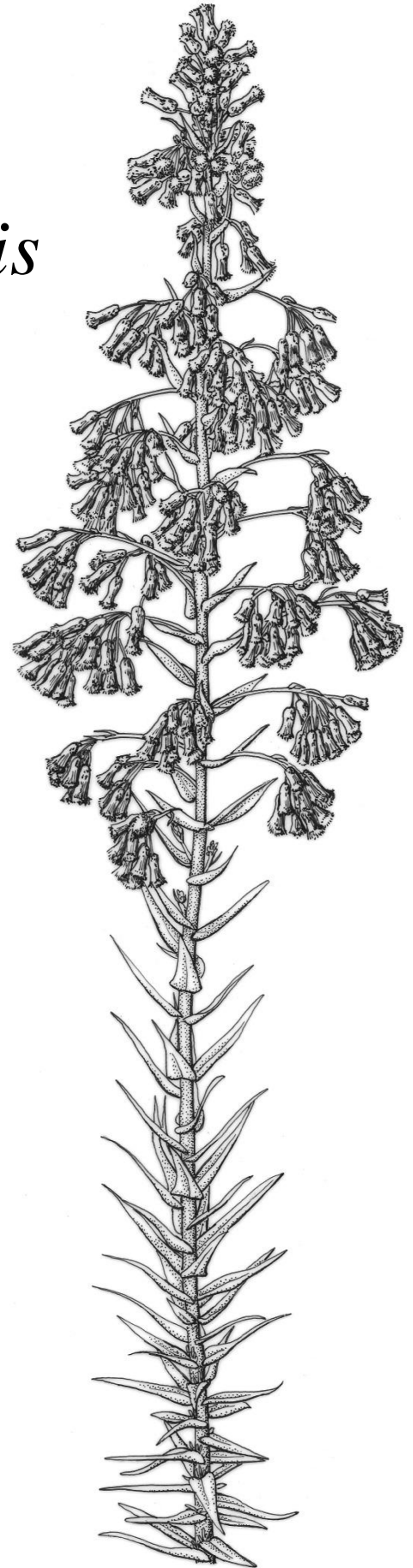


Gustavo Heiden

Systematics of *Baccharis*  
(Asteraceae: Astereae)



São Paulo, 2014.



Gustavo Heiden

Systematics of *Baccharis*  
(Asteraceae: Astereae)

São Paulo, 2014.





Gustavo Heiden

Systematics of *Baccharis*  
(Asteraceae: Astereae)

Tese apresentada ao Instituto de  
Biociências da Universidade de São  
Paulo, para a obtenção de título de Doutor  
em Ciências, na área de Botânica.

Orientador: José Rubens Pirani

Versão corrigida.

A versão original encontra-se na biblioteca do Instituto de Biociências e na  
Biblioteca Digital de Teses e Dissertações da USP.

São Paulo, 2014.



Heiden, Gustavo

Systematics of *Baccharis* (Asteraceae:  
Astereae)

Número de páginas: 372 pp.

Tese (Doutorado) – Instituto de Biociências  
da Universidade de São Paulo.

Departamento de Botânica.

1. Compositae 2. Sistemática 3. Filogenia  
I. Universidade de São Paulo. Instituto de  
Biociências. Departamento de Botânica.

### Comissão Julgadora:

---

Prof(a). Dr(a).

---

Prof(a). Dr(a).

---

Prof(a). Dr(a).

---

Prof(a). Dr(a).

---

Prof. Dr. José Rubens Pirani



*À minha avó Irena Karow Bergmann,  
quem primeiro percebeu o quanto eu  
admirava as plantas.*



*Não sei pensar a máquina, isto é, faço o meu trabalho criativo primeiramente a lápis.  
Depois, com o queixo apoiado na mão esquerda, repasso tudo a máquina com um dedo só.*

– *Mas isso não custa muito?*

– *Custar, custa, mas dura mais...*

Mário Quintana,  
Da preguiça como método de trabalho.





