* (Linnaeus 1753: 1015; Salicaceae).

Phenology:—Flowers in January, March, August and December; fruits in April and between October and January.

Conservation Assessment:—*Myrcia salicifolia* is known from few specimens, from a poorly collected area. This species likely has several other unknown populations spread in the Amazon forest. Due to the absence of additional information about the real distribution of *M. salicilifolia*, it is preferably scored as DD (Data Deficient) according to IUCN criteria (2012).

Comments:—*Myrcia salicifolia* is characterized by its lanceolate or elliptic-lanceolate leaves and racemiform inflorescences shorter than the leaves. *Martinelli 12304* presents small few-flowered panicles. This species differs from Amazonian specimens of *Myrcia guianensis* through its narrower leaves and reduced, pauciflorous inflorescences. *Myrcia salicifolia* is poorly known, with few collections available.

Specimens examined:—BRAZIL. Amazonas: prope Panuré ad Rio Uaupés, October 1852, *Spruce 2818* (BM, BR, K). Mato Grosso: Campo Teles Pires, August 1950, *Sick B531* (RB). Pará: Obidos, 6 December 1987, *Martinelli 12304* (K, RB). COLOMBIA. Caqueta, 17 January 1989, *Gentry 64810* (BM, MO-photo); Rio Apaporis, 16 September 1951, *Schultes 14019* (US-photo); 21 January 1952, *Schultes 14927A* (US-photo); 15 March 1952, *Schultes 15947* (US-photo); Rio Caquetá, 2 May 1952, *Schultes 16364* (US-photo).

21. *Myrcia stricta* (O. Berg) Kiaerskou (1893: 99). *Aulomyrcia stricta* O. Berg in Martius (1859: 548). Figures 28 and 45.

Type:—BRAZIL. Goiás: in campis editis ladiposisque planitieri Chapada de S. Marcos prov. Goyazensis, *Riedel 2495* (holotype LE; isotypes G!, GH-photo!, K!, P [3]!, S-photo!, U!, W!).

Myrcia stricta (O. Berg) Mattos & D. Legrand (1975: 5), nom. illeg.

Sub-shrubs or shrubs to 1 m. **Twigs** terete, rarely flat, light brown or greyish, densely to moderately covered with simple white trichomes 0.3–1 mm when young; mature twigs terete, cortex exfoliating, covered with trichomes turning dark or glabrescent to glabrous; internode 5–13 mm long. **Leaves** sessile or with petioles semi-terete, up to 0.7 × 0.6 mm, covered with trichomes to glabrous; blades elliptic-lanceolate, 1.5–3 × 0.3–0.6 cm, 4–6 times longer than wide, concolorous when dry, apices acute to acuminate, bases acute to obtuse, margins moderately to strongly revolute when dry (then the leaves look like linear), secondary veins 5–8 at each side, ca. 8 mm apart, leaving the midvein at angles of 45–50º, one marginal vein ca. 0.5 mm from the margin; adaxial surface moderaly covered with trichomes when young, glabrescent to glabrous when mature, dull or polished, midvein raised, secondary and tertiary venation inconspicuous, gland dots inconspicuous; abaxial surface moderaly to densely covered with trichomes when young, glabrescent when mature, midvein raised, secondary veins flat or inconspicuous, tertiary veins inconspicuous, gland dots inconspicuous or not, ca. 8/mm^2. **Inflorescences** axillary or sub-terminal, racemiform, dichasial or reduced to a single flower, main axis terete or slightly flat, 6–25 × 0.4–0.5 mm, sparsely to moderately covered with trichomes or glabrous, flowers sessile or with pedicels up to 3.6 mm; bracts lanceolate to linear, 2.7–3.7 × 0.5–1, with scattered trichomes to glabrous on both sides, frequentely persistent after anthesis; bracteoles lanceolate to linear, ca. 2.5–3 × 0.6–0.8, with scattered trichomes to glabrous on both sides, frequentely persistent after anthesis. **Floral buds** globose or obovoid, 3–4 × 3–3.5 mm; flowers with hypanthium not tearing at anthesis, ca. 0.7 mm prolonged above the ovary, sparsely covered with trichomes to glabrous externally, glabrous internally, rarely scattered trichomes on the top of the ovary; calyx 5-merous, lobes triangular, 0.8–1.9 × 1.5–2.1, <1 mm thick, unequal between them, apices acute to acuminate, externally with scattered trichomes to glabrous, internally densely covered with trichomes; corolla 5-merous, petals ca. 3.5 × 3.5 mm, white or pinkish; floral disc 2–2.5 mm diam.; stamens 2–5 mm long, white, anthers eglandular; ovary 3-locular, with two ovules per locule, style 4.7–6 mm stigma punctiform. **Fruits** globose, 6–9 × 6–8 mm, green when young, red when mature, with scattered trichomes to glabrous, crowned by the five calyx lobes; seed not seen.

Distribution and Habitat:—*Myrcia stricta* occurs in Goiás, Distrito Federal and southwestern Minas Gerais, Brazil, growing in sandy and rocky soils of *cerrado* and *campo rupestre*. It has been found at altitudes of 800–1220 m. BFG (2015) cited *Myrcia stricta* to Bahia, but the related specimen is *M. laricina*. The same authors also cited *M. stricta* to Tocantins, but without any voucher. A specimen in RB (*Delforge s.n.* RB00315560) has its locality databased as 'Brasilândia do Tocantins', but its label bears 'Brasilândia, Goiás, prox. Brasília'. Indeed, the state of Tocantins was part of Goiás when the collection was made (1960) and there are localities called 'Brasilândia' in both states. As no other records of *Myrcia stricta* were found northwards Chapada dos Veadeiros region, it is presumable that the species is restricted to a more southern distribution.

Etymology:—the epithet 'stricta' means 'tight, narrow', alluding to its leaf shape.

Phenology:—Flowers between August and January; fruits between November and March.

Conservation Assessment:—Altough *Myrcia stricta* is known from a relatively wide area of distribution, this species seems be restricted to few protected and unprotected localities, with an Area of Occupancy of ca. 60 km^2. The habitats where *Myrcia stricta* occurs are severaly fragmented and frequently subject to anthropogenic action. Additionaly, *Myrcia stricta* has usually small populations. This species can be accessed as Endangered (EN) following criteria B2a, biii (IUCN 2012).

Comments:—*Myrcia stricta* is a sub-shrub or small shrub moderately to densely covered with white and long trichomes on the young vegetative branches. Trichomes become dark and tend to fall when mature. Specimens from Goiás and Distrito Federal present denser and longer hairs than those from Minas Gerais. Leaves are opposite, alternate or verticillate, varying even in a single individual, normally narrow, elliptic-lanceolate, coriaceous, with indistinguishable secondary venation on both sides. Inflorescences are reduced to racemes, dichasia or single flowers, glabrous or sparselly covered with white hairs. Bracts and bracteoles are frequentely persistent after anthesis; bracteoles are sometimes longer than the floral buds. Flowers are essencialy glabrous, an important feature to distinguish *Myrcia stricta* from *M. nivea* that has densely pubescent flowers (see also notes on *M. nivea*). Few individuals of *M. stricta* present scattered white trichomes on the top of the ovary and base of the style, an unusual characteristic within the Guianensis clade.

Selected specimens examined:—BRAZIL. Distrito Federal: Brasília, 4 September 1984, *Cavalheiro 36* (SPF); Taguatinga, 17 December 2010, *Santos 627* (SPF). Goiás: Alto Paraíso de Goiás, 14 December 2010, *Santos 608* (SPF); Brasilândia, 27 October 1960, *Dalforge s.n.* (RB00315560); Cocalzinho, 14 January 2007, *Bosquetti 508* (ESA); Pirenópolis, 12 September 2014, *Lima 508* (K, UPCB). Minas Gerais: Indianápolis, 26 September 1990, *Gottsberger 12-26990* (UB); Uberlândia, 6 January 2004, *Oliveira 14* (HUFU, UPCB); 24 November 1995, *Leenza 189* (HUFU).

22. *Myrcia subalpestris* De Candolle (1828: 250). *Aulomyrcia subalpestris* (DC.) O. Berg (1855: 73). Figures 29 and 45.

Type:—BRAZIL. Minas Gerais: prov. Minarum, *Martius s.n.* (holotype M-photo! [0137008], isotype G-DC!).

Aulomyrcia subverticillaris O. Berg in Martius (1857: 124). *Aulomyrcia subverticillaris* var. *incanescens* O. Berg in Martius (1857: 124). *Myrcia subverticillaris* (O. Berg)

Kiaerskou (1893: 88). Type:—BRAZIL. Brasilia, *Sellow s.n.* (lectotype K! [000344445], selected by Lima *et al.* (in press.); isolectotype K!).

Aulomyrcia subverticillaris var. *rufa* O. Berg in Martius (1857: 124). Type:—BRAZIL. Minas Gerais: prov. Minarum, September 1840, *Gardner 4664* (lectotype W! [0040181], selected by Lima *et al.* (in press.); isolectotypes BM!, G!, K [2]!, W-Rich!)

Aulomyrcia subverticillaris var. *angustifolia* O. Berg in Martius (1857: 124). Type:—BRAZIL. Minas Gerais: prov. Minas Geraes, *Martius 1232* (lectotype M-photo! [0137006], selected by Lima *et al.* (in press.); isolectotypes BM!, BR [3]!, F-photo!, HAL-photo!, K!, M-photo!, NY-photo!, P!, S-photo!, W [2]!).

Aulomyrcia corymbiflora O.Berg (1855: 127). Type:—BRAZIL. Minas Gerais: in monte vulgo Serra de Curumatahi, *Saint-Hilaire 2031* (lectotype P! [00161343], selected by Lima *et al.* (in press.); isolectotypes P [2]!).

Aulomyrcia bicudoensis O.Berg in Martius (1859: 557). *Myrcia bicudoensis* (O.Berg) Mattos (2009: 4). Type:—BRAZIL. In desertis prope Bicudo prov. Mato Grosso (on the protologue), prov. Minas [Gerais] (on the label), November 1834, *Riedel s.n.* (lectotype LE-photo! [00007025], selected by Lima *et al.* (in press.); isolectotype LE-photo!).

Aulomyrcia daphnoides var. *ochracea* O. Berg (1860: 663). Type:—BRAZIL. Minas Gerais: prov. Minarum, in campis prope Caldas, 25 September 1854, *Lindberg 314* (holotype BR! [0000013473792]).

Trees or shrubs to 4 m. **Twigs** flat or angular, brown, densely covered with simple ferrugineous to rufous trichomes 0.3–0.6 mm when young; mature twigs terete, cortex exfoliating, covered with trichomes turning grey or withish, rarely dark, glabrescent; internode 6–26 mm long. **Leaves** with petioles sulcate, (3.5–)5–11 × 1–1.8 mm, densely

covered with trichomes when young, glabrescent when mature; blades elliptic or oblong-elliptic to obovate, 2.5–8.2 × 0.9–3.7 cm, 1.8–3.5 times longer than wide, discolorous when dry, apices emarginate, rounded or obtuse, bases acute, rarely obtuse, margins slightly revolute when dry, secondary veins 12–14 at each side, 3–7 mm apart, leaving the midvein at angles of 50–80°, one marginal vein 0.6–1.5 mm from the margin; adaxial surface moderately to sparsely coverered with trichomes when young, sometimes the trichomes restricted to the midvein, glabrescent to glabrous when mature, dull, midvein raised, secondary veins generally inconspicuous, tertiary veins inconspicuous, gland dots conspicuous or not, 4–6/mm^2; abaxial surface densely covered with trichomes when young, these turning grey or witish, rarely dark, and falling when mature, midvein raised, secondary veins raised (but visible only under the trichomes), tertiary veins inconspicuous, gland dots conspicuous, 4–6/mm^2.
Inflorescences sub-terminal or terminal, paniculiform, pyramidal with opposite branching and dichasial subunits, main axis flat, 28–95 × 0.9–1.5 mm, moderately to densely covered with trichomes, flowers sessile or with pedicels up to 4 mm; bracts lanceolate, 2–4 × 0.5–1.8 mm, densely covered with trichomes on both sides, deciduous before anthesis; bracteoles elliptic to lanceolate, 1–1.8 × 1.2 mm, densely covered with trichomes on both sides, deciduous before anthesis. **Flower buds** globose or obovoid, 2–3.8 × 2.2–3.5 mm; flowers with hypanthium not tearing at anthesis, 0.9–1.5 mm prolonged above the ovary, externally glabrous or nearly so, rarely covered with trichomes, internally glabrous; calyx 5-merous, lobes triangular, 0.7–1.6 × 0.6–1.5 mm, <1 mm thick, unequal between them, rarely depressed ovate, apices acute, rarely rounded, internally densely covered with simple brown trichomes 0.1–0.3 mm; corolla 5-merous, petals ca. 3 × 3 mm, white; floral disc 1.2–1.6 mm diam.; staminal ring glabrous, stamens 2–7 mm long, white, anthers eglandular or with an apical gland;

ovary 3-locular, 2 ovules per locule, style 4–6 mm, glabrous, stigma punctiform. **Fruits** globose, ca. 6 × 6 mm, green when young, turning red when mature, glabrous, rarely with scattered trichomes, crowned by the five calyx lobes; one or two seeds, testa smooth, brown, polished.

Distribution and Habitat:—*Myrcia subalpestris* is distributed from the border between Espírito Santo and Minas Gerais, Brazil, to Amambay department in Paraguay and Santa Cruz department in Bolivia. This species occurs in *cerrado* and *campo rupestre*, more frequently in the Brazilian states of Minas Gerais and São Paulo, but can also be found in montane Atlantic rainforest from Caparaó National Park, Minas Gerais/Espírito Santo, and Nova Friburgo, Rio de Janeiro. *Myrcia subalpestris* has been usually registered in altitudes of 600–1500 m. In its southweastern distribution however, this species grows at lower elevations between 240–480 m in Mato Grosso do Sul (Brazil), Amambay (Paraguay) and Santa Cruz (Bolivia). *Myrcia subalpestris* is here newly recorded to Paraguay, Bolivia and the Brazilian states of Espírito Santo, Rio de Janeiro, São Paulo and Mato Grosso do Sul.

Etymology:—from the latin word ‘alpestris’ meaning ‘mountaneous’ or ‘rocky’. The epithet alludes to the habitat where *Myrcia subalpestris* normally occurs: rocky soils in montaneous regions.

Phenology:—Flowers between June and March; fruits between July and February.

Conservation Assessment:—*Myrcia subalpestris* has been registered in many protected and unprotected sites in a wide area of distribution. Altough the habitats where this species occur are severely threatened and fragmented, *M. subalpestris* can easily resprout after fire (pers. observ.) and occurs in large populations. This species has an Extent of Occurrence (EOO) >987,950 km^2 and can be assessed as Least Concerned (LC) following IUCN criteria (2012).

Comments:—*Myrcia subalpestris* is characterized by its elliptic or elliptic-oblong leaves densely pubescent abaxially, frequentely inconspicuous secondary venation adaxially, and long petioles. Phylotaxy varies between alternate, opposite or verticillate in a single individual. Inflorescences are developed panicles also covered with ferrugineous to rufous trichomes and flower buds are normally glabrous or nearly so.

Individuals growing at higher elevations have smaller leaves and inflorescences. Likely due to that, Mazine & Souza (2007) treated *Myrcia subalpestris* from Serra do Caparaó as the non-Guianensis clade *M. venulosa* De Candolle (1828: 250). All specimens listed by the authors were analyzed by us and well-match the morphology of *M. subalpestris*.

This species can resemble *Myrcia tortuosa*, especially where both species co-occur (São Paulo and Mato Grosso do Sul), due to the habit, general indument and glabrous flower buds. *Myrcia tortuosa* however, tends to be more robust presenting coriaceous leaves, visible secondary venation adaxially, and thicker petioles and inflorescence raquis. Most of the collections from São Paulo were named as *Myrcia linguiformis*, a synonym of *M. tortuosa*, but are here reidentified as *M. subalpestris* following the morphological rationale described above. Future population genetics studies would help in the delimitation between these two species.

Selected specimens examined:—BOLIVIA. Santa Cruz: Velasco, 26 October 1995, *Killeen 76342* (SP); 17 October 1996, *Carrión 443* (SP). BRAZIL. Espírito Santo: Dores do Rio Preto, 19 October 1999, *Mazine 182* (ESA). Mato Grosso: Tapurah, 9 June 1997, *Souza 17447* (UPCB); Mato Grosso do Sul: Campo Grande, 9 August 1970, *Hatschbach 24550* (C, K, MBM); Sidrolândia, 25 August 1973, *Hatschbach 32330* (C, MBM). Minas Gerais: Alpinópolis, 18 September 1977, *Leitão Filho 5953* (UEC); Alto Caparaó, 20 October 1999, *Mazine 218* (ESA); Belo Horizonte, 16 August 1988, *Peron 626* (RB); Boa Esperança, 30 July 2006, *Geraldino 433* (UEC); Brumadinho, 16 July 2008, *Rodrigues 358* (RB); Caldas, 3 October 1845, *Regnell 553* (C); Capitólio, 4 September 2014, *Lima 476* (UEC, UPCB); Carrancas, 9 December 1983, *Leitão-Filho 15442* (UEC); Delfinópolis, 6 September 1998, *Souza 21224* (ESA); Ibiraci, 6 September 1998, *Souza 21150* (ESA); Itabirito, 14 October 19995, *Souza 226* (ESA); Lavras, 8 September 2001, *Chaddad 66* (ESA); Lima Duarte, 22 January 1987, *Andrade 893* (RB); Morro do Pilar, 26 October 1993, *Campos CFSC 13479* (SPF); Ouro Branco, 11 November 2014, *Lima 514* (UEC, UPCB); Ouro Preto, 22 October 1992, *Oliveira 1567* (SPF); Pedra Menina, 13 January 2010, *Colletta 369* (RB); Pimenta, 11 August 1983, *Carvalho s.n.* (SPF 37442); Sacramento, 1 September 2014, *Lima 457* (UEC, UPCB); Santana do Riacho, 23 September 1993, *Campos CFSC 13433* (SPF); São Batista do Glória, 13 November 2011, *Scatigna 10* (UEC); São Roque de Minas, 2 September 2014, *Lima 464* (UEC, UPCB); São Sebastião do Paraíso, 8 January 1990, *Tozzi 23077* (UEC). São Paulo: Altinópolis, 19 September 1984, *Santos Filho 16600* (UEC); Bauru, 21 October 1997, *Pinheiro 531* (UEC); Campinas, 6 November 2002, *Costa 462* (UEC); Casa Branca, 7 November 1994, *Kinoshita 94/223* (SPF, UEC); Descalvado, 24 August 1997, *Oliveira 3237* (UEC); Itirapina, 6 July 1991, *Barbosa 456* (HUFU); Luiz Antônio, 4 September 2001, *Silva s.n.* (UEC 145569); Mogi-Guaçu, 15 September 1980, *Mantovani 79087* (SPF); Pedregulho, 23 August 2003, *Sasaki 658* (K, SPF); Pirassununga, 15 August 1994, *Batalha 190* (SPF); Pratânia, 3 September 2002, *Carmello-Guerreiro 162* (UEC). Rio de Janeiro: October 1840, *Gardner 5467* (BM, W); Nova Friburgo, 15 December 2011, *Borges 1180* (RB). PARAGUAY: Amambay, 27 July 1910, *Hassler 10571* (K); 8 March 1978, *Bernardi 18966* (BM, K, U); 9 December 1978, *Bernardi 19028* (BM, U); 18 December 1999, *Ferrucci 1686* (K).

23. *Myrcia tortuosa* (O. Berg) N. Silveira (1985a: 67). *Aulomyrcia tortuosa* O. Berg in Martius (1859: 558). Type:—BRAZIL. Goiás: in campis editis super Chapada de S. Marcos prov. Goyazensis, August 1834, *Riedel 2497* (holotype LE, isotypes F [fragm.]-photo!, G!, P [2]!). Figures 30 and 46.

Aulomyrcia linguiformis O. Berg in Martius (1857: 125). *Myrcia linguiformis* (O. Berg) N. Silveira (1985a: 66). Type:—BRAZIL. Goiás: ad Porto Real in prov. Goyaz, *Pohl 1065* (lectotype W! [0032542], selected by Lima *et al.* (in press.); isolectotypes K [2]!, M-photo!, W!).