## AGRADECIMENTOS

Agradeço ao programa de pós-graduação em Ciências Biológicas - Botânica, do Instituto de Biociências da Universidade de São Paulo por ter oferecido a oportunidade e as condições para a realização deste trabalho. À Coordenação de Aperfeiçoamento de Pessoal de Nível Superior, pelos primeiros seis meses de bolsa, e à FAPESP (processos 2010/00519-8, 2011/18385-0 e 2012/17911-3) pela Bolsa de Doutorado, pela Bolsa Estágio de Pesquisa no Exterior e pelo Auxílio Regular à Pesquisa, sem os quais este trabalho não teria alcançado os objetivos almejados. Também contribuíram para a realização do mesmo os auxílios do IAPT Research Grants in Plant Systematics 2010 e Smithsonian Institution's 2011 Cuatrecasas Fellowship Award.

Sou grato ao meu orientador José Rubens Pirani pela confiança, entusiasmo e presteza com que me guiou em todas as etapas deste trabalho e também ao Alexandre Antonelli pela supervisão e por propiciar um ambiente de trabalho instigante na Universidade de Gotemburgo. Agradeço ainda àqueles que os precederam na minha formação acadêmica: José Fernando Andrade Baumgratz, Rosa Lía Barbieri, Leila Macias e Vera Lúcia Bobrowski.

Diversos amigos contribuíram diretamente para a qualidade deste trabalho e seria impossível nomear todos. O conteúdo científico não teria o mesmo apelo visual sem as belas pranchas de ilustração científica confeccionadas pelo exímio amigo João Iganci, que também ofereceu um apoio incondicional em várias outras etapas durante o doutorado. As discussões e as distrações no "Neighborhood Compositae Newsletter" com o Benoît Loeuille, a Carol Siniscalchi e o Caetano Oliveira foram essenciais para o amadurecimento de muitas ideias. Todos eles também foram grandes companhias nos trabalhos de campo assim como a Cíntia Luz, a Clarisse Bolfe Poliquesi, o Guilherme Heiden, o Joel Morais da Silva, o Joel Vaz, a Mariana Bünger, o Osmar dos Santos Ribas, a Rosa Lía Barbieri e a Vanessa Leite Rezende, nas viagens pelo Brasil; a Gisela Sancho e o Santiago Catalano na Argentina; a Christine Bacon, o Daniel Mauricio Diaz Rueda, o Fabio Ávila, o Jose Aguilar Cano, o Juan Carlos Copete Maturana e o Mauricio Diazgranados na Colômbia; e o José Mauricio Bonifacino no Uruguay. A amostragem da filogenia também não teria sido tão representativa sem as

contribuições da Ana Claudia Fernandes, da Carol Kellof, do G. Felitto, da Mélica Muñoz-Schick, do Paulo Takeo Sano, da Vanessa Rivera, e da Vicki Funk. O aprendizado no laboratório de biologia molecular foi facilitado pelo Benoît Loeuille, Maria Fernanda Calió, Alexandre Zuntini, Luiz Fonseca, Filipe de Portugal e Marcela Firens.

Também contribuíram direta ou indiretamente para este trabalho os demais professores da pós-graduação como a Lúcia Lohmann, o Jefferson Prado, o Paulo Sano e o Renato de Mello-Silva. O apoio técnico prestado pelo Abel, Vivi Jono e Robertinha Figueiredo foi essencial para o processamento do material coletado. Além disso, foi parte efetiva da minha formação a convivência em classe ou extra-classe com outras personalidades da pós-graduação tais como a Caroline Oliveira Andrino, a Jenifer Lopes, a Juliana Gastaldello Rando, a Juliana El Ottra, a Juliana de Paula-Souza, o Leonardo Borges, o Maurício Watanabe, o Paulo Baleeiro e o Paulo Gonella. Em Gotemburgo foi uma agradável surpresa ter feitos amigos como o Filipe de Portugal, a Karine Bresolin de Souza, a Marcela Firens, a Rosemeri Morokawa e o Thomas Berg Hasper. Por fim, eu agradeço a todos os meus familiares e amigos, pois, longe ou perto, vocês são o sentido de tudo isso.