Aulomyrcia pachyclada O. Berg in Martius (1857: 133). *Aulomyrcia pachyclada* var. *spathulata* O. Berg in Martius (1857: 133). *Myrcia pachyclada* (O. Berg) N. Silveira (1985b: 2). *Myrcia pachyclada* var. *spathulata* (O. Berg) N. Silveira (1985b: 2). Type:—BRAZIL. In campis prov. Itararé, *Sellow s.n.*; S. Ignacio prov. Paraná, *Sellow s.n.* (syntypes B†). BRAZIL. Mato Grosso do Sul: Três Lagoas, Faz. Floresta prop. Joaquim Queiros, 17 September 1964, *Gomes Jr. 2139* (neotype UB! [no barcode], selected by Lima *et al.* (in press.)).

Aulomyrcia pachyclada var. *elliptica* O. Berg in Martius (1857: 134). Type:—BRAZIL. Goiás: ad urbem Natividade, in regione boreali prov. Goyaz, *Pohl 1019* (lectotype W! [0037117], selected by Lima *et al.* (in press.); isolectotypes F [fragm.]-photo!, K!, W!).

Aulomyrcia pachyclada var. *prolifera* O. Berg in Martius (1859: 558). *Myrcia pachyclada* var. *prolifera* (O. Berg) N. Silveira (1985: 2). Type:—BRAZIL. São Paulo:

in deserto prope Rio Pardo prov. S. Pauli, Sep. 1826, *Riedel 1564* (holotype LE-photo! [no barcode]; isotypes G!, P [2]!).

Trees or shrubs to 5 m. **Twigs** angular or flat, brown, densely covered with simple brown to ferrugineous trichomes 0.3–0.6 mm when young; mature twigs terete, cortex exfoliating, covered with trichomes turning dark to glabrescent; internode 5–37 mm long. **Leaves** with petioles semi-terete or sulcate, 2.5–7 × 1.7–2 mm, densely covered with the trichomes when young, glabrescent to glabrous when mature; blades elliptic, widely elliptic, oblong or obovate, 5–15.6 × 3–9 cm, 1.5–2 times longer than wide, concolour or discolour when dry, apices obtuse to rounded, bases attenuate, acute or obtuse, margins slightly revolute or not at all when dry, secondary veins 12–24 at each side, 6–8 mm apart, leaving the midvein at angles of 60–70º, one marginal vein 2.5–3 mm from the margin; adaxial surface moderately to densely covered with trichomes when young, glabrescent to glabrous when mature, midvein and secondary veins raised or flat, tertiary veins conspicuous, gland dots conspicuous, 5–9/mm^2; abaxial suface moderately to densely covered with trichomes when young, these turning dark and falling when mature, midven and secondary veins raised, tertiary veins conspicuous, gland dots conspicuous, 5–10/mm^2. **Inflorescences** sub-terminal or terminal, paniculiform, pyramidal with opposite branching and dichasial subunits, main axis angular or flat, 25–73 × 1–2 mm, densely covered with trichomes, flowers sessile or with pedicels up to 3 mm; bracts not seen, deciduous before anthesis; bracteoles lanceolate, 1.5–2 × 1.2–1.5 mm, densely covered with trichomes on both sides, covered with trichomes on both sides, deciduous before anthesis. **Flower buds** globose or obovoid, 0.2–0.4 × 0.1–0.4 mm; flowers with hypanthium not tearing at anthesis, 0.5–0.8 mm prolonged above the ovary, externally glabrous or nearly so, internally glabrous; calyx 5-merous, lobes depressed ovate, rarely triangular, 2–4.6 × 2.2–4.8 mm,

<1 mm thick, unequal between them, apex obtuse or rounded, internally densely covered with simple brown trichomes 0.1–0.3 mm; corolla 5-merous, petals ca. 3.5 × 3.5 mm, white; floral disc 1.8–2 mm diam.; staminal ring glabrous, stamens 2–7 mm long, white, anthers eglandular; ovary 3-locular, 2 ovules per locule, style 4–6 long, glabrous, stigma punctiform. **Fruits** globose, 5–7 × 5–7 mm, green when young, turning dark when mature, glabrous or with very scattered trichomes, crowned by the five calyx lobes; seed not seen.

Distribution and Habitat:—*Myrcia tortuosa* is found in dense cerrado vegetation from the states of Mato Grosso, Mato Grosso do Sul, Goiás, Minas Gerais and São Paulo. This species has been registered in sandy soils at altitudes of 90–850 m elevation.

Etymology:—the Latin word 'tortuosa' is a reference to the crooked stem and branches.

Phenology:—Flowers between June and November; fruits in April and between October and February.

Conservation Assessment:—*Myrcia tortuosa* has a wide distribution in central and southeastern Brazil totalizing an Extent of Occurrence of 842,750 km^2. This species can be considered as Least Concerned (LC) following IUCN criteria (2012).

Comments:—*Myrcia tortuosa* is a robust shrub or tree with crooked stem and branches, coriaceous leaves that are hairy at least abaxially, and thickened branches, petioles and inflorescence raquis. Branches and leaves are glabrescent when mature. BFG (2015) considered this species as synonym of *M. vestita*, but morphological differences can be seen and we chose to keep them apart (see also Chapter 2). Flower buds are glabrous or very sparsely pubescent in *Myrcia tortuosa* and densely so in *M. vestita*. Additionally, *Myrcia tortuosa* is a branched large shrub or a tree while *M. vestita* tends to be an unbranched small shrub (Rosa 2015).

Specimens of *Myrcia tortuosa* from São Paulo and Mato Grosso do Sul can be morphologically similar to *M. subalpestris*, but this last species has thiner petioles and nearly or completely inconspicuous secondary venetion adaxially. See notes on *Myrcia subalpestris*.

Selected specimens examined:—BRAZIL. Goiás: Campinaçu, 7 August 2011, *Faria 1546* (UB); Cavalcante, 15 April 2009, *Martinelli 16457* (RB); Chapadão do Céu, 11 October 2006, *Paula-Souza 8237* (SPF); Ipameri, 26 September 1975, *Hatschbach 37149* (C, MBM); Jataí, 2 October 1968, *Onishi 184/953* (K); Jussara, 21 November 2011, *Staggemeier 303* (UB); Mineiros, 24 September 1993, *Proença 922* (K); Monte Alegre de Goiás, 18 October 1990, *Hatschbach 54736* (MBM, RB); Piracanjuba, 26 September 1975, *Hatschbach 37149* (C, MBM); Mato Grosso: Alto Araguaia, 28 October 1983, *Saddi 3694* (RB); Barra do Garças, 16 September 2005, *Faria 114* (UB); Chapada dos Guimarães, 13 February 1975, *Hatschbach 36125* (C, MBM); Cocalinho, 20 October 2000, *Pinheiro Neto 113* (UB); Nova Xavantina, 23 November 2011, *Staggemeier 456* (UB); Novo Santo Antônio, 2 November 2005, *Marimon 943* (UB); Rio Verde, 7 April 1994, *Martinelli 352* (RB). Mato Grosso do Sul: Corumbá, 24 November 2001, *Damasceno Jr 3068* (UB); Selvíria, 5 November 1985, *Leitão-Filho 15* (UEC); Três Lagoas, 17 September 1964, *Gomes Jr 2139* (UB). Minas Gerais: Comendador Gomes, 7 August 1967, *Goodland 3720* UB); São Paulo: Ilha Solteira, July 1979, *Bianco 10268* (UEC); Paranapanema, 17 July 1962, *Labouriau 97* (RB).

24. *Myrcia tumida* Sobral (2010: 342). Figures 31 and 46.

Type:—BRAZIL. Espírito Santo: Santa Teresa, Valsugana Velha, Reserva Biológica Santa Lúcia, 28 January 1999, *Kollmann et al. 1736* (holotype MBML!, isotypes BHCB, SPF!, UPCB!).

Treelets to 5 m. **Twigs** terete or flat, brown or greyish, glabrous when young; mature twigs terete, cortex exfoliating, glabrous; internode 28–40 mm. **Leaves** with petioles sulcate, 9.8–13 × 1–1.8 mm, glabrous; blades widely elliptic or elliptic-oblong, 6.8–10 × 3–6 cm, 1.5–1.7 times longer than wide, concolorous or slightly discolorous when dry, apices obtuse to rounded, bases attenuate, margins not revolute when dry, secondary veins 15–18 at each side, 3–7 mm apart, leaving the midvein at angles of 45–60°, one marginal vein 0.8–1.2 mm from the margin; adaxial surface glabrous, polished, midvein raised, secondary veins flat or raised, tertiary veins conspicuous, gland dots conspicuous, 7–10/mm^2; abaxial surface glabrous, midvein and secondary veins raised, tertiary veins conspicuous, gland dots conspicuous, 7–10/mm^2. **Inflorescences** subterminal or lateral, paniculiform, pyramidal with opposite branching and ramified only once, racemiform, or rarely reduced to one flower, main axis terete, 15–70 × 1–1.5 mm, glabrous, flowers with pedicels up to 2.5 mm; bracts not seen; bracteoles not seen. **Floral buds** globose or obovoid, 3–4 × 3–4 mm; flowers with hypanthium not tearing at anthesis, 1–1.5 mm prolonged above the ovary, externally and internally glabrous; calyx 5-merous, lobes 0.9–1.3 × 2–2.4 mm, >1 mm thick, triangular and swollen, unequal between them, apices acute, externally glabrous, internally covered with simple brown trichomes to 0.1 mm; corolla 5-merous, petals 2.5–3 × 2.5–3 mm, white; floral disc 2.5–3.3 mm diam.; staminal ring glabrous, stamens 2–5 mm long, white, anthers with an apical gland or eglandular; ovary 3-locular, 2 ovules per locule, style 6–8 mm long, stigma punctiform. **Fruits** globose, 11–17 × 10–18 mm, green when young, yellowish when mature, crowned by the five calyx lobes; seed not seen.

Distribution and Habitat:—*Myrcia tumida* is restricted to the Atlantic montane forests from the state of Espírito Santo, southeastern Brazil. It was registered in the municipalities of Santa Teresa and Santa Leopoldina, at altitudes of 600–950 m.

Etymology:—from the Latin 'tumidus' meaning 'swollen', in reference to the calyx lobes shape.

Phenology:—Flowers in November and January; fruits in May and July.

Conservation Assessment:—*Myrcia tumida* is known from few collections in a fragmented and threatened area covered with less than 20% of its original forests (Mendes & Padovan 2000). This species has an Extent of Occurrence (EOO) of ca. 45 km^2 and must be assessed as Critically Endangered (CR) according to criteria B1a, biii (IUCN 2012).

Comments:—*Myrcia tumida* is a treelet promptly recognized by the swollen calyx lobes (1.2–1.5 mm thick) and the reduced panicles ramified only once or racemes with 3–10 flowers, more rarely uniflorous peduncles can be seen. Leaves present reticulate venation and visible, dense gland dots on both sides.

This species is related to *Myrcia guianensis*, but is distinguished through its calyx lobes (never swollen in *M. guianensis*), the longer petioles (9.8–13 mm in *M. tumida* vs. up to 6 mm in *M. guianensis*) and the more visible gland dots in the leaves.

Specimens examined:—BRAZIL. Espírito Santo: Santa Leopoldina, 3 July 1984, *Boone 245* (K, MBML); Santa Teresa, January 1997, *Sobral 8277* (K, MBML); 31 January 2002, *Kollmann 5451* (MBML, SPF); 28 July 2004, *Kollmann 6598* (MBML); 9 July 2007, *Souza 547* (K, RB, UPCB); 23 November 2013, *Lima 387* (K, UEC, UPCB); 24 May 2002, *Vervloet 287* (MBML); 10 April 2003, *Vervloet 2217* (MBML).

25. ***Myrcia variabilis*** De Candolle (1828: 254). *Myrcia variabilis* var. *intermedia* De Candolle (1828: 254). *Aulomyrcia variabilis* (DC.) O. Berg (1855: 62). *Aulomyrcia variabilis* var. *intermedia* (DC.) O. Berg in Martius (1857: 106). Figures 32 and 47.

Type:—BRAZIL. Minas Gerais: prov. Minarum, *Martius s.n.* (lectotype M-photo! [0136979], selected by Lima *et al.* (in press.); isolectotype G-DC!).

Myrcia variabilis var. *ovalifolia* De Candolle (1828: 2554). *Aulomyrcia variabilis* var. *ovalifolia* (DC.) O. Berg in Martius (1857: 106). Type:—BRAZIL. Minas Gerais: prov. Minarum, *Martius s.n.* (lectotype M-photo! [0136981], selected by Lima *et al.* (in press.); isolectotype G-DC!).

Myrcia variabilis var. *nummularia* De Candolle (1828: 254). *Aulomyrcia variabilis* var. *nummularia* (DC.) O. Berg in Martius (1857: 106). Type:—BRAZIL. Minas Gerais: prov. Minarum, *Martius s.n.* (lectotype M-photo! [0136983], selected by Lima *et al.* (in press.); isolectotype G-DC!).

Myrcia dealbata De Candolle (1828: 254). *Aulomyrcia dealbata* (DC.) O. Berg in Martius (1857: 102). *Aulomyrcia dealbata* var. *glaucescens* O. Berg in Martius (1857: 102). Type:—BRAZIL. Minas Gerais: in campis mediterraneis prov. Minas Geraes, *Martius s.n.* (holotype M-photo! [0136877]; isotype G-DC!).

Myrcia cordata Cambessèdes in Saint-Hilaire *et al.* (1832: 330). Type:—BRAZIL. Goiás: in campis petrosis prope tuguria vulgo Sitio do Ribeirão in parte australi provinciae Goyaz, *Saint-Hilaire C1-907* (lectotype P! [0161453], selected by Lima *et al.* (in press.); isolectotypes F [fragm.]-photo!, MPU-photo!, P [2]!).

Aulomyrcia dealbata var. *pallida* O. Berg in Martius (1857: 103). Type:—BRAZIL. Minas Gerais: in parte ajusdem provinciae, dicta Minas Novas, *Martius s.n.* (holotype M-photo! [0136876]).

Aulomyrcia ovalis O. Berg in Martius (1857: 107). *Myrcia ovalis* (O. Berg) N. Silveira (1985b: 2). Type:—BRAZIL. Minas Gerais: prov. Minarum, 1840, *Claussen 529* (lectotype BR! [0000005304684], selected by Lima *et al.* (in press.)).

Aulomyrcia amethystina O.Berg in Martius (1857: 108). *Aulomyrcia amethystina* var. *pulchra* O.Berg (in Martius 1857: 108)**.** *Myrcia amethystina* (O.Berg) Kiaersk. (Kiaerksou 1893: 90). *Myrcia amethystina* var. *pulchra* (O.Berg) Kiaersk. (Kiaerksou 1893: 90)**.** Type:—BRAZIL. Minas Gerais: prov. Minarum, ad praedium Olho-d'Agua prope vicum Contendas in desertis, *Sellow s.n.* (holotype B†; lectotype LE-photo! [00007020], selected by Lima *et al.* (in press.); isolectotypes BR!, K!).

Aulomyrcia amethystina var. *dealbata* O.Berg in Martius (1857: 108). *Myrcia amethystina* var. *dealbata* (O.Berg) Kiaersk. (Kiaerksou 1893: 90). Type:—BRAZIL. Minas Gerais: prov. Minarum, ad villam S. João d'El Rey, s.d., *Pohl 1073* (lectotype W! [0033191], selected by Lima *et al.* (in press.); isolectotypes BR!, K [2]!).

Aulomyrcia intermedia O.Berg in Martius (1857: 107). *Myrcia intermedia* (O.Berg) Kiaersk. (Kiaerskou 1893: 90). Type:—BRAZIL. Goiás: prov. Goyaz, ad Formiga Oliveira et Rio de S. Francisci et Parnahyba, 1837, *Pohl 1030* (lectotype W! [0032482], selected by Lima *et al.* (in press.); isolectotypes BR!, F-photo!, K [2]!, W!).

Aulomyrcia trifolia O.Berg in Martius (1857: 107). Type:—BRAZIL. Minas Gerais: ad Pompeo in parte occidental prov. Minas Geraes, *Sellow s.n.* (lectotype BR! [0000005304370], selected by Lima *et al.* (in press.)).

Aulomyrcia variabilis var. *suffruticosa* O. Berg in Martius (1857: 106). Type:—BRAZIL. Minas Gerais: in campis siccis prope Alegres, *Riedel s.n.* (holotype LE; isotype U!).

Shrubs, treelets or trees to 3 m. **Twigs** flat, brown or rarely whitish, glabrous or sparsely to moderately covered with simple white or brown trichomes 0.1–0.4 mm when young; mature twigs flat or terete, cortex exfoliating, glabrous or sparsely covered trichomes; internode 9–37 mm. **Leaves** sessile or with petioles semi-terete, up to 3.5 × 2.5 mm, glabrous; blades cordate, ovate, ovate-lanceolate, elliptic or elliptic-lanceolate, 3–9.5 × 1.5–5 cm, 1.5–2.2 times longer than wide, concolorous, rarely slightly discolorous when dry, apices acute to obtuse, rarely rounded or retuse, bases cordate to obtuse, margins revolute or not when dry, secondary veins 8–13 at each side, 1–7.5 mm apart, leaving the midvein at angles of 85°–40°, one marginal vein 0.3–2.3 mm from the margin; adaxial surface glabrous, rarely with scattered trichomes restricted to the midvein, midvein raised, secondary veins raised or flat, tertiary veins conspicuous, gland dots conspicuous, up to 5/mm^2; abaxial surface glabrous, rarely covered with scattered trichomes, midvein and secondary veins raised, tertiary veins conspicuous, gland dots conspicuous, up to 5/mm^2. **Inflorescences** subterminal, terminal or axillary, paniculiform with opposite branching and dichasial subunits, main axis flat, 22–90 × 0.5–0.9 mm, glabrous, rarely moderately covered with trichomes, flowers sessile or with pedicels up to 1.5 mm; bracts cordate to lanceolate, 1.5–7 × 1.5–6 mm, glabrous, generally deciduous before anthesis; bracteoles lanceolate to linear, to 1.3 × 0.4 mm, glabrous, persistent or not after anthesis. **Floral buds** globose, 2.3–3.8 × 2–4 mm; flowers with hypanthium not tearing at anthesis, 0.5–1.5 mm prolonged above the ovary, externally and internally glabrous; calyx 5-merous, lobes depressed ovate to triangular, 1–1.8 × 1.5–2.2 mm, <1 mm thick, unequal between them, apices rounded or obtuse, internally densely covered with brown or white simple trichomes 0.1–0.3 mm; corolla 5-merous, petals 3–3.5 × 3–3.5 mm, white, pinkish or purplish; floral disc 2–3 mm diam.; staminal ring glabrous, stamens 2–5 mm long, white, anthers eglandular;

ovary 3-locular, 2 ovules per locule, style 3.6–8 mm long, glabrous, stigma punctiform. **Fruits** globose, 0.5–0.7 × 0.5–0.7 mm, green when young, red to dark when mature, glabrous, crowned by the five calyx lobes; one seed, testa smooth, light brown, somewhat polished.

Distribution and Habitat:—*Myrcia variabilis* is commonly found in dense or open *cerrado* and *campo rupestre* vegetation from the interior of Bahia, southwestern Maranhão, Tocantins, southern Rondônia, Mato Grosso, Mato Grosso do Sul, Goiás, Distrito Federal, Minas Gerais and northwestern São Paulo, Brazil; it is here newly recorded from Maranhão and Rondônia. This species grows in sandy and rocky soils at altitudes of 210–1250 m elevation.

Etymology:—from the Latin 'variabilis' meaning 'variable', aluding to the variation found in leaf shape and size.

Phenology:—Flowers between June and March; fruits in June and between August and April.

Conservation Assessment:—*Myrcia variabilis* is widely distributed in the *cerrado* biome and many collections have been made inside protected areas. This species usually appears in relatively large populations. With an Extent of Occurrence greater than 1,730,000 km^2, *M. variabilis* is accessed as Least Concerned (LC) according to IUCN criteria (2012).

Comments:—*Myrcia variabilis* is a tree, treelet or shrub with compressed branches that are glabrous or very scattered pubescent. Individuals from the northernmost distribution (Goiás, Tocantins and Maranhão) tend to present more trichomes on the branches. *Myrcia variabilis* has variable leaves in respect to shape and size, as represented by the De Candolle's varieties. A single individual can present this variation with cordate leaves at basal portions of the branches and elliptic leaves apically. Leaves are normally congested, cordate to elliptic-lanceolate, sessile or sub-sessile with cordate to obtuse bases, with gland dots conspicuous on both surfaces and sometimes visible through naked eyes, and generally well-marked venation also on both sides. Morphotypes with longer petioles (up to 3 mm) and elliptic-lanceolate leaves with obtuse bases can also be found and represent the synonym *Myrcia amethystina*. Inflorescences are always longer than the leaves, generally multiflorous, glabrous, with gland dots visible on the thin peduncules and axes. Flowers are also glabrous, except inside the calyx lobes covered with brown or white hairs.

Selected specimens examined:—BRAZIL. Bahia: Barreiras, 8 July 1983, *Coradin 7414* (UB); Luís Eduardo Guimarães, 10 October 2004, *Paula-Souza 9299* (SPF); São Desidério, 7 November 1997, *Alvarenga 1035* (UB). Distrito Federal: Brasília, 21 August 2003, *Proença 2662* (SPF, UB). Goiás: Alvorada do Norte, 20 October 1995, *Pereira 2918* (RB); Caiaponia, 12 October 2006, *Paula-Souza 8439* (SPF); Caldas Novas, 14 September 2009, *Moura 19* (ESA); Campo Alegre de Goiás, 8 September 1998, *Souza 21300* (ESA, UEC); Catalão, 22 August 2007, *Arantes et al. s.n.* (HUFU 50518); Ipameri, 26 November 2003, *Mello-Silva 2191* (RB, SPF); Mossâmedes, 5 November 2012, *Borges 969* (SPF); São João da Aliança, 15 August 1990, *Cavalcanti 637* (HUEFS). Maranhão: Carolina, 16 April 1983, *Taylor E1257* (K); Entre Estreito e Carolina, 9 February 2012, *Rosa 1358* (UB). Mato Grosso: Aripuanã, 15 September 1979, *Setz 10500* (UEC); Barra dos Garças, 14 October 1964, *Irwin 6868* (W); Chapada dos Guimarães, 29 January 1989, *Falkenberg 4757* (FLOR, UPCB); Cuiabá, 21 October 1685, *Pirani 1337* (K); Diamantino, 25 August 2008, *Santos 376* (SPF); Nobres, 18 September 1985, *Cid Ferreira 6097* (SPF); Ponte Branca, 10 January 1988, *Ramos 152* (UB); Rosário Oeste, 9 October 1997, *Souza 20526* (ESA); Tapurah, 12 June 1997, *Souza 17831* (ESA); Xavantina, 1 June 1966, *Hunt 5710* (UB). Mato Grosso do Sul: Camapuã, 2 November 1979, *Mendonça 24* (RB); Campo Grande, 11 October 1989, *Resende 32* (RB); São Pedro, 2 November 1996, *Gomes 238* (UB); Três Lagoas, 12 October 1998, *Amaral Jr. 23* (RB). Minas Gerais: Buenópolis, 17 November 2014, *Lima 544* (UEC, UPCB); Curvelo, 3 August 1989, *Simão-Bianchini 106* (SPF); Delfinópolis, 23 November 2000, *Silva 736* (SPF); Diamantina, 23 September 2008, *Mello 398* (HUFU, UPCB); Goiveia, 26 October 1999, *Hatschbach 69773* (MBM, UPCB); Januária, 13 September 2003, *Bovini 2345* (RB, UPCB); Juramento, 4 December 2004, *Hatschbach 78844* (MBM, SPF); Lagoa Dourada, 23 October 2013, *Lima 366* (K, RB, UEC, UPCB); Matozinhos, 22 October 2006, *Mello Jr. 535* (SPF); Paracatu, November 2008, *Solórzano 210* (UB); Patrocínio, 23 November 1994, *Ceccantini 211* (SPF); Ritápolis, 22 October 2013, *Lima 365* (K, RB, UEC, UPCB); Santana do Riacho, 21 March 1983, *Varanda CFSC 9269* (SP); São João del-Rei, 3 November 2009, *Sobral 13022* (RB); São Sebastião do Paraíso, 8 September 1982, *Leitão-Filho 14180* (UEC); Uberlândia, 20 November 2013, *Lima 374* (RB, UEC, UPCB). Rondônia: Vilhena, 7 November 1979, *Vieira 1003* (RB); Vilhena, 26 April 2012, *Antunes 311A* (RB). São Paulo: Estreito, 6 November 1997, *Ferreira 1623* (SPF); Franca, 3 September 1963, *Bicalho 20* (RB); Igaçaba, 12 November 1994, *Ferreira 1024* (UEC); Pedregulho, 15 December 2003, *Sasaki 891* (SPF); Santa Rita do Passa Quatro, 18 November 1947, *Kuhlmann 1580* (UB). Tocantins: Almas, 10 August 2004, *Mendonça 5642* (K, RB); Pindorama do Tocantins, 6 October 2007, *Paula-Souza 9052* (SPF); Taguatinga, 10 March 2015, *Labiak 6049* (RB, UPCB).

26. *Myrcia vestita* De Candolle (1828: 248). *Aulomyrcia vestita* (DC.) O. Berg in Martius (1859: 127). *Aulomyrcia vestita* var. *parviflora* O. Berg in Martius (1857: 127). *Myrcia vestita* var. *parviflora* (O. Berg) Kiaerskou (1893: 97). Figures 33 and 48.

Type:—BRAZIL. Minas Gerais: in campis editis ferruginosis prov. Minarum, *Martius s.n.* (holotype M-photo! [0136975]; isotype G-DC!).

Myrcia vestita var. *obtusifolia* De Candolle (1828: 248). Type:—BRAZIL. Minas Gerais: prov. Minas Geraes, *Martius s.n.* (holotype M-photo! [0136976]; isotype G-DC!).

Aulomyrcia thyrsiflora O. Berg (1855: 74). *Aulomyrcia thyrsiflora* var. *genuina* O. Berg in Martius (1857: 126). *Myrcia thyrsiflora* (O. Berg) Mattos (2008: 4). Type:—BRAZIL. Ad Fazenda Bom Retiro, *Pohl 1049* (lectotype W! [0032442], selected by Lima *et al.* (in press.); isolectotypes BM!, K!).

Aulomyrcia thyrsiflora var. *obtusifolia* (DC.) O. Berg in Martius (1857: 126). Type:—BRAZIL. Brasilia, *Martius s.n.* (lectotype M-photo! [0136974], selected by Lima *et al.* (in press.)).

Aulomyrcia thyrsiflora var. *laterifolia* O. Berg in Martius (1857: 126). Type:—BRAZIL. Ad Rancho de Francisco da Paula, *Pohl 5761* (lectotype W! [032440], selected by Lima *et al.* (in press.)).

Aulomyrcia thyrsiflora var. *petiolaris* O. Berg in Martius (1857: 126). Type:—BRAZIL. Minas Gerais: in prov. Minarum, [*Sellow*, crossed out] *Pohl s.n.* (holotype B†; lectotype W! [0032441], selected by Lima *et al.* (in press.)).

Aulomyrcia vestita var. *grandifolia* O. Berg in Martius (1857: 127). *Myrcia vestita* var. *grandifolia* (O. Berg) Kiaerskou (1893: 97). Type:—BRAZIL. Minas Gerais: in campis provinciae Minas Geraes haud infrequens, *Saint-Hilaire 2354* (lectotype P! [00161346], selected by Lima *et al.* (in press.); isolectotype P!).

Aulomyrcia chapadensis O. Berg in Martius (1859: 554), non *Myrcia chapadensis* S. Moore (1895: 355). Type:—BRAZIL. Goiás: in campis editis lapidosis supra planitiem altam Chapada de S. Marcos, prov. Goyazensis, August 1834, *Riedel 2498* (lectotype LE-photo! [no barcode], selected by Lima *et al.* (in press.); isotypes F [2 fragm.]-photo!, G!, K!, LE-photo!, P [2]!).

Atomostigma mattogrossense Kuntze (1898: 76). Type:—BRAZIL. Mato Grosso, July 1892, *Kuntze 880* (holotype NY-photo! [00418571]).

Myrcia decaisneana Glaziou (1908: 221) nom. nud.

Shrubs or sub-shrubs to 1,5 m. **Twigs** angular or terete, brown, densely covered with simple brown, rarely hialinous, trichomes 0.3–0.6 mm when young; mature twigs terete, cortex exfoliating or not, densely covered with greyish trichomes to glabrescent; internode 13–71 mm long. **Leaves** with petioles semi-terete or slightly sulcate, 2–6.5 × 1.7–2 mm, densely covered with trichomes when young ones, glabrescent when mature; blades elliptic, oblong or obovate, rarely widely elliptic, 5–11 × 2.5–7.6 cm, 1.5–2.5 times longer than wide, discolorous when dry, apices acumite or acute to rounded, bases attenuate to obtuse, margins slightly revolute or not at all when dry, secondary veins 15–21 at each side, 3.4–8 mm apart, leaving the midvein at angles of 50–80°, one marginal vein 0.6–10 mm from the margin; adaxial surface densely covered with trichomes when young, glabrous or with trichomes restricted to the midvein when mature, dull, midvein raised to sulcate, secondary veins raised or flat, tertiary veins conspicuous, gland dots conspicuous, 4–7/mm^2; abaxial surface densely covered with trichomes when young, these turning yellowish or greyish and falling when mature, midvein raised, secondary veins raised, tertiary veins conspicuous, 3–7/mm^2. **Inflorescences** terminal or sub-terminal, paniculiform, pyramidal with alternate or opposite branching and dichasial subunits, main axis angular or terete, 7–210 × 1.5–2 mm, densely covered with trichomes, flowers sessile or with pedicels up to 3 mm; bracts elliptic to lanceolate, ca. 3.6 × 1.5 mm, densely covered with trichomes on both sides, deciduous before anthesis; bracteoles lanceolate, 1.5–2 × 1.2–1.5 mm, densely covered with trichomes on both sides, generally persistent after anthesis. **Floral buds** obovoid, 3.5–4 × 2.7–4 mm; flowers with hypanthium not tearing at anthesis, 1–1.5 mm prolonged above the ovary, externally densely covered with trichomes, internally glabrous; calyx 5-merous, lobes triangular, 2–3 × 1.8–2.8 mm, <1 mm thick, unequal between them, apices acute to acuminate, externally and internally densely covered with trichomes; corolla 5-merous, petals ca. 3.5 × 3.5 mm, white; floral disc 1.6–2.7 mm diam.; staminal ring glabrous, stamens 2–6 mm long, white, anthers eglandular; ovary 3-locular, 2 ovules per locule, style 6–8 mm long, glabrous, stigma punctiform. **Fruits** globose, 5–7 × 5–8 mm, green when young, turning dark when mature, glabrescent, crowned by the five calyx lobes; one seed, testa smooth, dark brown, polished.

Distribution and Habitat:—*Myrcia vestita* occurs in the Brazilian states of Mato Grosso, Goiás, Minas Gerais, São Paulo and Distrito Federal. A single collection from Santa Cruz department, Bolivia, was found in SP herbarium. *Myrcia vestita* grows in sandy soils of *cerrado*, at altitudes between 300–1300 m. BFG (2015) cites this species to Mato Grosso do Sul and Bahia, but the related specimens are respectively *Myrcia tortuosa* and the non-Guianensis clade *M. pseudovenulosa* Stadnik & Sobral (2015: 220). *Myrcia vestita* is here newly recorded from Distrito Federal, Brazil, and Bolivia.

Etymology:—the epithet 'vestita' means 'dressed', in reference to the leaves, inflorescences and young branches completely convered with trichomes.

Phenology:—Flowers all over the year; fruits in February and between May and November.

Conservation Assessment:—*Myrcia vestita* is widely distributed from southeastern and central Brazil to the border with Bolivia, with an Extent of Occurrence (EOO) greater than 898,240 km^2. This species can be therefore categorized as Least Concerned (LC) according to IUCN criteria (2012).

Comments:—*Myrcia vestita* is a distinctive sub-shrub or small shrub presenting coriaceous leaves with acute to rounded tips and well-marked venation, terminal or sub-terminal, long, many flowered panicles with usually alternate branching (then the panicle has a slightly zig-zaged appearance), densely covered with brown to ferrugineous trichomes, and generally persistent bracteoles even after falling fruits. Leaves are uniformily densely covered with trichomes on both sides when young, these then turning yellowish or greyish and falling with age.

Myrcia vestita can resemble the closely related *M. tortuosa*, but these two species are distinguished through the habit and external pubescence of flowers buds (see notes under *M. tortuosa*). Vegetative material of *Myrcia vestita* can also resemble *M. camapuanensis*, from which it is distinguished through the panicles in the former and glomeruliform inflorescences in the latter.

Selected specimens examined:—BOLIVIA. Santa Cruz: Velasco, 14 October 1994, *Killeen 6795* (SP). BRAZIL. Distrito Federal: Brasília, 28 February 1980, *Heringer 3532* (RB). Goiás: Caldas Novas, 12 November 2008, *Rosa 1276* (HUFU, UPCB); Cristalina, 12 April 1991, *Hatschbach 43842* (C, MBM); Minaçu, 20 November 1991, *Walter 778* (RB); Pinerópolis, 26 May 2011, *Lima 292* (UPCB). Mato Grosso: Águas Boas, 23 October 1992, *Windisch 7199* (SPF); Alto Garças, 19 September 1996, *Proença 1532* (UB); Barra dos Garças, 23 November 2011, *Staggemeier 411* (UB); Chapada dos Guimarães, 17 October 1984, *Oliveira Filho 205* (UEC); Cocalinho, 1 January 1997, *Forzza 434* (ESA); Garapu, 28 September 1964, *Prance 59150* (U); Itiquira, 11 February 1974, *Hatschbach 34037* (ESA); Nova Xavatina, 25 November 2011, *Staggemeier 421* (UB); Ribeirão Cascalheira, 18 August 1998, *Ratter 8084* (UB); São José do Rio Claro, 14 June 1997, *Souza 18007* (ESA). Minas Gerais: Belo Horizonte, 18 November 1988, *Peron 754* (RB); Lagoa Santa, December 1937, *Brade 15973* (RB); Moeda, 11 January 2003, *Vieira 320* (SPF); Nova Lima, 17 April 2002, *Vincent 513* (ESA); Olhos D'Água, 25 January 2002, *Matsumoto 767* (UEC); Ouro Preto, 15 October 1987, *Peron 414* (RB); Paracatu, 8 February 1970, *Irwin 26332* (UB); Patrocínio, 1 February 1970, *Irwin 25845* (UB); São Roque de Minas, 31 August 2014, *Lima 455* (K, UEC, UPCB). São Paulo: Brotas, 28 January 2003, *Lucas 93* (K).

27. *Myrcia* sp. 1. Figures 34 and 49.

Sub-shrubs to 1 m. **Twigs** flat, brown, glabrous or with very scattered simple hialinous trichomes 0.1–0.4 mm when young; mature twigs terete, cortex exfoliating, glabrous; internode 5–14 mm. **Leaves** sessile or with petioles semi-terete, up to 2 × 0.6 mm, glabrous or with scattered trichomes; blades linear to lanceolate, 1.5–6 × 0.1– 0.5 cm, 12–15 times longer than wide, concolorous when dry, apices acute, bases attenuate, margins revolute or not when dry, secondary veins inconspicuous, one marginal vein 0.2–0.5 mm from the margin; adaxial surface glabrous or with very scattered trichomes, polished or dull, midvein raised or flat, secondary and tertiary veins inconspicuous, gland dots conspicuous or not, 5–8/mm^2; abaxial surface glabrous or with scattered trichomes, midvein raised, secondary and tertiary veins inconspicuous, gland dots conspicuous or not, 5–8/mm^2. **Inflorescences** sub-terminal or terminal, racemiform or reduced to a single flower, main axis flat, 19–25(40) × 0.5–1 mm, glabrous, flowers sessile or with pedicels up to 7 mm; bracts linear to lanceolate, 5–6 × 1–2 mm, glabrous, generally deciduous before anthesis; bracteoles linear, 1–2 × 0.5 mm, glabrous, generally deciduous before anthesis. **Floral buds** globose or obovoid, ca. 3 × 3 mm; flowers with hypanthium not tearing at anthesis, 0.7–1.5 mm prolonged above the ovary, externally and internally glabrous; calyx 5-merous, lobes depressed ovate, 0.6–2 × 1–2.2 mm, <1 mm thick, unequal between them, apices rounded or acute, externally glabrous, internally densely covered with light brown or hialinous trichomes to 0.1–0.3 mm; corolla 5-merous, petals ca. 3 × 3 mm, white; floral disc 1.8–2.5 mm diam.; staminal ring glabrous, stamens 2–8 mm long, white, anthers eglandular; ovary 3–4-locular, 2 ovules per locule, style 5–7 mm long, glabrous, stigma punctiform. **Fruits** globose, 5–7 × 5–7 mm, green when young, turning red or dark when mature, glabrous, crowned by the fice calyx lobes; seed not seen.

Distribution and Habitat:—*Myrcia* sp.1 is distributed in the Brazilian states of Minas Gerais, Goiás and Distrito Federal. This species grows in rocky or sandy soils, in open *cerrado* and *campo rupestre* vegetation, at altitudes of 600–1400 m.

Phenology:—Flowers between May and October; fruits between October and February.

Conservation Assessment:—Altough *Myrcia* sp.1 is distributed in a relatively broad area in central and southeastern Brazil, this species is known from only few collections. Additionaly, *M.* sp.1 is endemic to habitats that are constantly subject of human action and fire, even inside protected areas where this species has been registered, such as Serra da Canastra and Brasília National Parks. *Myrcia* sp.1 has an Area of Occupancy of 40 km^2 and is assessed as Endangered (EN) according to criteria B2a, biii (IUCN 2012).

Comments:—*Myrcia* sp.1 represents *Myrcia depauperata* Glaziou (1908: 228), a *nomen nudum* soon to be validated by other authors (P.O.Rosa pers. comm.). *Myrcia* sp.1 is a sub-shrub, glabrous or nearly so, characterized by narrow, long leaves and few-flowered, normally reduced inflorescences. This species has been for a long time misidentified as *Myrcia pinifolia* in several herbaria, due to similaries in their habit and leaf shape. These species however, differ in the 3-locular ovaries, globose flower buds and racemiform inflorescences in *M.* sp.1, while *M. pinifolia* has 2-locular ovaries, depressed ovate flower buds and generally panicles. Besides, *Myrcia pinifolia* belongs to sect. *Aulomyrcia* (clade 9), while *M.* sp.1 constantly appears in the Guianensis clade (Chapter 1). This species can also present 4-locular ovaries.

Specimens examined:—BRAZIL. Distrito Federal: Brasília, 12 September 1965, *Irwin 8246* (K, NY-photo); 30 August 2011, *Bezerra 9* (K, UB). Goiás: s.d., *Glaziou 21129* (K, P); Alto Paraíso de Goiás, 15 December 2010, *Santos 613* (K, SPF, RB); Niquelândia, 17 October 1998, *Forzza 1063* (SPF). Minas Gerais: Itacambira, 23 February 2002, *Souza 28629* (ESA); São Roque de Minas, 15 October 1994, *Nakajima 471* (HUFU); 2 October 1999, *Mello-Silva 1713* (HUFU, SPF, UPCB).

28. *Myrcia* sp. 2. Figures 35 and 49.

Sub-shrub or shrub to 1 m. **Twigs** slightly flat to terete, light brown, densely covered with simple whitish, rarely greyish, trichomes 0.5–1 mm when young; mature twigs terete, cortex exfoliating, densely covered with trichomes or glabrescent; internode 3–11 mm. **Leaves** sessile or with petioles semi-terete, up to 1 × 1.6 mm, densely covered with trichomes when young and mature; blades elliptic-lanceolate or elliptic-ovate, 2–5 × 0.8–2 cm, ca. 2.5 times longer than wide, lightly discolorous or concolorous when dry, apices acuminate, bases rounded, margins revolute when dry, secondary veins 8–11 at each side, 1.8–6 mm apart, leaving the midvein at angles of 50–60°, one marginal vein 0.4–0.9 mm from the margin; adaxial surface with scattered trichomes, these denser on the midvein, when young and mature, dull, midvein raised, secondary veins flat, tertiary veins generally inconspicuous, gland dots inconspicuous; abaxial surface moderately covered with trichomes when young and mature, sometimes glabrescent when mature, midvein and secondary veins raised, tertiary veins conspicuous or not, gland dot conspicuous, 2–3/mm^2. **Inflorescences** terminal or sub-terminal, racemiform, mais axis terete or slightly flat, 10–90 × 0.7–1 mm, densely covered with simple whitish to ferrugineous trichomes 0.5–1 mm, flowers sessile or with pedicel up to 4 mm; bracts elliptic-lanceolate, 6.5–10 × 1.7–3, moderately covered with trichomes on both sides, denser abaxially, persistent after anthesis; bracteoles linear, 3–5.8 × 1.2–1.5 mm, moderately covered with trichomes on both sides, denser abaxially, persistent after anthesis. **Floral buds** obovoid, 3–4 × 2–4 mm; flowers with hypanthium not tearing at anthesis, 0.5–0.8 mm prolonged above the ovary, externally densely covered with trichomes, internally glabrous; calyx 5-merous, lobes triangular, 1.4–1.9 × 1.5–1.7, <1 mm thick, unequal between them, apices acuminate, externally densely covered with trichomes, internally densely covered with simple ferrugineous trichomes to 0.4 mm; corolla 5-merous, petal ca. 3 × 3 mm, white; floral disc 1.5–2.2 mm diam.; staminal ring glabrous, stamens 2–6 mm long, white, anthers eglandular; ovary 3-locular, 2 ovules per locule, style ca. 6 mm long, glabrous, stigma punctiform. **Fruits** globose, 3–8 × 3–9 mm, green when young, turning yellow or purple when mature, glabrescent, crowned by the five calyx lobes; one or two seeds, testa smooth, light brown, polished.