## CONTENTS

RESUMO .....	26
ABSTRACT .....	28
INTRODUCTION .....	30
CHAPTER 1      A novel infrageneric classification of <i>Baccharis</i> (Asteraceae: Astereae) .....	38
CHAPTER 2      Studies in <i>Baccharis</i> subgen. <i>Tarchonanthoides</i> (Asteraceae, Astereae) .....	136
PART 2.1        A synopsis and notes for <i>Baccharis</i> subgen. <i>Tarchonanthoides</i> (Asteraceae: Astereae) .....	138
PART 2.2        Two new combinations in <i>Baccharis</i> (Asteraceae: Astereae) .....	160
PART 2.3        Taxonomy of <i>Baccharis</i> subgen. <i>Tarchonanthoides</i> (Asteraceae: Astereae), a group from the southeastern South American open vegetations .....	168
CONCLUSIONS .....	260
APPENDICES     Eight new species of <i>Baccharis</i> (Asteraceae: Astereae) .....	264
APPENDIX 1     A new dwarf shrubby species of <i>Baccharis</i> subg. <i>Baccharis</i> (Asteraceae, Astereae) from southeastern Brazil .....	266
APPENDIX 2     A new species of <i>Baccharis</i> sect. <i>Caulopterae</i> DC. (Asteraceae) from the high altitude grasslands of Parque Nacional do Caparaó, southeastern Brazil .....	280
APPENDIX 3 <i>Baccharis umbellata</i> (Asteraceae, Astereae): a new species endemic to the highest summits of Paran�, southern Brazil .....	292
APPENDIX 4 <i>Baccharis napaea</i> (Asteraceae, Astereae): a new species of subgen. <i>Tarchonanthoides</i> sect. <i>Coridifoliae</i> from the subtropical highlands of southern Brazil .....	306

APPENDIX 5	<i>Baccharis magnifica</i> (Asteraceae, Astereae): a striking new species endemic to the summits of Serra do Caparaó, southeastern Brazil ...	322
APPENDIX 6	Two new species of <i>Baccharis</i> subgen. <i>Baccharis</i> (Asteraceae, Astereae) with single-flowered female capitula from the Serra do Cipó, Minas Gerais, Brazil .....	338
APPENDIX 7	<i>Baccharis nebularis</i> (Asteraceae, Astereae): a new species of subgen. <i>Tarchonanthoides</i> from the mountains of southern Brazil .....	356

## LIST OF TABLES, FIGURES AND APPENDICES

### CHAPTER 1

- Table 1.** Summary of subgenera, sections and taxa accepted at the rank of species following the new infrageneric classification of *Baccharis*. Numbers outside brackets are total number of taxa accepted per category, numbers within brackets are sampled taxa. .... 78
- Figure 1.** Schematic tree to the subgenera of *Baccharis* as clades recovered through Bayesian inference based on a partitioned analyses of all molecular data (nuclear ETS+ITS and plastidial *trnH-psbA+trnL-F*). Bayesian posterior probabilities are shown in the nodes. Collapsed branches represent the relative sampling size; branches lengths are not to scale. .... 91
- Figure 2.** Early divergent lineages of *Baccharis*: *B.* subgen. *Tarchonanthoides*, *B.* subgen. *Oblongifolia* and *B.* subgen. *Heterothalamus*. Bayesian inference phylogram based on the partitioned analyses of all molecular data (nuclear ETS+ITS and plastidial *trnH-psbA+trnL-F*). Bayesian posterior probabilities are shown in the nodes. Collapsed branches are not to scale. .... 93
- Figure 3.** *Baccharis* subgen. *Molina*. Bayesian inference phylogram based on the partitioned analyses of all molecular data (nuclear ETS+ITS and plastidial *trnH-psbA+trnL-F*). Bayesian posterior probabilities are shown in the nodes. Collapsed branches are not to scale. .... 95
- Figure 4.** *Baccharis* subgen. *Heterothalamulopsis* and *B.* subgen. *Coridifolia*. Bayesian inference phylogram based on the partitioned analyses of all molecular data (nuclear ETS+ITS and plastidial *trnH-psbA+trnL-F*). Bayesian posterior probabilities are shown in the nodes. Collapsed branches are not to scale. .... 97
- Figure 5.** Schematic tree to the sections of *Baccharis* subgen. *Baccharis* based on the Bayesian inference phylogeny on the partitioned analyses of all molecular data (nuclear ETS+ITS and plastidial *trnH-psbA+trnL-F*). Bayesian posterior probabilities are shown in the nodes. Collapsed branches represent the relative sampling size and branches length are not to scale. .... 99
- Figure 6.** Early divergent lineages of *Baccharis* subgen. *Baccharis*. Bayesian inference phylogram based on the partitioned analyses of all molecular data (nuclear ETS+ITS and plastidial *trnH-psbA+trnL-F*). Bayesian posterior probabilities are shown in the nodes. Collapsed branches are not to scale. .... 101
- Figure 7.** Core *Baccharis* subgen. *Baccharis* I. Bayesian inference phylogram based on the partitioned analyses of all molecular data (nuclear ETS+ITS and plastidial *trnH-psbA+trnL-F*). Bayesian posterior probabilities are shown in the nodes. Collapsed branches are not to scale. .... 103