Distribution and Habitat:—*Myrcia* sp.2 is endemic from the state of Goiás, Brazil. This species is found in rocky and sandy soils of *cerrado* and has been registered at altitudes of 975–1060 m elevation.

Phenology:—Flowers in September; fruits in September and November.

Conservation Assessment:—*Myrcia* sp.2 is restricted to the central portion of the state of Goiás and presents a small Extent of Occurrence (EOO) of ca. 620 km^2. *Myrcia* sp.2 appears to be a rare species as it occurs in a well-surveyed region, but only five collections are available. Its natural habitat is constantly threatened and any of its collections was registered inside protected areas. *Myrcia* sp.2 is assessed as Endangered (EN), following the criteria B1a, biii (IUCN 2012).

Comments:—*Myrcia* sp.2 represents the *nomen nudum Myrcia siriacoana* Glaziou (1908: 217), which will be soon validated by other authors (P.O. Rosa pers. comm.). This species is characterized by short internodes, generally sessile leaves with elliptic-lanceolate or elliptic-ovate blades, acuminate tips and rounded bases, terminal or sub-terminal racemiform inflorescences with generally sessile flowers. Trichomes are normally long (0.5–1 mm), whitish on the branches and leaves, and ferrugineous to whitish on the inflorescences. Leaves are alternate and spiraly, larger at the base of the branches and decreasing in size upwards. Calyx lobes are consistently triangular with acuminate apices erect on the fruits.

Myrcia sp.2 is phylogenetically related to *M. vestita* (Chapter 1) and can also be morphologically similar. Differences are the racemiform inflorescences in *Myrcia* sp.2 (vs. developed panicles in *M. vestita*), whitish trichomes 0.5–1 mm long on vegetative structures (vs. brown trichomes up to 0.5 mm long), shorter leaves up to 5 × 2 cm (vs.

leaves larger than 5 × 2.5 cm) and shorter internodes 3–11 mm long (vs. 13–71 mm long).

Specimens examined:—BRAZIL. Goiás: s.d., *Glaziou 21148* (K, P, S); Cocalzinho de Goiás, 12 September 2014, *Rosa 1398* (UB); Corumbá de Goiás, 30 November 1965, *Irwin 10783* (UB); Pirenópolis, 12 September 2014, *Lima 505* (UEC, UPCB); Rio Bonifácio to Estiva, s.d., *Burchell s.n.* (K000342780).

29. *Myrcia* sp. 3. Figures 36 and 48.

Shrubs to 2.5 m. **Twigs** flat, brown, moderately to densely covered with dibrachiate brown trichomes 0.3–0.4 mm when young; mature twigs terete, cortex exfoliating, covered with trichomes turning dark to grabrescent; internode 17–30 mm. **Leaves** with petioles sulcate, 5.3–6.3 × 0.3–0.5, covered with trichomes; blades elliptic to widely-elliptic, 4.9–7.4 × 3–4.2 cm, 1.4–2 times longer than wide, slightly discolorous when dry, apices obtuse, rarely acute, bases obtuse to rounded and somewhat decurrent on the petiole, margins slightly revolute when dry, secondary veins 10–14 at each side, 3.4–5.5 mm apart, leaving the midvein at angles of 70–80°, one marginal vein 1–1.3 mm from the margin; adaxial surface moderately covered with dibrachiate whitish trichomes 0.3–0.4 mm, these denser on the midvein, dull, midvein sulcate to raised, secondary veins flat, nearly inconspicuous, tertiary veins inconspicuous, gland dots conspicuous, ca. 5/mm^2; abaxial surface densely covered with trichomes when young, glabrescent to glabrous when mature, midvein and secondary veins raised, tertiary veins inconspicuous, gland dots conspicuous, ca. 5/mm^2. **Inflorescences** terminal, paniculiform, pyramidal with opposite branching and dichasial or single flower subunits, main axis flat, 50–64 × 0.8–1 mm, densely covered with tichomes, flowers sessile or with pedicels up to 2.4 mm; bracts not seen, deciduous before anthesis; bracteoles lanceolate, ca. 0.8 × 0.3 mm, covered with trichomes on both sides, deciduous before anthesis. **Floral buds** not seen; flowers with hypanthium not tearing at anthesis, ca. 0.6 mm prolonged above the ovary, externally densely covered with trichomes, internally glabrous; calyx calyx 5-merous, lobes triangular, 1–1.9 × 1.8–2 mm, <1 mm thick, unequal between them, apices acute to obtuse, externally and internally densely covered with trichomes; corolla 5-merous, petals 3–4 × 3.5–4 mm, white; floral disc 1.7–1.9 mm diam.; staminal ring glabrous, stamens 3.8–6.5 mm long, white, anthers eglandular; ovary 3-locular, 2 ovules per locule, style 4–6 mm long, glabrous, stigma punctiform. **Fruits** not seen.

Distribution and Habitat:—*Myrcia* sp.3 is known from a single collection from the municipatily of Nova Venécia, northern Espírito Santo, Brazil. This species was registered in an inselberg, growing in rocky soils at an altitude of 137 m elevation.

Phenology:—Flowers in December; fruits unknown.

Conservation Assessment:—*Myrcia* sp.3 is known from a single gathering from a severaly fragmented and threatned area in the state of Espírito Santo, Brazil. Altought this state has been botanically well-surveyed in the last years, many of its inselbergs are still poorly known. More information about the real distribution of *Myrcia* sp.3 is needed before the conservation status of this species can be fully assessed. *Myrcia* sp.3 is therefore categorized as Data Deficient (DD) following IUCN criteria (2012).

Comments:—*Myrcia* sp.3 has coriaceous elliptic leaves abaxially covered with dibrachiate trichomes, flat or nearly inconspicuous secondary venation adaxially, and terminal, symmetrical and few-flowered panicles, also covered with dibrachiate trichomes. These characters are sufficiently distinctive to consider *Myrcia* sp.3 as a new species. Phylogenetic analysis shows this species in a sub-clade with *M. guianensis* (*M. rotundifolia* morphotype), *M. laxiflora*, *M. ovina* and *M. cordiformis*, all from the Atlantic Forest; no morphological evidence distinguishes this sub-clade (Chapter 1).

Specimens examined:—BRAZIL. Espírito Santo: Nova Venécia, 18 December 2014, *Trad 579* (K, UEC).

DOUBTFUL SPECIES

Myrcia proencana Villarroel & Gomes-Bezerra (2015: 163).

In the protologue, *Myrcia proencana* is compared to *M. torta*, an accepted synonym of *M. guianensis*, and therefore could be considered within the Guianensis clade following its morphological description. *Myrcia proencana* is endemic from Bolivia and has 3-locular ovaries, a glabrous hypanthium prolonged above the ovary and glabrous staminal ring. Its inflorescences are described as dichasia usually reduced to a single flower, also acceptable in the group. We had no access to any duplicates of the type collection, or high-quality photos to confirm the correct placement of the species. Thus, *Myrcia proencana* is kept in the present treatment as a doubtful species.

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Wilson, C.E., Forest, F., Devey, D.S., Lucas, E. (2016) Phylogenetic relationships in *Calyptranthes* (Myrtaceae) with particular emphasis on its monophyly relative to *Myrcia* s.l. *Systematic Botany* 41(2): 378–386.

FIGURE 1. Geographical distribution of the Guianensis clade species.

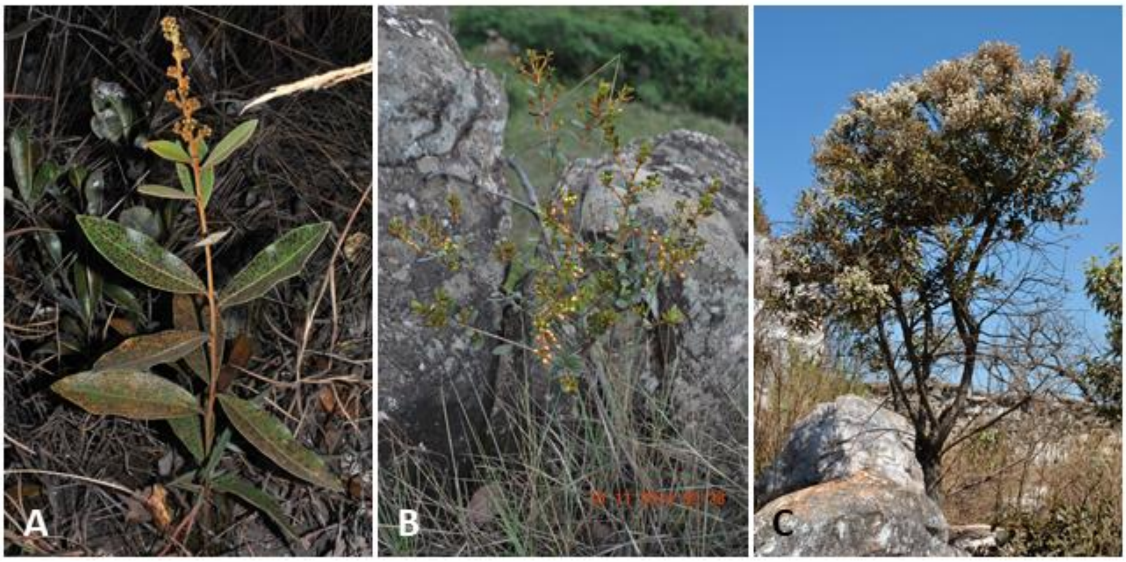

FIGURE 2. Habit of *Myrcia* clade Guianensis species. A: sub-shrub (*Myrcia vestita*); B: shrub (*Myrcia rufipes*); C: tree (*Myrcia subalpestris*).

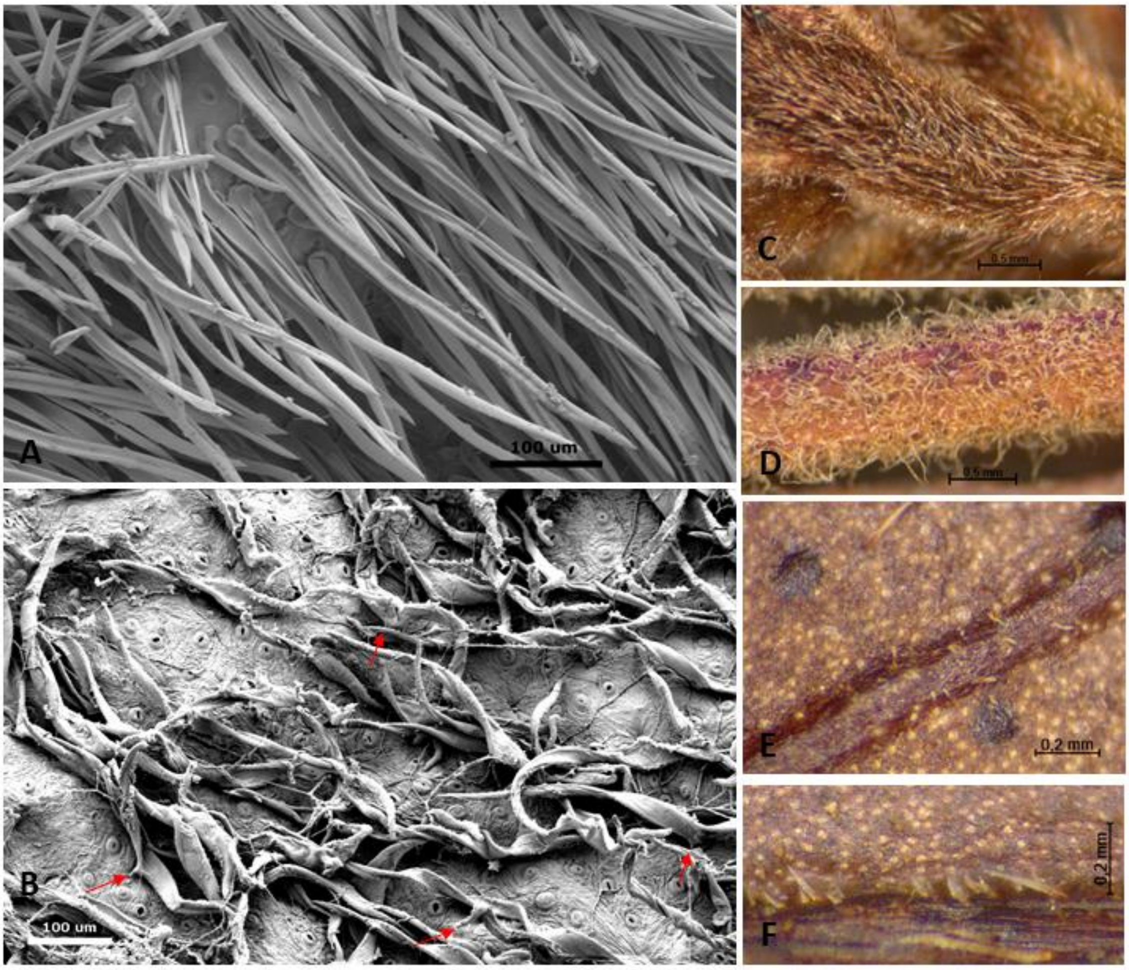

FIGURE 3. Trichomes of *Myrcia* clade Guianensis. A: simple trichomes on leaf abaxial surface (*Myrcia cuprea*, *Sobel 4584*); B: dibrachiate trichomes on leaf abaxial surface; arrows indicate the trichomes bases (*Myrcia* sp. 3, *Trad 579*); C: straight trichomes on petiole (*Myrcia rufipes*, *Lima 534*); D: curly trichomes on peduncle (*Myrcia subalpestris*, *Lima 514*); E and F: prickly trichomes on leaf abaxial surface (*Myrcia pistrinalis*, *Herrera 9892*).

FIGURE 4. Inflorescences of *Myrcia* clade Guianensis. A: paniculiform (*Myrcia cuprea*; *Silva 3499*); B: racemiform (*M. salicifolia*, *Sick 531*); C: single flowers (*M. nivea*, *Lima 492*); D: triads (*M. retusa*); E: dichasium (*M. stricta*, *Cavalheiro 36*) ; F: glomeruliform (*M. camapuanensis*, *Marimon 160-C*).

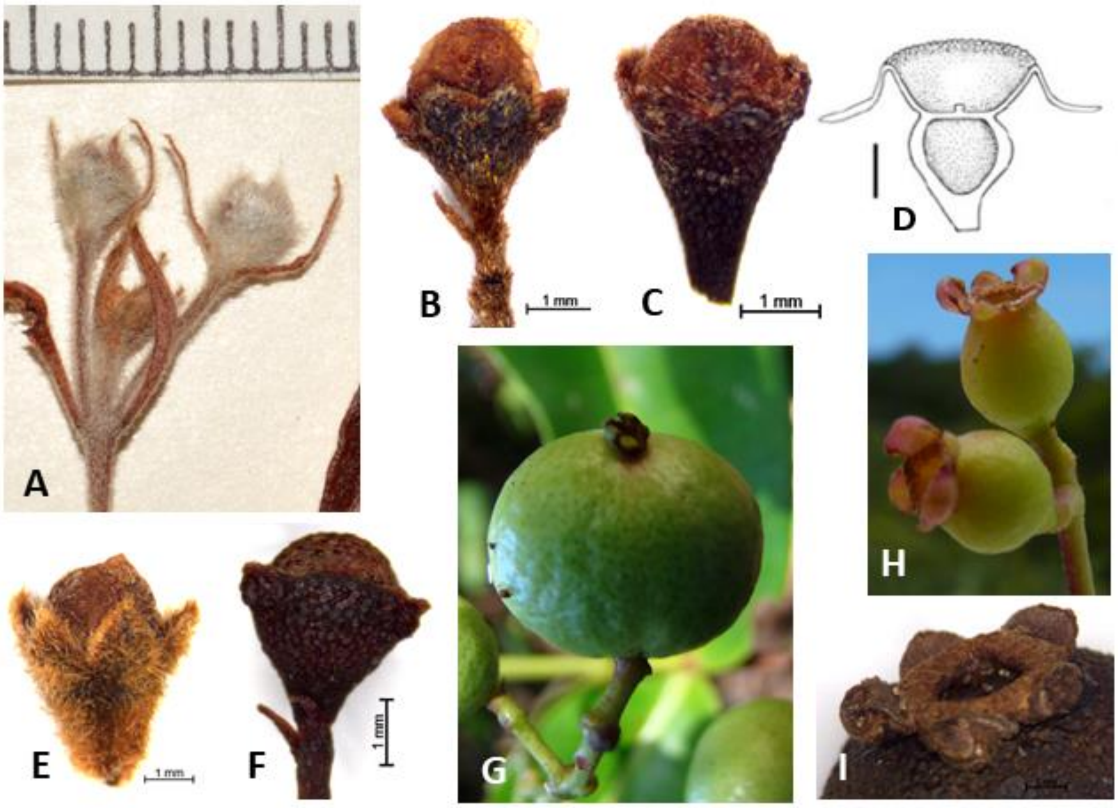

FIGURE 5. General morphology of *Myrcia* clade Guianensis species. A: Bracteoles longer than the bud (*Myrcia nivea*, *MGC 453*); B: Bracteoles shorter than the globose bud (*Myrcia cuprea*, *Silva 3499*); C: turbinate bud of *Myrcia gigas* (*Nave 1593*); D: transversal section of a flower, showing the glabrous hypanthium prolonged above the ovary and glabrous staminal ring (*Myrcia* sp. 1, *Mello-Silva 1713*); E–I: calyx morphology of *Myrcia* clade Guianensis; E: free regular calyx lobes in a bud (*Myrcia rufipes*, *Flores 819*); F: short calyx lobes, almost indistinguishable in a bud (*Myrcia laxiflora*, *Sugiyama 1393*); G: irregular remnants of the partially ripped calyx lobes in a fruit (*Myrcia cordiformis*); H: remnants of the free calyx lobes in a fruit (*Myrcia guianensis*); I: swollen calyx-lobes of *Myrcia tumida* (*Souza 547*). Images: V.G. Staggemeier (G); line drawing adapted from Lucas *et al.* (2011), p. 925 (D).

FIGURE 6. Fruits of *Myrcia* clade Guianensis. A: *Myrcia vestita*; B: *Myrcia subalpestris*; C: *Myrcia nivea*; D: *Myrcia guianensis*; E: *Myrcia* sp. 2; F: *Myrcia cuprea*; G: *Myrcia guianensis*.

FIGURE 7. *Myrcia camapuanensis* (*Barbosa 1530*, RB00831329).

FIGURE 8. *Myrcia citrifolia* (*Araújo 1791*, SPF193739).

FIGURE 9. *Myrcia clavata* (*Thomas 13244*, CEPEC00095883).

FIGURE 10. *Myrcia cordiformis* (*Jardim 1894*, CEPEC00082098).

FIGURE 11. *Myrcia cuprea* (*Sobel 4584*, K000342767).

FIGURE 12. *Myrcia gigas* (*Silva 959*, RB0014659).

FIGURE 13. *Myrcia glabra* (*Zanette 1388*, UPCB0023397).

FIGURE 14. *Myrcia guianensis* (*Lima 503*, UPCB0024210).

FIGURE 15. Morphological variety of *Myrcia guianensis*. A: *Gardner 1300*; B: *Glaziou 17660*; C: *Daly 8732*; D: *Pohl 2003*; E: *Pohl 817*; F: *Sellow s.n.* (W33192); G: *Hatschbach 11094*; H: *Glaziou 17677*; I: *Richard s.n.* (P00163124).

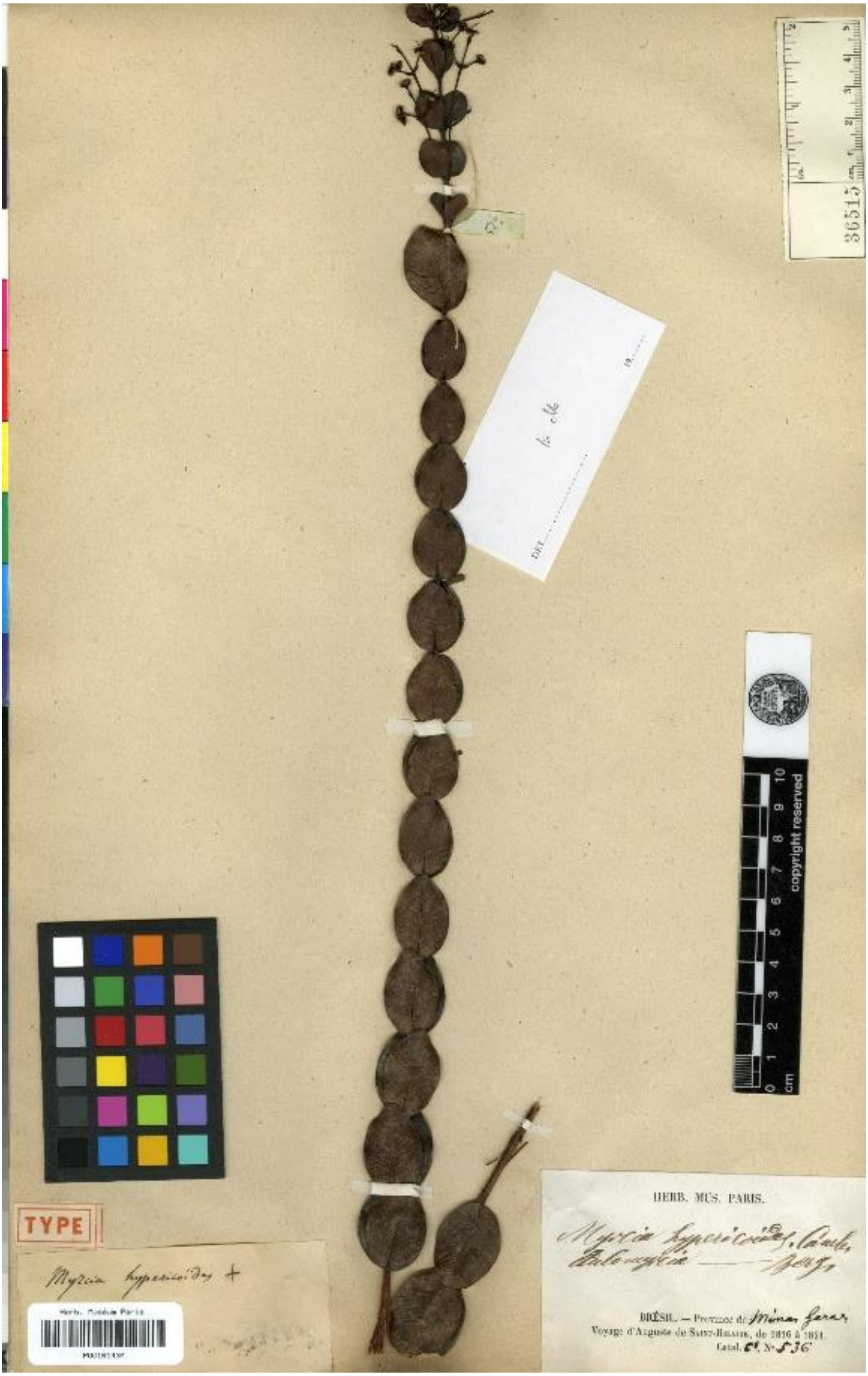

FIGURE 16. *Myrcia hypericoides* (*St.-Hilaire* 536, P00161434).

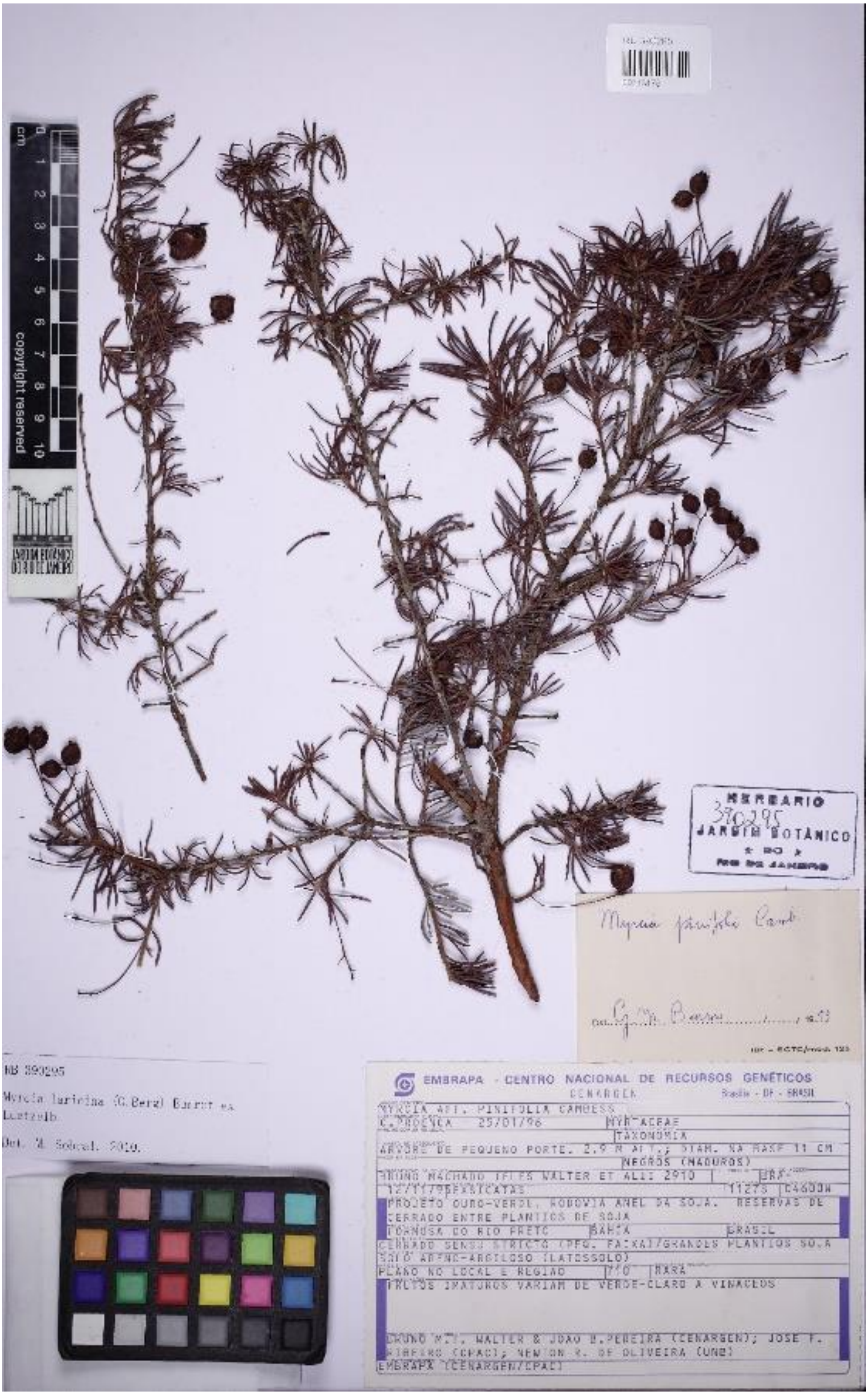

FIGURE 17. *Myrcia laricina* (*Walter 2910*, RB00313476).

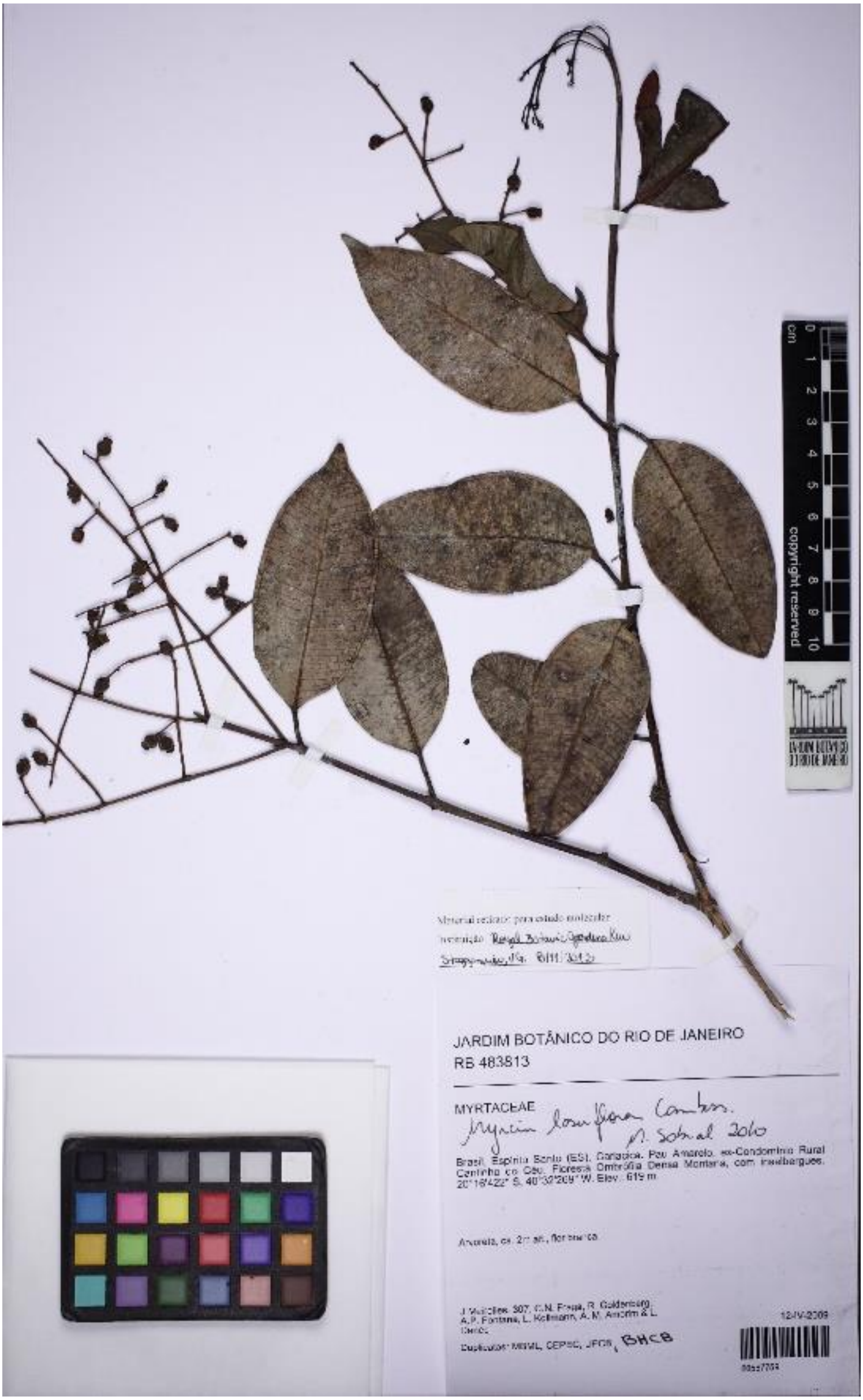

FIGURE 18. *Myrcia laxiflora* (*Meirelles 307*, RB00567759).

FIGURE 19. *Myrcia macaca* (*Cid 11603*, INPA194096). Image provided by SpeciesLink (2017).

FIGURE 20. *Myrcia monoclada* (*Harley 18204*, RB00564539).

FIGURE 21. *Myrcia nivea* (*Lima 492,* UPCB0023852).

FIGURE 22. *Myrcia obovata* (*Lima 368*, UPCB0023863).

FIGURE 23. *Myrcia ovina* (*Ibrahim 277,* UPCB0023858).

FIGURE 24. *Myrcia pistrinalis* (*Evans 3294*, RB00727809).

FIGURE 25. *Myrcia retusa* (*Mattos 10588*, SPF00067432).

FIGURE 26. *Myrcia rufipes* (*Souza 29618*, UPCB0031437).

FIGURE 27. *Myrcia salicifolia* (*Martinelli 12304*, K000344331).

FIGURE 28. *Myrcia stricta* (*Lima 508,* UPCB0023635).

FIGURE 29. *Myrcia subalpestris* (*Lima 367*, UPCB0023634).

FIGURE 30. *Myrcia tortuosa* (*Sidney 953*, RB00314773).

FIGURE 31. *Myrcia tumida* (*Souza 547*, RB00493050).

FIGURE 32. *Myrcia variabilis* (*Labiak 6049*, UPCB0023598).

FIGURE 33. *Myrcia vestita* (*Lima 292*, UPCB0023748).

FIGURE 34. *Myrcia* sp. 1 (*Santos 613*, RB00695581).

FIGURE 35. *Myrcia* sp. 2 (*Lima 505*, UPCB0023754).

FIGURE 36. *Myrcia* sp. 3 (*Trad 379,* UEC133804). Photo: D.F.Lima

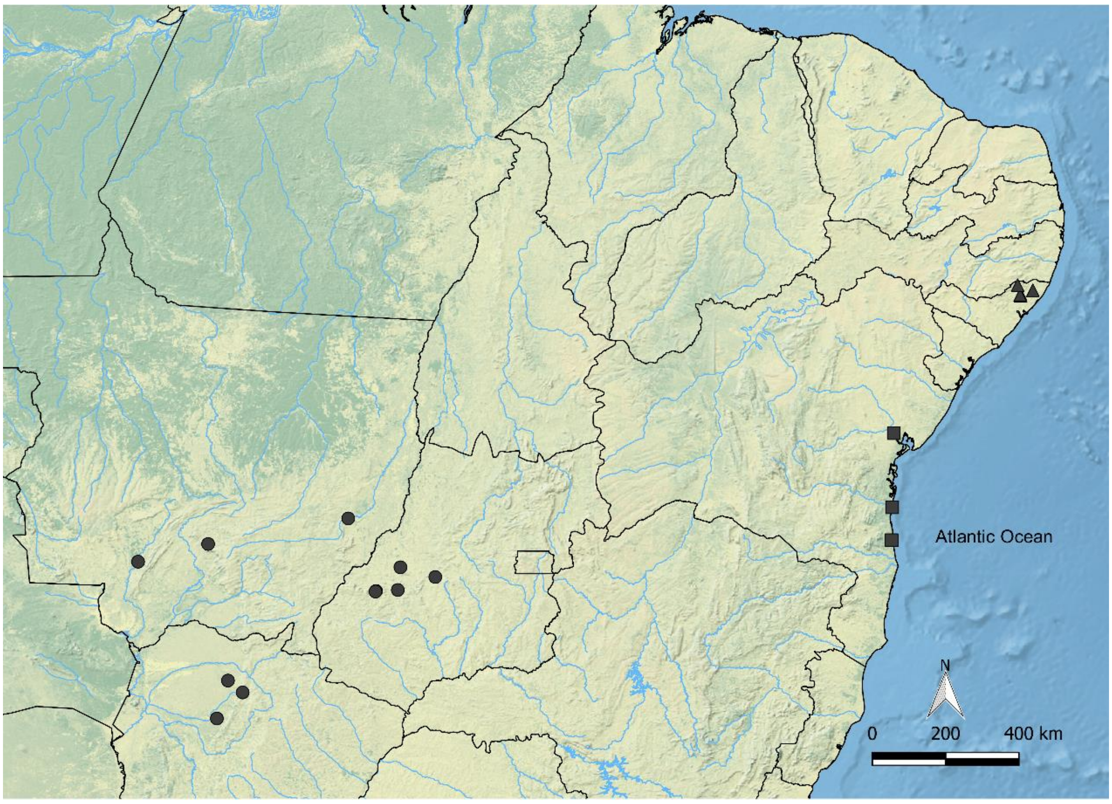

FIGURE 37. Geographical distribution of *Myrcia camapuanensis* (circles), *M. clavata* (triangles) and *M. cordiformis* (squares).

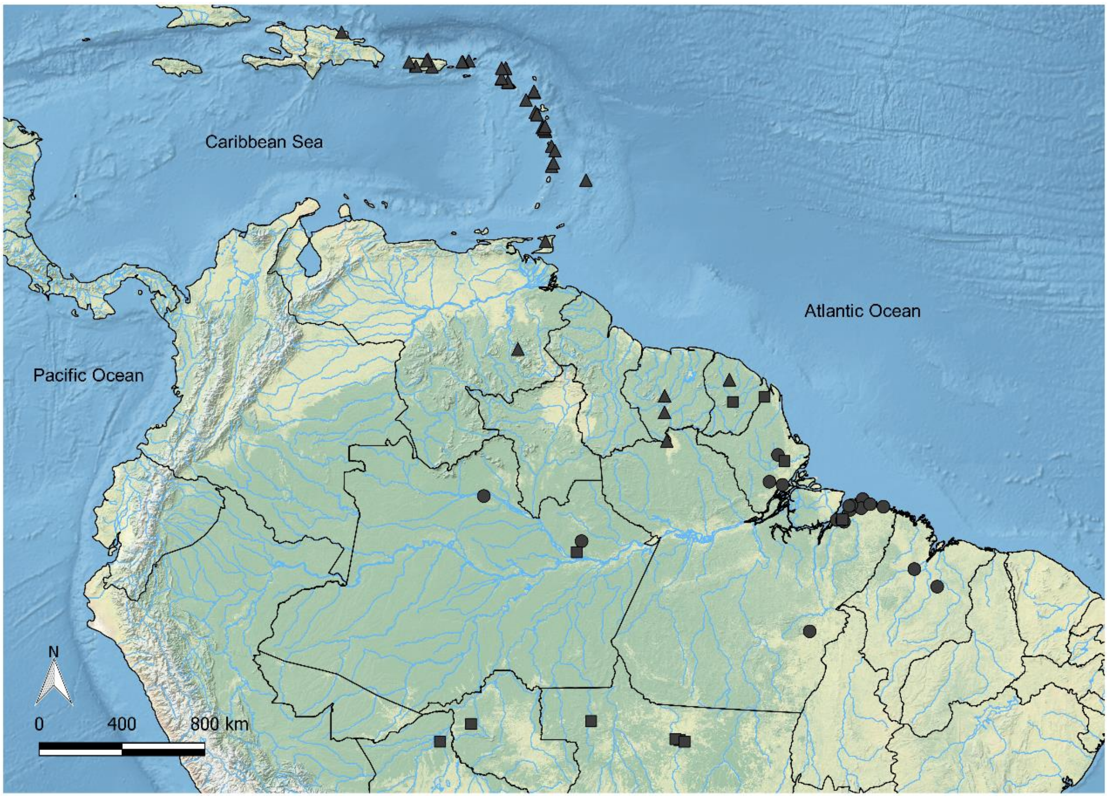

FIGURE 38. Geographical distribution of *Myrcia citrifolia* (triangles), *M. cuprea* (circles) and *M. gigas* (squares).