<b>Figure 8.</b> Core <i>Baccharis</i> subgen. <i>Baccharis</i> II. Bayesian inference phylogram based on the partitioned analyses of all molecular data (nuclear ETS+ITS and plastidial <i>trnH-psbA+trnL-F</i> ). Bayesian posterior probabilities are shown in the nodes. Collapsed branches are not to scale. ....	105
<b>Appendix 1.</b> Species included in the molecular analysis, voucher information and GenBank accession numbers (ETS, ITS, <i>trnH-psbA</i> , <i>trnL-F</i> ) . ....	108
<b>Table S1.</b> List of genera segregate from <i>Baccharis</i> , date of publication, associate information of type species and sampling of type species. ....	120
<b>Table S2.</b> List of subgenera described to <i>Baccharis</i> or its segregates, date of publication, associate information of type species and sampling of type species. ....	121
<b>Table S3.</b> List of sections described to <i>Baccharis</i> or its segregates, date of publication, associate information of type species and sampling of type species. ....	122
<b>Table S4.</b> List of series described to <i>Baccharis</i> , date of publication, associate information of type species and sampling of type species. ....	125
<b>Table S5.</b> Summary of sampling of type species of generic segregates and infrageneric taxa and species of <i>Baccharis</i> . ....	125
<b>Figure S1.</b> Bayesian inference tree based on the nuclear subset analyses (ETS+ITS). Bayesian posterior probabilities are shown above the branches. ....	127
<b>Figure S2.</b> Bayesian inference tree based on the plastidial subset analyses ( <i>trnH-psbA+trnL-F</i> ). Bayesian posterior probabilities are shown above the branches. ....	130
<b>Figure S3.</b> Bayesian inference tree based on the partitioned analyses of all molecular data (nuclear ETS+ITS and plastidial <i>trnH-psbA+trnL-F</i> ). Bayesian posterior probabilities are shown above the branches. ....	133

## CHAPTER 2

### PART 2.3

<b>Figure 1.</b> Distribution of <i>Baccharis</i> subgen. <i>Tarchonanthoides</i> in Southeastern South America (○). ....	225
<b>Figure 2.</b> <i>Baccharis chionolaenoides</i> . A. Fertile shoot of estaminate plant. B. Leaves. C. Portion of lanose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A–F: <i>Heiden 1799</i> (SPF). G–K: <i>Heiden 1800</i> (SPF). Illustration by João Iganci. ....	226
<b>Figure 3.</b> <i>Baccharis chionolaenoides</i> . A. Habitat on steep cliffs in the transition between bare rocks and cloud forests at Morro da Igreja, Parque Nacional de São Joaquim, Urubici, Santa Catarina, Brazil. B. View from above of a specimen growing in a basaltic crevice. C. Habit. D. Male capitulescence. E. Female capitulescence. Photos by G. Heiden. ....	227