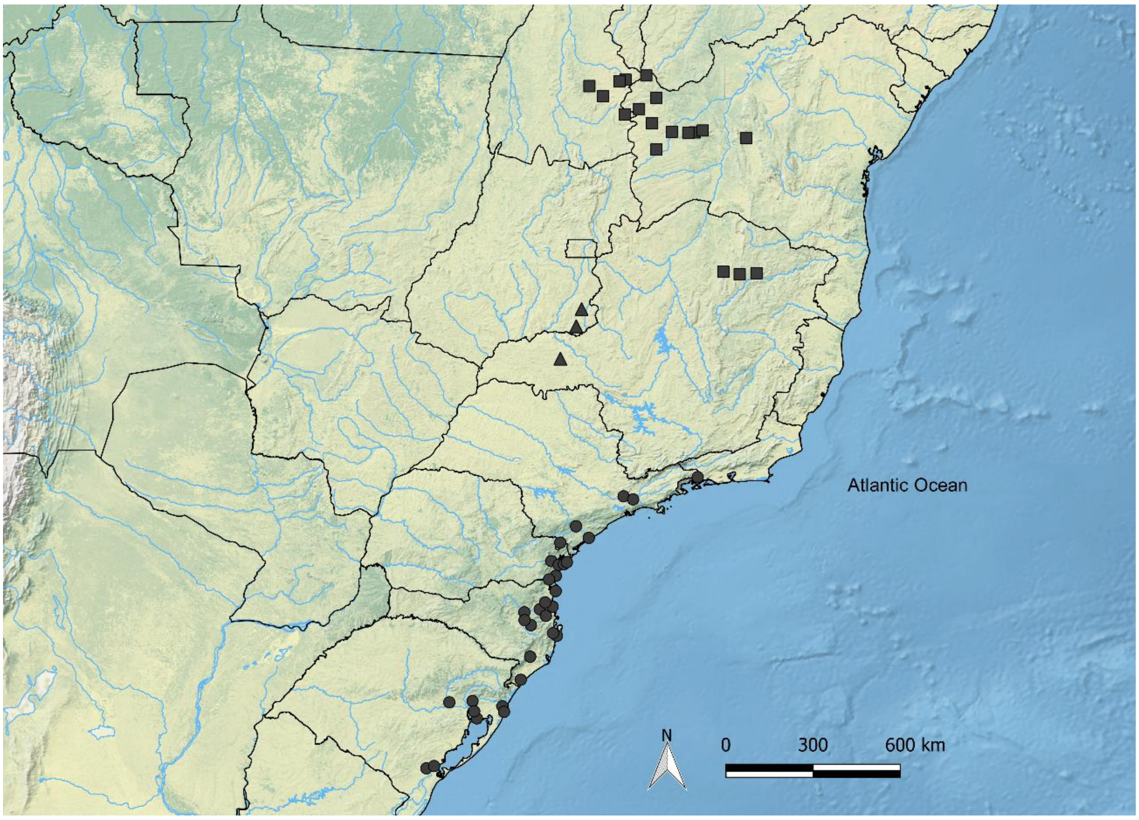

FIGURE 39. Geographical distribution of *Myrcia glabra* (circles), *M. hypericoides* (triangles) and *M. laricina* (squares).

FIGURE 40. Geographical distribution of *Myrcia guianensis*.

FIGURE 41. Geographical distribution of *Myrcia laxiflora* (triangles) and *M. monoclada* (square).

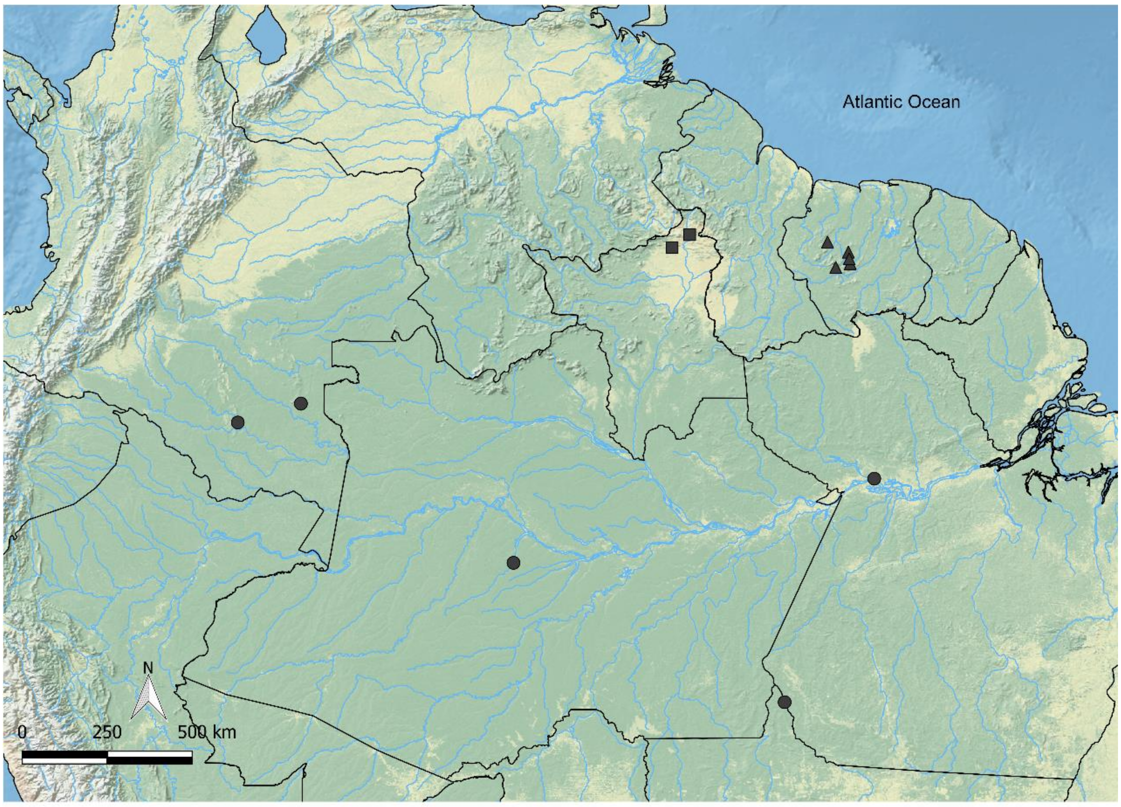

FIGURE 42. Geographical distribution of *Myrcia macaca* (squares), *M. pistrinalis* (triangles) and *M. salicifolia* (circles).

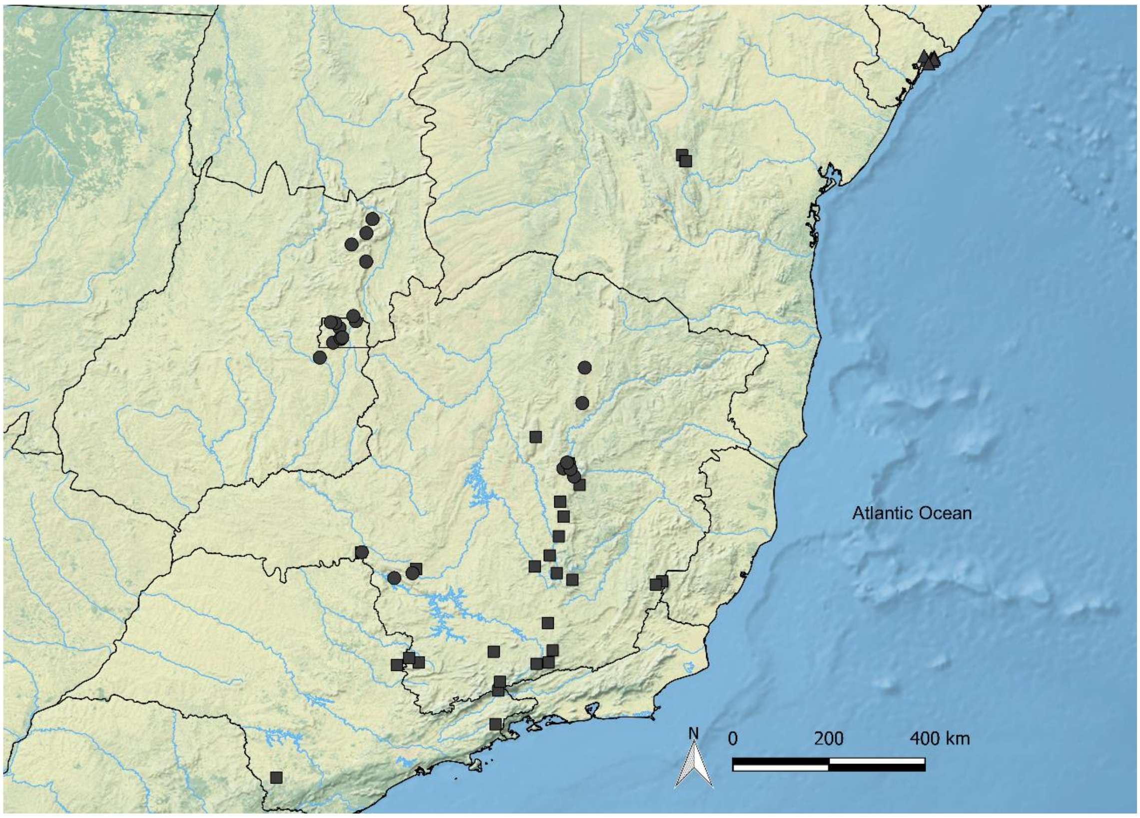

FIGURE 43. Geographical distribution of *Myrcia nivea* (circles), *M. obovate* (squares) and *M. ovina* (triangles).

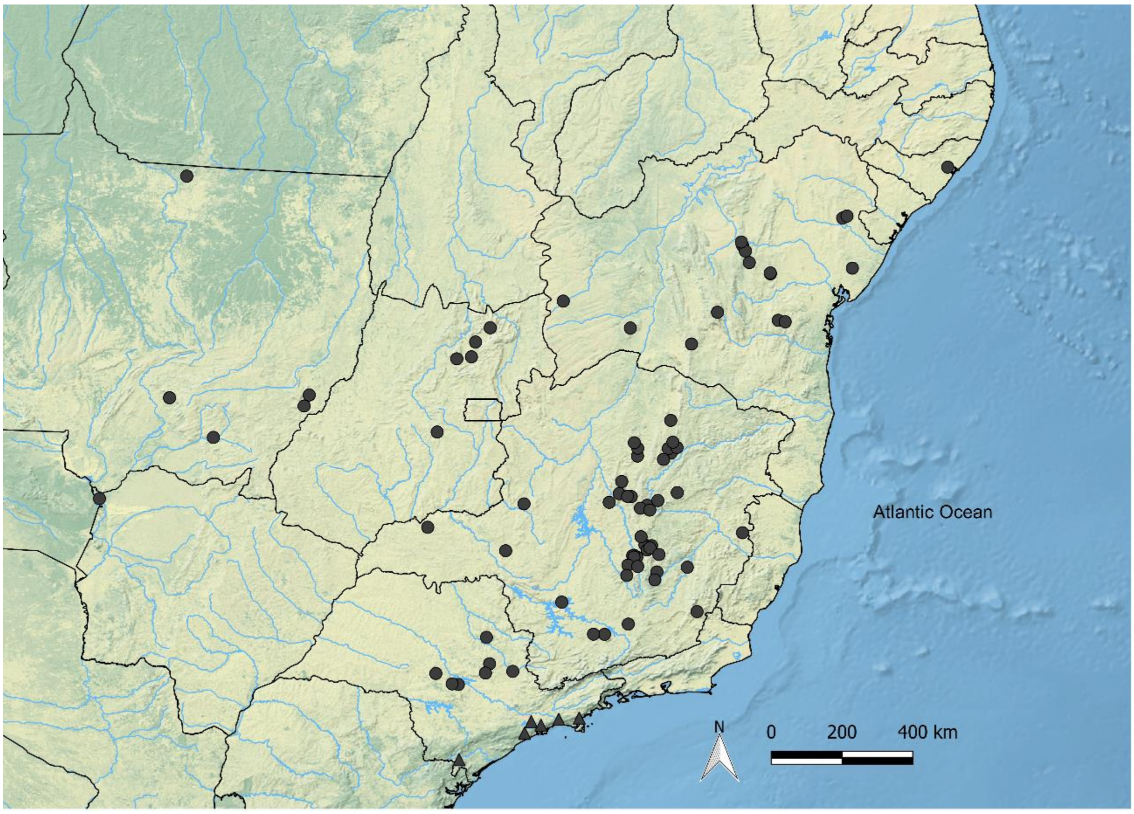

FIGURE 44. Geographical distribution of *Myrcia retusa* (triangles) and *M. rufipes* (circles).

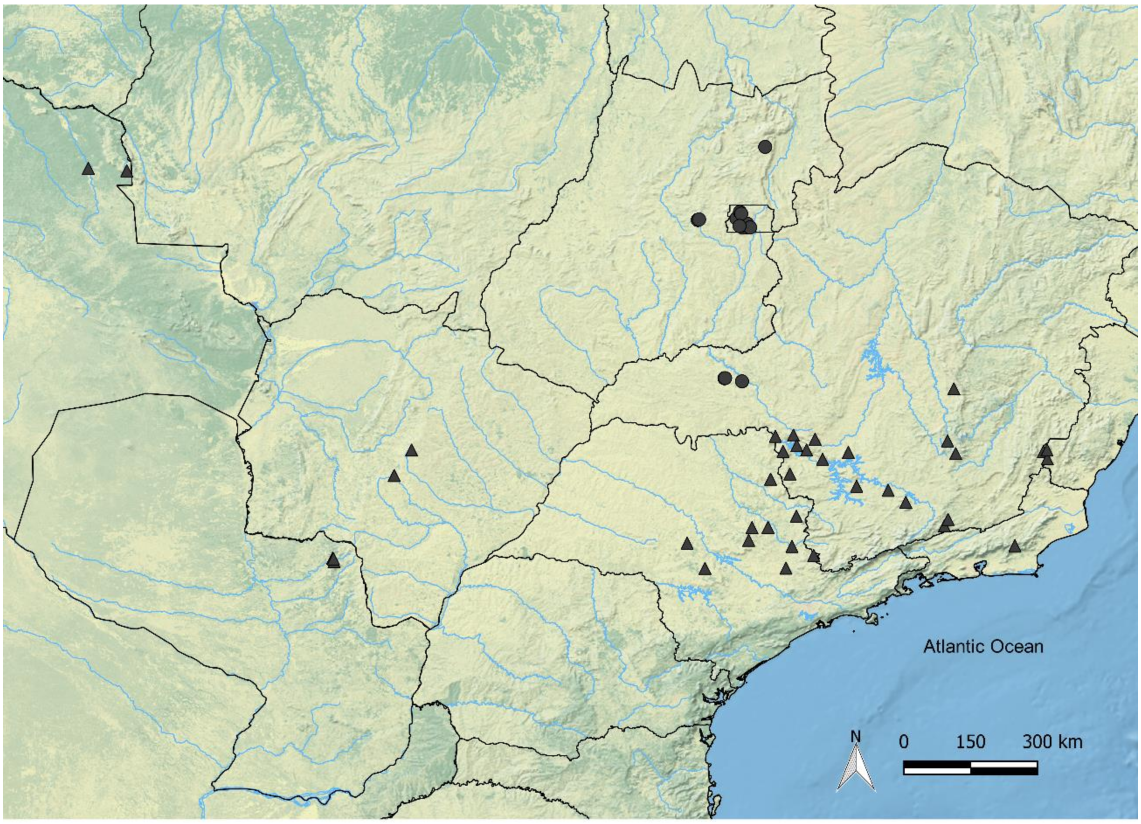

FIGURE 45. Geographical distribution of *Myrcia stricta* (circles) and *M. subalpestris* (triangles).

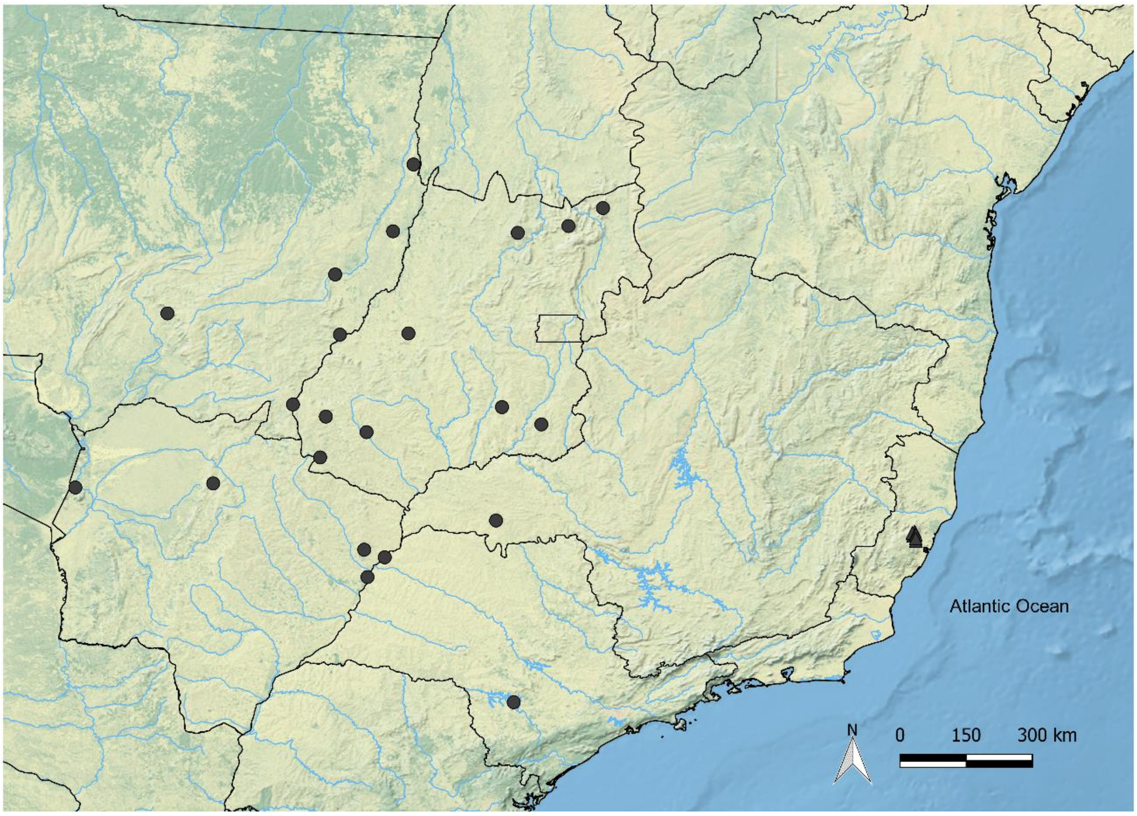

FIGURE 46. Geographical distribution of *Myrcia tortuosa* (circles) and *M. tumida* (triangles).

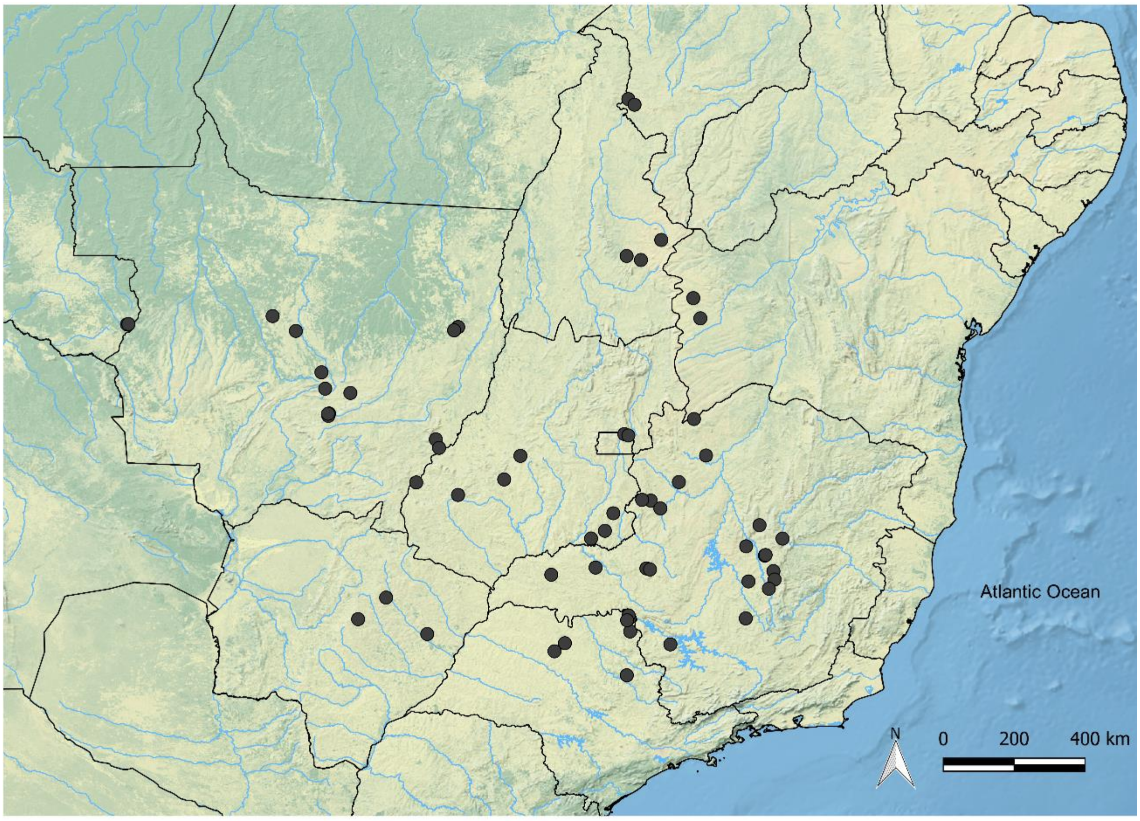

FIGURE 47. Geographical distribution of *Myrcia variabilis*.

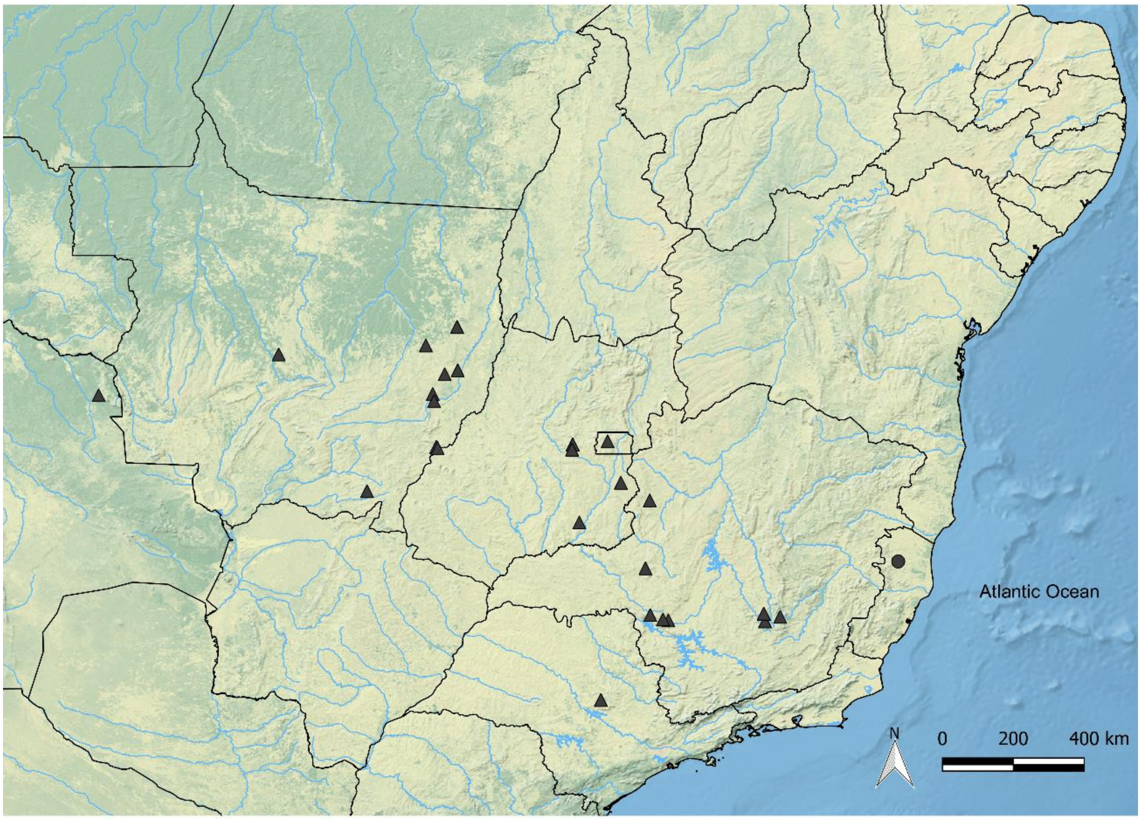

FIGURE 48. Geographical distribution of *Myrcia vestita* (triangles) and *Myrcia* sp. 3 (circle).

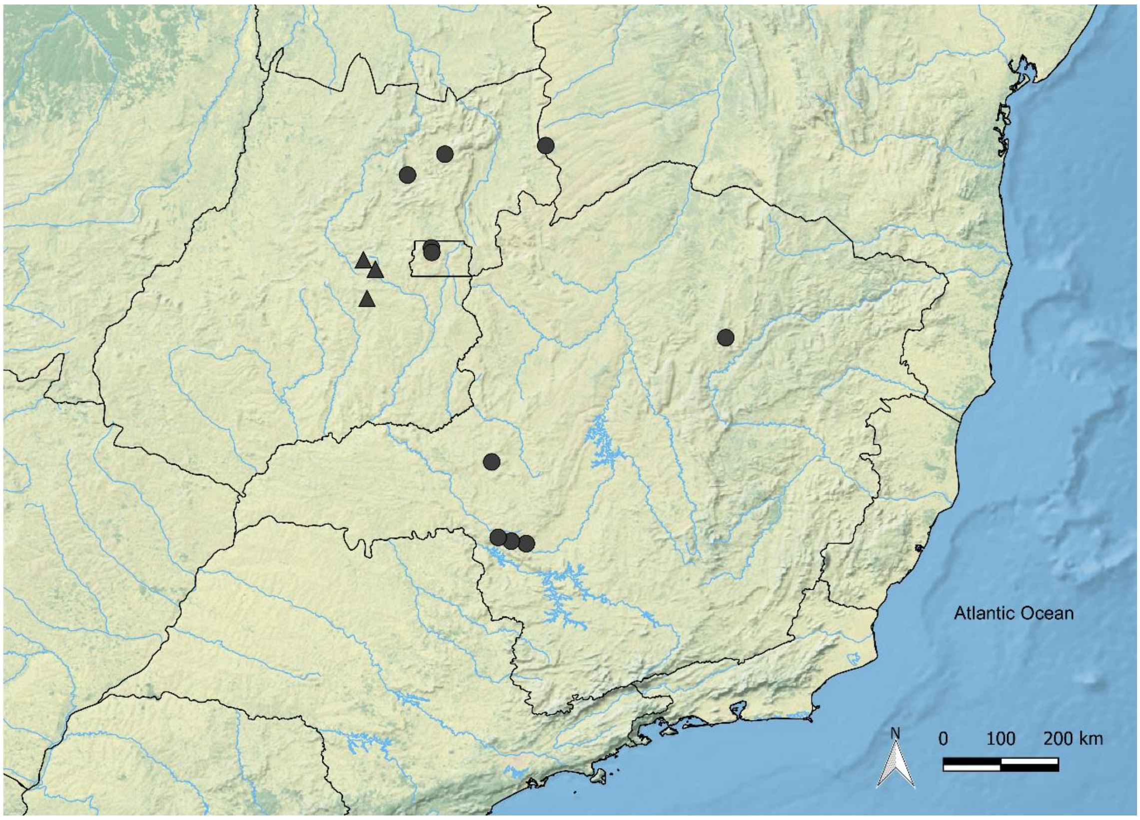

FIGURE 49. Geographical distribution of *Myrcia* sp. 1 (circles) and *Myrcia* sp. 2 (triangles).

CAPÍTULO 4

Nova espécie de *Myrcia* seção *Aulomyrcia* e notas sobre *Myrcia pinifolia* (Myrtaceae)

New species of *Myrcia* sect. *Aulomyrcia* and notes on *Myrcia pinifolia* (Myrtaceae) *

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New species of *Myrcia* sect. *Aulomyrcia* and notes on *Myrcia pinifolia* (Myrtaceae)

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Abstract

A new species of *Myrcia* sect. *Aulomyrcia* is presented along with taxonomic notes on *M. pinifolia*. *Myrcia tetraloba* is a new species found in *campo rupestre* and *cerrado* vegetation from the Chapada Diamantina, Bahia, Brazil. This species resembles *Myrcia hirtiflora*, but differs mainly in its 4-merous flowers and unreflexed calyx lobes (vs. 5-merous, strongly reflexed). *Myrcia pinifolia* is a very distinctive narrow-leaved species, widely misidentified in herbaria and recognised here as belonging to *Myrcia* sect. *Aulomyrcia*; a lectotype is here chosen and a new synonym is proposed for this species.

Key words: *Campo rupestre*, *Cerrado*, Chapada Diamantina, Neotropics, taxonomy

Introduction

Myrcia s.l. includes more than 700 species and comprises the traditional genera *Myrcia* De Candolle (1827: 406), *Marlierea* Cambessèdes (1833: 373), *Gomidesia* O.Berg (1854: 5) and *Calyptranthes* Swartz (1788: 79) (Govaerts *et al.* 2016; Lucas *et al.* 2007). Molecular studies show that these four genera are poly- or paraphyletic in respect to each other (Lucas *et al.* 2007; Lucas *et al.* 2011; Santos *et al.* 2017; Vasconcelos *et al.* 2017), and a new sub-generic classification is needed to maintain a monophyletic genus. For these reasons, *Gomidesia*, *Marlierea* and *Calyptranthes* species are gradually being synonymized under *Myrcia* (BFG 2015; Flora do Brasil 2020; Govaerts *et al.* 2016; Lucas *et al.* 2016); see Lucas & Sobral (2011) for discussion on the conservation of the name *Myrcia*.

Recent molecular phylogenies focusing on *Myrcia s.l.* identified nine clades congruent with a combination of morphological characters (Lucas *et al.* 2011; Staggemeier *et al.* 2015). A new sectional classification of the genus is ongoing based on these nine clades (Lucas *et al.* in prep.). *Myrcia* sect. *Aulomyrcia* (O.Berg 1855: 35) Grisebach (1860: 234) (clade 9 *sensu* Lucas *et al.* 2011) is characterized by generally asymmetric and irregularly branched inflorescences, 4–5-merous flowers with free or fused calyx lobes that open irregularly through a tearing hypanthium, and that are frequently caducous in the globose fruit, the hypanthium is elevated above the ovary but is generally inconspicuous after tearing, and a bilocular ovary. The group is extremely diverse with more than 120 species distributed throughout the Neotropics in many vegetation types (Lucas *et al.* 2016).

During taxonomic and phylogenetic studies of *Myrcia s.l.* (Lucas *et al.* 2016; Lima *et al.* in prep.), species previously predicted to emerge in a clade with 3-locular species were unexpectedly found to belong to the 2-locular *Myrcia* sect. *Aulomyrcia*, e.g. *M. myrtillifolia* De Candolle (1828: 250), *M. coelosepala* Kiaerskou (1893: 81), *M. littoralis* De Candolle (1828: 249) and *M. ramuliflora* (O.Berg 1857: 64) N. Silveira (1985: 66). *Myrcia pinifolia* Cambessèdes (1832: 333), previously informally placed in clade 4 (*sensu* Lucas *et al.* 2011), is here discussed, typified and placed in *Myrcia* sect. *Aulomyrcia*. A new species of *Myrcia* sect. *Aulomyrcia* is also presented with descriptions, illustrations and discussion regarding distribution, conservation and taxonomic affinities.

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NEW SPECIES OF *MYRCIA* SECT. *AULOMYRCIA* AND NOTES ON *Myrcia pinifolia* (MYRTACEAE)

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***Key words*:** *Campo rupestre*, *Cerrado*, Chapada Diamantina, Neotropics, taxonomy

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Materials & Methods

Examined specimens are deposited in the herbaria listed below (acronyms follow Thiers *et al.* 2016). Morphological terminology is based mainly on Radford *et al.* (1974). Area of Occupancy (AOO) and Extent of Occurrence (EOO) are assessed using the Geospatial Conservation Assessment Tool (GeoCAT; Bachman *et al.* 2011), and IUCN criteria (IUCN 2012) were used to propose conservation status for the species. Maps were produced using QGIS 2.14 software (www.qgis.org).

New species

1. ***Myrcia tetraloba*** D.F.Lima & E.Lucas, *sp. nov.* Type:—BRAZIL. Bahia: Mun. Andaraí, Chapada Diamantina, estrada de pedra a partir da BA-142 para o distrito de Igatu, cerrado, 12°53’47”S, 41°18’53”W, 713 m, 11 February 2014, *D.F. Lima, J. Meirelles & C.R. Boelter 415* (holotype UEC!; isotypes K!, UPCB!). (Figures 1 and 2).

Diagnosis:—*Myrcia tetraloba* is related to *Myrcia hirtiflora* De Candolle (1828: 249), differing in its 4-merous flowers (vs. 5-merous), depressed ovate calyx lobes with rounded apices, not reflexed (vs. triangular calyx lobes with acute apices, strongly reflexed), and 2–4 panicles clustered in groups subtended by small bracts (vs. single panicles).

Tree to 5 m. Inflorescences, bracts, bracteoles, flowers and fruits densely covered with white, simple, curly trichomes 0.1–0.3 mm long; branches, petioles and leaves abaxially sparsely to moderately covered with the same trichomes, these generally turning grey and falling in mature structures. **Twigs** semi-terete to terete, grey, with scattered trichomes and frequently covered with dark glandular dots when young; mature twigs cylindrical, cortex exfoliating, reddish, glabrescent to glabrous; internodes 30–60 mm long. **Leaves** with petioles 3–6.5 × 0.9–1.6 mm, canaliculate, pubescent to glabrous, dark when dry; blades elliptic to widely elliptic, concolorous olive-green, 4.5–10.5 × 2–5 cm, 1.8–2.1 times longer than wide, apices acuminate, bases acute to obtuse, margins revolute when dry, secondary veins 10–15 at each side, 4–8 mm apart, leaving the midvein at angles of 60–70°, two marginal veins, the first 1.7–2 mm and the second 0.5–0.8 mm from the margin; adaxial surface glabrous, generally bullate, midvein sulcate, secondary veins sulcate or flat, tertiary veins flat, sometimes lighter than the blade, gland dots conspicuous, up to 5/mm²; abaxial surface with scattered trichomes when young, more abundant near or on the veins, glabrescent at maturity, midvein and secondary veins prominent, tertiary veins prominent or flat, gland dots conspicuous, up to 5/mm². **Inflorescences** axillary or terminal clustered in groups of 2–4 panicles, irregularly branched, flattened, densely pubescent, main axis 26–65 × 0.8–1.3 mm, first order ramifications 8–24 × 0.7 mm; bracts 1.1–2 × 1 mm, persistent, triangular, densely pubescent; bracteoles 1.4–1.7 × 0.7–1 mm, generally persistent, triangular to lanceolate, pubescent. **Flower buds** globose to slightly clavate, 1.5–2 × 1.4–1.6 mm; flowers with hypanthium not tearing at anthesis, ca. 0.5 mm prolonged above the ovary, externally densely pubescent, internally glabrous; calyx 4-merous, lobes 1–1.5 × 0.9–1.3 mm, depressed ovate, apices rounded, externally and internally pubescent, not reflexed; corolla 4-merous, petals ca. 2 × 1.5 mm, glabrous, white; floral disc 1.1–1.3 mm diam., glabrous; staminal ring thin, comprising less than 30% of the total disc width, glabrous, stamens 2–4 mm long; ovary glabrous, 2-locular, 2 ovules per locule, style 3.5–4.3 mm long, glabrous, stigma punctiform. **Fruit** green when young, 3–5 × 3–5 mm, globose, pubescent, crowned by the four calyx lobes; two seeds, reniform, testa smooth, shining, brown.

Distribution and Habitat:—*Myrcia tetraloba* is known from the Chapada Diamantina region, Bahia, Brazil. The species was collected in dense *cerrado* vegetation and in areas of transition between *cerrado* and *caatinga* vegetation, at 700–1100 m elevation.

Phenology:—*Myrcia tetraloba* was collected with flowers in November and December; with fruits between December and February.

Etymology:—The epithet alludes to the four free calyx lobes.

Conservation status:—*Myrcia tetraloba* is known from few collections, most of them in the municipality of Abaíra, inside a partially protected area (APA Serra do Barbado). The species is also recorded from two collections in opposite borders of the Chapada Diamantina National Park, suggesting a wider distribution of the species inside this protected area. *Myrcia tetraloba* has an extent of occurrence (EOO) of ca. 5,780 km^2 and can be considered as Vulnerable (VU), following the criteria B1a, biii (IUCN 2012): this species has a total known EOO smaller than 20,000 km^2 (criterion B1) and is known from less than 10 locations that can be subject to fire and human action (criteria a, biii).

Discussion:—*Myrcia tetraloba* is recognized by its whorled terminal or axillary panicles, these are asymmetric and densely covered with whitish trichomes, and by its 4-merous flowers. Vegetative material resembles *Myrcia hirtiflora* mainly because of the indument and the elliptic and frequently bullate leaves with acuminate apices. They can be distinguished through the characters given in the diagnosis. Additionally, *Myrcia hirtiflora* is restricted to coastal northeastern Brazil, while *Myrcia tetraloba* is known from inland *cerrado* vegetation in Bahia.

Some specimens of *Myrcia tetraloba* were previously identified as *Myrcia* cf. *alagoensis* O.Berg (1857: 165) [=*M. splendens* (Swartz 1788: 79) De Candolle (1828: 244)], in some herbaria and in Flora of Catolés (Zappi *et al.* 2003). These two species can be distinguished by the 4-merous flowers of *Myrcia tetraloba* (vs. 5-merous), glabrous hypanthium prolonged above the ovary (vs. pubescent and flat hypanthium) and globose fruits (vs. ellipsoid).

Myrcia tetraloba may also resemble the widespread *Myrcia tomentosa* Aublet (1775: 504) De Candolle (1828: 245) due to the asymmetrical inflorescences, sessile flowers and indument. *Myrcia tetraloba* however, has elliptic leaves (vs. obovoid in *M. tomentosa*), 4-meros flowers (vs. 5-merous), and calyx lobes not reflexed (vs. reflexed).

Molecular data based on nuclear and plastid sequences (Lima *et al.* in prep.) show that *Myrcia tetraloba* emerges in *Myrcia* sect. *Aulomyrcia* (clade 9 *sensu* Lucas *et al.* 2011), while *M. tomentosa* and *M. splendens* (= *M. alagoensis*) appear respectively in clade 8 and 5. *Myrcia hirtiflora* is still not included in a molecular phylogenetic framework, but it probably belongs to clade 9, due to its morphology. *Myrcia tetraloba* is likely part of the informal species group C of *Myrcia* sect. *Aulomyrcia* (*sensu* Lucas *et al.* 2016).

Paratypes:—BRAZIL. Bahia: Mun. Abaíra, arredores de Catolés, 13°17’S, 41°51’W, 1000–1100 m, 24 December 1991, *R.M. Harley H50323* (HUEFS!, K!, SP!, SPF!, UPCB!); Brejo do Engenho, 13°18’S, 41°48’W, 900–1000 m, 30 December 1991, *E. Nic Lughadha, D.J.N. Hind & R.F. Queiroz H50555* (ESA!, K!, SPF!); Estrada Catolés-Abaíra, ca. 5 km de Catolés, mata do engenho, 13°19’S, 41°49’W, 1000 m, 24 November 1992, *W. Ganev 1544* (CEPEC, K!, HUEFS!, SPF!, UB); Estrada nova Abaíra-Catolés, perto de São José, 13°15’S, 41°42’W, 750–900 m, 28 December 1992, *R.M. Harley H50511* (HUEFS!, K!, RB!, SP!, SPF!); Capão do Criminoso, 13°20’S, 41°47’W, 950 m, 22 January 1994, *W. Ganev 2851* (HUEFS!, K!, SPF!, UB). Mun. Jacobina, Morro da Torre, próximo ao cruzeiro, 11°12’13”S, 40°30’27”W, 800–1000 m, 30 December 2004, *R.C. Forzza & R. Mello-Silva 3880* (RB!). Mun. Palmeiras, Campos de São João, cerrado denso, 12°27’S, 41°28’W, 15 December 2002, *L.S. Funch, E.B. Miranda, R. Funch, R.P. Oliveira, França et al. 1533* (HUEFS!).

A note on *Myrcia pinifolia*

Myrcia pinifolia Cambessèdes in Saint-Hilaire *et al.* (1832: 333). (Figures 2 and 3).

Type:—BRAZIL. Goiás: *in sabulosis partis australis provinciae Goyaz loco alto dicto Chapadão et in montibus Serra das Caldas prope aquas thermales*, s.d., *Saint-Hilaire 882* (lectotype P[P00161382]!, designated here; isolectotypes F-photo!, MPU-photo!, P[P00161381]!, P[P00161383]!, P[P00161384]!, P[P00161385]!).

≡ *Aulomyrcia pinifolia* (Cambess.) O.Berg (1855: 35).

= *Myrcia paracatuensis* var. *linearis* Mattos (1975: 2), *syn. nov*. Type:—BRAZIL. Goiás: Capelinha de Sto. Antonio, 21 August 1894, *A. Glaziou 21133* (holotype MVM; isotypes BR!, C!, G!, K-2!, LE, P-2!, RB!).

Distribution and Habitat:—*Myrcia pinifolia* has been collected in rocky and sandy soils in *cerrado* vegetation from the Brazilian states of Goiás, Mato Grosso, Minas Gerais and Distrito Federal.

Phenology:—*Myrcia pinifolia* was collected with flowers between July and February; with fruits in October.

Etymology:—from the Latin words 'pini' and 'folia', meaning respectively 'pine' and 'leaf', alluding to the resemblance of the narrow leaves to those of *Pinus* Linnaeus (1753: 1000; Pinaceae).

Conservation status:— *Myrcia pinifolia* is relatively widely distributed in central Brazil and Minas Gerais. However, it occurs in *cerrado* vegetation, a biome severely fragmented and disturbed by human actions. Few collections of *Myrcia pinifolia* were registered inside protected areas (Caldas Novas and Serra dos Pireneus State Parks). The species has an area of occupancy (AOO) of ca. 48 km^2 and can be considered Endangered (EN) following the criteria B2a, biii, biv (IUCN 2012): this species has an AOO smaller than 500 km^2 (criterion B2) and occupies a severely fragmented region presently subject to deforestation, that is likely to further reduce its habit (criteria a, biii, biv).

Discussion:—*Myrcia pinifolia* is a glabrous sub-shrub characterized by linear leaves, 9–12 times longer than wide, with obtuse to rounded apices and acute bases, plane margins and midveins slightly channelled to flat on the adaxial surface. Petioles are very short, generally pinkish and somewhat swollen, up to 1 mm long, but sessile leaves can also be found. Inflorescences are generally panicles, delicate and slightly asymmetric. Flower buds are usually depressed globose, with acute bases that widen abruptly upwards, often pinkish, with five free calyx lobes that may be internally glabrous or lightly pubescent. The ovary is bilocular with two ovules per locule.

Myrcia pinifolia joins *M. myrtillifolia*, *M. coelosepala*, *M. littoralis*, *M. ramuliflora* and their synonyms, as unexpected additions to *Myrcia* sect. *Aulomyrcia*. Recent systematic reviews (Lucas *et al.* 2016; Lima *et al.* in prep.) reveal these latter five species, that were previously assumed related to tri-locular *Myrcia guianensis* (Aublet 1775: 506) De Candolle (1828: 245) in clade 4 (*sensu* Lucas *et al.* 2011), are better placed in *Myrcia* sect. *Aulomyrcia.* The same five species share a distinctive midrib that narrows abruptly from the petiole, beginning wide and sulcate (adaxially) and ending so narrow as to be almost absent and flattened. *Myrcia pinifolia* is placed in the informal species group C of *Myrcia* sect. *Aulomyrcia* (*sensu* Lucas *et al.* 2016).

Many specimens with 3-locular ovaries, globose flower buds, longer leaves and reduced inflorescences were misidentified as *Myrcia pinifolia* in herbaria. These specimens represent in fact *Myrcia depauperata* Glaziou (1908: 228), a *nomen nudum* soon to be validated (P.O.Rosa pers. comm.; see also Rosa 2015) and here treated as *Myrcia* sp. Molecular phylogenies based on plastid and nuclear data (Staggemeier *et al.* 2015, Lima *et al.* in prep.) show a clear separation between bi- and tri-locular species: *Myrcia pinifolia* emerges in the consistently bilocular *Myrcia* sect. *Aulomyrcia* (clade 9 *sensu* Lucas *et al.* 2011), while *Myrcia* sp. groups with other tri-locular species within clade 4 (*sensu* Lucas *et al.* 2011).

Mainly due to similarities in habit and leaf shape, *Myrcia pinifolia* also resembles *M. linearifolia* Cambessèdes (1832: 148), *M. lignosa* D. Villarroel & Proença (2013: 261) and *M. macrocalyx* Faria & Soares-Silva (2015: 181), all of them belonging to *Myrcia* sect. *Myrcia* (clade 5 *sensu* Lucas *et al*. 2011). These species are promptly distinguished by the characters presented in Table 1.

Myrcia pinifolia was described by Cambessèdes based on *Saint-Hilaire 882*. Although Cambessèdes' types are housed at MPU (Stafleu & Cowan 1976), duplicates of *M. pinifolia* bearing his handwriting were found in P, indicating that he analyzed both specimens likely before the distribution of these duplicates. In this case, a lectotype must be assigned for *Myrcia pinifolia* and the selected material (P[00161382]) is a complete specimen that well-match the protologue.

Myrcia paracatuensis Kiearskou (1893: 99) var. *linearis* Mattos (1975: 2) is easily distinguished from the typical variety by its much narrower (1–2 mm wide) and sessile or subssesile leaves and match exactly the morphology of *M. pinifolia*; as a result, the former is synonymized under the latter.

Material examined:—BRAZIL. Distrito Federal: Brasília, área do Cristo Redentor, 16 August 1988, *R.C. Mendonça 1046* (RB!); 30 August 1988, *D. Alvarenga 79* (RB!); *R.C. Mendonça 1069* (RB!); 3 October 1990, *P.S. Câmera & M. Dias 48* (K!); Sítio do Ipê, cerrado, 4 October 1989, *V.F. Ferreira 4274* (RB!); Estação Ecológica do Jardim Botânico de Brasília, área do Cristo Redentor, 2 July 2006, *C.M.L. Viana, R.G. Chacon & V.F. Paiva 4* (BHCB). Goiás: Serra dos Cristaes, 15 September 1875, *Glaziou 21132* (BR!, C!, G!, K!, LE, P!, RB!); Cascade do Abbade, près de l'eau, 17 July 1894, *Glaziou 21131* (BR!, C!, G!, K!, LE, P!). Mun. Caldas Novas, Parque Estadual de Caldas Novas, 13 August 2009, *D.I. Junqueira 536* (K). Mun. Cristalina, Cachoeira, 7

October 1981, *G. Hatschbach 44075* (C!, MBM!, SPF!); ca. 15 km de Cristalina em direção a Campo Alegre de Goiás, 8 September 1998, *V.C. Souza, L. Capellari Jr., J.P. Souza & F.F. Mazine 21344* (ESA!, SP!); *V.C. Souza, L. Capellari Jr., J.P. Souza & F.F. Mazine 21346* (ESA!, UB); cerrado, 5 November 2014, *T.N.C. Vasconcelos 505* (K!, UB); próximo as Lages, ca. 12 km ao sul de Cristalina, campo sujo, 30 July 2011, *J.E.Q. Faria, M.R.C. Cota & P.R.F. Amorim 1494* (BHCB, HUEG, UB). Mun. Pirenópolis, Serra dos Pirineus, 26 January 1991, *N.L. Menezes 1239* (SPF!, UPCB!). Mun. Planaltina, a 14 km da cidade de Planaltina-GO, a 5 km da Lagoa Formosa e a 600 m do Córrego Maranhão, 9 October 1992, *J. Fontella & J.E. de Paula 2832* (RB!); *J. Fontella & J.E. de Paula 2854* (RB!). Mun. São Gabriel, arredores, 7 November 1991, *G. Hatschbach, M. Hatschbach & J.M. Silva 55873* (C!, MBM!, MO). Mato Grosso: Próximo à Fazenda 3 Marias, June 1981, *J.P.S. Lima 99* (RB!). Mun: Itiquira, arredores, 11 February 1970, *G. Hatschbach 34041* (MBM, SP!). Minas Gerais: Mun. Corinto, Estrada Corinto-Várzea da Palma, km 47, 2 October 1965, *A.G. Ferreira & M. Marques 51* (SP!); *M.E.R. Matos et al. 47* (SP!); *M.E.R. Matos, A.B. Gusman & F. Chacur 42* (SP!). Mun. Paracatu, ramal entrando a NE da BR040, 30 October 2010, *L.P. de Queiroz, A.S. Conceição, J.G. Carvalho-Sobrinho & R. Machado 15057* (HUEFS).

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TABLE 1. Comparative characters between *Myrcia pinifolia* and morphologically similar species and their geographical distribution. Clade numbers follow Lucas *et al.* (2011). GO: Goiás, DF: Distrito Federal, MT: Mato Grosso, MG: Minas Gerais, TO: Tocantins.

	Myrcia pinifolia (clade 9)	*Myrcia* sp. (clade 4)	*Myrcia linearifolia* (clade 5)	*Myrcia lignosa* (clade 5)	*Myrcia macrocalyx* (clade 5)
Leaves lenght (cm)	0.9–2.2	2–4	0.5–2.5	2–4	1.2–3.8
Petioles lenght (mm)	Up to 1	Up to 2	Up to 1.5	1–2	1–1.5
Indument on the branches	Glabrous	Glabrous or nearly so	Pubescent when young and mature, rarely glabrescent	Glabrous	Pubescent when young, then glabrescent
Indument on the inflorescences	Glabrous	Glabrous	Pubescent	Glabrous	Pubescent to glabrous
Calyx lobes shape	Rounded	Rounded to triangular	Triangular	Narrow triangular to lanceolate	Ovate to lanceolate
Indument on the calyx lobes	Glabrous without; glabrous or pubescent within	Glabrous without; pubescent within	Pubescent without; glabrous within	Glabrous on both sides	Pubescent without; glabrous within
Hypanthium (inside)	Glabrous	Glabrous	Densely pubescent	Puberulous	Densely velutinous
Ovary locules	2-locular	3-locular	2-locular	2-locular	2-locular
Fruits	Globose	Globose	Ellipsoid	Globose	Ellipsoid
Geographical distribution	Brazil (GO, DF, MT, MG)	Brazil (GO, DF, MG)	Brazil (TO, GO, DF, MG)	Bolivia (Santa Cruz)	Brazil (GO)

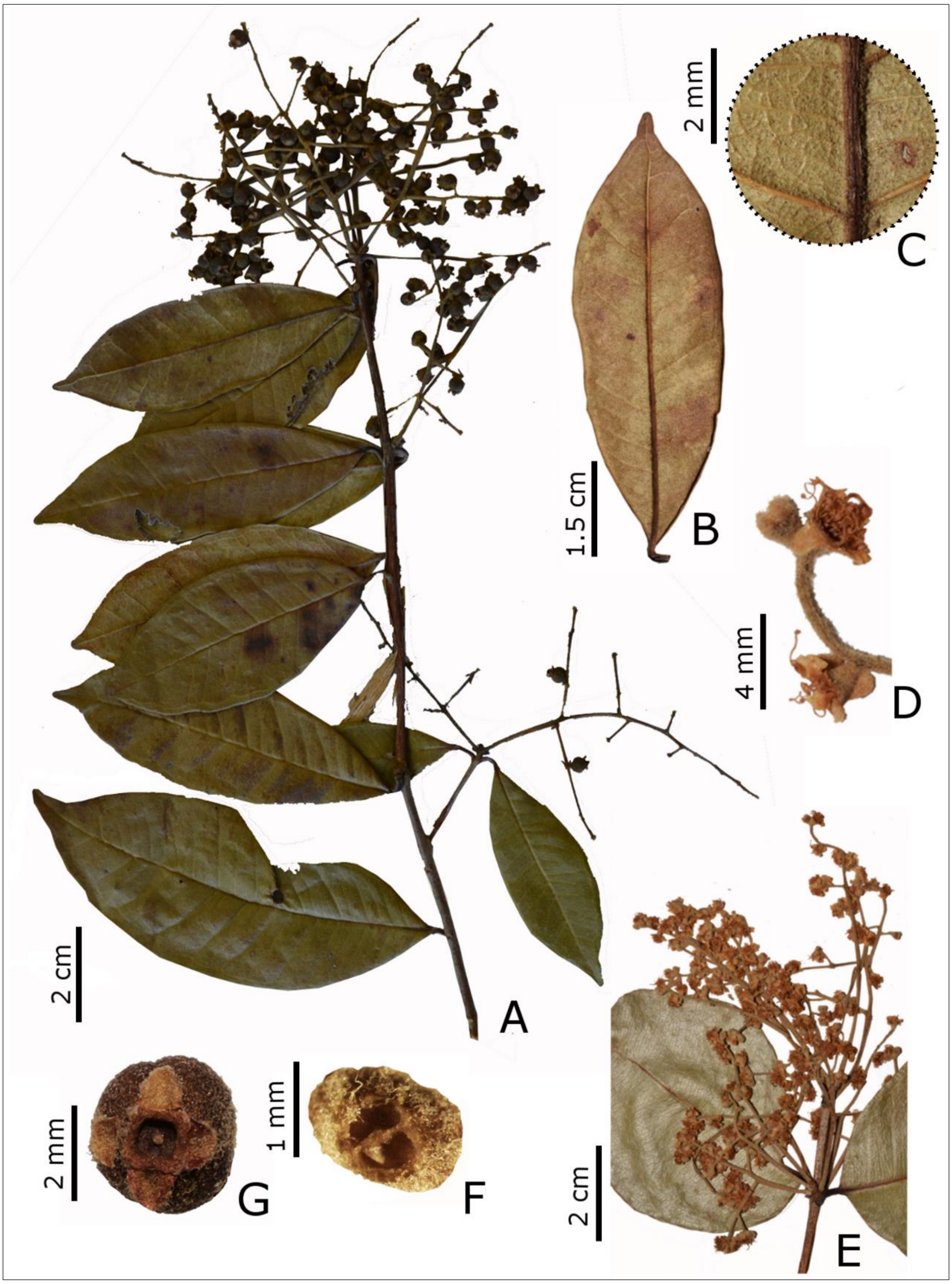

FIGURE 1. *Myrcia tetraloba*, photos from dried specimens. A: branch with infructescence; B. leaf, abaxial view; C: detail of the leaf indument, abaxial view; D: sessile flowers; E: inflorescences; F: bilocular ovary, transversal section; G: fruit crowned by the 4 calyx lobes. (A, B, C, G from *Lima et al. 415*; D, E, F from *Funch et al. 1533*).

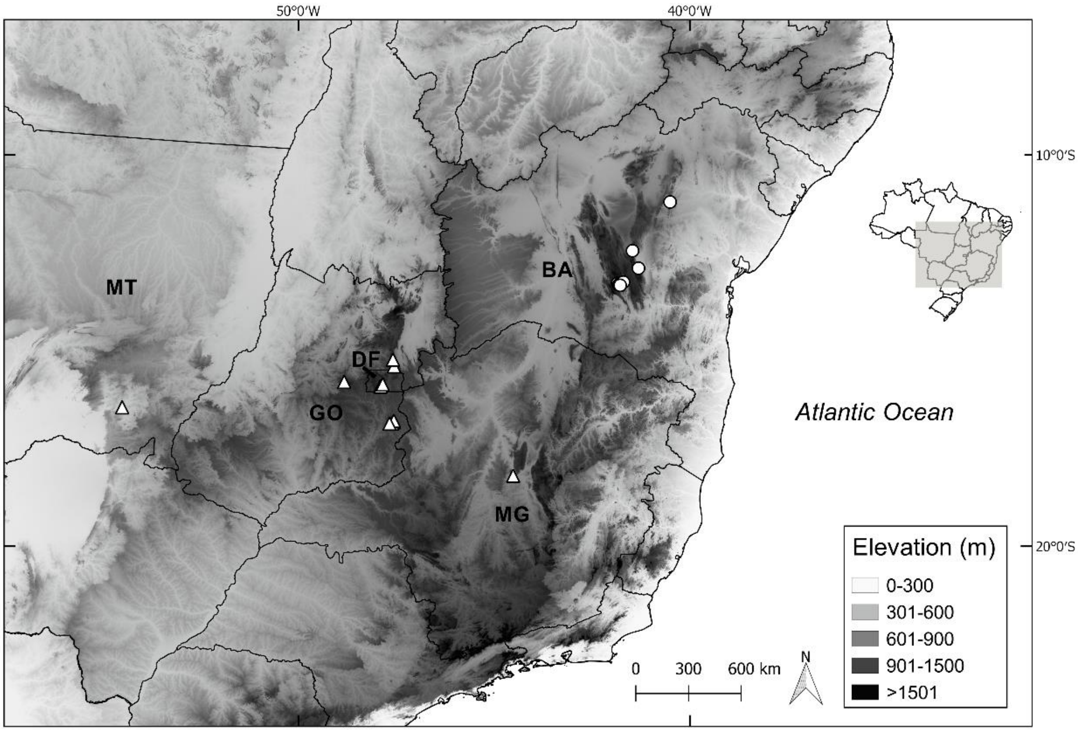

FIGURE 2. Distribution map of *Myrcia tetraloba* (circles) and *M. pinifolia* (triangles). BA: Bahia; DF: Distrito Federal; GO: Goiás; MG: Minas Gerais; MT: Mato Grosso.

FIGURE 3. Lectotype of *Myrcia pinifolia* Cambess. (*Saint-Hilaire 882*, P [P00161382]). Image provided by the Muséum National d'Histoire Naturalle, Paris. <https://science.mnhn.fr/institution/mnhn/collection/p/item/p00161382>.

CONSIDERAÇÕES FINAIS

Myrcia s.l., assim como outros gêneros de Myrtaceae, apresenta grande complexidade morfológica e confusão taxonômica. No total, mais de 700 espécies são atualmente aceitas no grupo, e várias outras espécies novas têm sido descobertas. A última revisão completa do gênero foi realizada há mais de 150 anos, incluindo menos da metade das espécies conhecidas atualmente, fato que comprova uma defasagem no conhecimento do grupo. Após os primeiros estudos filogenéticos-moleculares focando *Myrcia* s.l., um panorama geral da circunscrição, diversificação e evolução do grupo é conhecido, mas muitas questões ainda permanecem abertas e são dignas de estudos.

Quando se pesquisando grandes gêneros, uma tática recorrente é a separação destes em grupos menores para estudos mais focados. No caso de *Myrcia* s.l., nove clados bem suportados são reconhecidos e informalmente nomeados como 'clado Calyptranthes', 'clado Eugeniopsis', 'clado Gomidesia', 'clado Guianensis', 'clado Myrcia', 'clado Reticulosa', 'clado Sympodiomyrcia', 'clado Tomentosa' e 'clado Aulomyrcia'. Com base neles, uma futura divisão sub-genérica será proposta. Seis destes nove clados foram recentemente ou estão sendo foco de estudos filogenéticos e taxonômicos aprofundados por diferentes pesquisadores. Assim sendo, a tese aqui apresentada tomou como modelo de estudo o clado Guianensis.

A partir de uma amostragem mais ampla, um estudo filogenético foi realizado para o clado Guianensis (capítulo 1), aliando técnicas modernas de *next-generation sequencing* (sequenciamento de nova geração) e tradicionais de sequenciamento de Sanger. Por sua praticidade, a metologia de *genome skimming* foi empregada e se mostrou útil para obter sequências completas de cloroplasto e sequências parciais de núcleo. Esta técnica foi empregada no intuíto de gerar mais caracteres filogeneticamente informativos e, consequentemente, gerar bons suportes dentro do clado Guianensis. Como nem todos os clados de *Myrcia* s.l. foram amostrados para o *genome skimming*, uma amostragem mais ampla de *Myrcia* s.l. foi utilizada com a finalidade de observar as relações externas do clado Guianensis. Nesta etapa, foram utilizadas cinco regiões específicas de DNA. Em ambas as análises, o clado Guianensis foi reconstruído e pôde ser precisamente circunscrito de acordo com sua morfologia e geografia. Além disso, os resultados filogenéticos aqui apresentados evidenciaram o reconhecimento de um décimo clado fortemente suportado em *Myrcia* s.l. que ainda não havia sido discutido em estudos anteriores, e que também deve ser descrito como seção de *Myrcia* s.l. As espécies que caíram neste clado (*Myrcia almasensis*, *M. maximiliana*, *M. pulvinata*, *M. robusta*, *M. thomasii* e *M.* aff. *unana*) são pobremente conhecidas e maiores observações são necessárias para uma adequada circunscrição morfológica e geográfica deste novo grupo.

Com o clado Guianensis bem circunscrito, adequações nomenclaturais, tipificações e uma revisão taxonômica completa foram realizadas para o grupo (capítulos 2 e 3). Mais de 4000 exemplares de herbário foram examinados, incluindo quase a totalidade dos tipos nomenclaturais do grupo, depositados em sua maioria em herbários europeus. Como esperado para grupos complexos, algumas dúvidas de delimitação específica ainda permanecem, como o caso de *Myrcia guianensis*. Nestes casos, muito se tem debatido sobre o reconhecimento de uma única espécie com ampla variação morfológica e/ou geográfica, ou o reconhecimento de várias entidades que na maioria das vezes apresenta certo grau de sobreposição de caracteres. Para esta e outras questões similares, foram tomadas decisões que se julgaram mais apropriadas para acomodar a diversidade do grupo e para facilitar o reconhecimento de suas espécies. Estudos moleculares a nível populacional são imprescendíveis para demais discussões neste tema, assim como estudos de biologia reprodutiva e ecologia.

Vale ressaltar que, apesar dos esforços recentes, muito ainda tem a ser feito em *Myrcia* s.l. Os resultados apresentados aqui, embora de grande importância para *Myrcia* s.l. e clado Guianensis, representam apenas uma pequena parcela no conhecimento do grupo. Demais estudos sobre anatomia, morfologia, fitoquímica, ecologia, e biossistemática são fortemente encorajados.

ANEXOS

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