<b>Figure 4.</b> Distribution of <i>Baccharis chionolaenoides</i> (□), <i>B. curitybensis</i> (○) and <i>B. nebularis</i> (△). .....	228
<b>Figure 5.</b> <i>Baccharis curitybensis</i> . A. Fertile shoot of pistillate plant. B. Leaves. C. Portion of pilose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A, C, G–K: <i>Heiden 1971</i> (SPF). B (from left to right): <i>Silva 4200</i> (MBM); <i>Robim 504</i> (MBM); <i>Hatschbach 6474</i> (MBM); <i>Barbosa 1672</i> (MBM); <i>Heiden 1971</i> (SPF); <i>Hatschbach 22813</i> (MBM); <i>Silva 4115</i> (MBM). D–F: <i>Heiden 1970</i> (SPF). Illustration by João Iganci. ....	229
<b>Figure 6.</b> <i>Baccharis curitybensis</i> . A. Habitat in dry high altitude tropical grasslands at Capivari, Campos do Jordão, São Paulo, Brazil. B. Habit. C. Male capitulescences. D. Female capitulescence. Photos by G. Heiden. ....	230
<b>Figure 7.</b> <i>Baccharis nebularis</i> . A. Fertile shoot of pistillate plant. B. Leaves. C. Portion of tomentose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A, C, G–K: <i>Heiden 1449</i> (SPF). B (from left to right): <i>Roderjan 1510</i> (MBM); <i>Hatschbach 6835</i> (MBM); <i>Kummrow 2626</i> (MBM); <i>Santos 297</i> (MBM); <i>Heiden 1449</i> (SPF). D–F: <i>Heiden 1450</i> (SPF). Illustration by João Iganci. ....	231
<b>Figure 8.</b> <i>Baccharis nebularis</i> . A. Habitat in moist high altitude tropical grasslands mixed with cloud forest thickets at Morro dos Perdidos, Serra de Araçatuba, Guaratuba, Paraná, Brazil. B. Habit. C. Leaves. D. Male capitula. E. Female capitula. Photos by G. Heiden. ....	232
<b>Figure 9.</b> <i>Baccharis patens</i> . A. Fertile shoot of pistillate plant. B. Leaves. C. Portion of tomentose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A, C, G–K: <i>Heiden 1395b</i> (SPF). B (from left to right): <i>Heiden 1466</i> (SPF); <i>Heiden 1463</i> (SPF); <i>Heiden 1403</i> (SPF); <i>Heiden 1395b</i> (SPF). D–F: <i>Heiden 1395a</i> (SPF). Illustration by João Iganci. ....	233
<b>Figure 10.</b> <i>Baccharis patens</i> . A. Habitat and erect habit with lateral shoots patente in subtropical highland grasslands with Ombrophilous Mixed forests at Itaimbezinho, Parque Nacional de Aparados da Serra, Cambará do Sul, Rio Grande do Sul, Brazil. B. Habitat and procumbent habit in low altitude temperate grasslands on rocky shores at Punta Ballena, Maldonado, Uruguay. C. Male capitulescences. D. Female capitulescences. Photos by G. Heiden. ....	234
<b>Figure 11.</b> Distribution of <i>Baccharis patens</i> (○). ....	235

- Figure 12.** *Baccharis lychnophora*. A. Fertile shoot of pistillate plant. B. Leaves. C. Portion of tomentose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A, C, G–K: *Saavedra 283* (RB). B (from left to right): *Wanderley CFCR4613* (SPF); *Simão CFCR11727* (SPF); *Forzza 3961* (SPF); *Carvalho 34* (SPF); *Saavedra 283* (RB); *Lima 1334* (RB). D–F: *Saavedra 282* (RB). Illustration by João Iganci. .... 236
- Figure 13.** *Baccharis lychnophora*. A. Habitat on rocky grasslands (campos rupestres) at Pico do Sol, Catas Altas, Minas Gerais, Brazil. B. Habitat and habit on riverine vegetation along a creek in the rocky grasslands at Pico do Pião, Parque Estadual do Ibitipoca, Lima Duarte, Minas Gerais, Brazil. C. Female capitulescence. Photo A by C.T. Oliveira; photos B and C by R.A.X. Borges. .... 237
- Figure 14.** Distribution of *B. lychnophora* (□) and *B. tarchonanthoides* (○). .... 238
- Figure 15.** *Baccharis tarchonanthoides*. A. Fertile shoot of estaminate plant. B. Leaves. C. Portion of villous peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A, C–F: *Heiden 1968* (SPF), G–K: *Heiden 1969* (SPF). B (from left to right): *Heiden 1969* (SPF); *Heiden 1708* (SPF); *Heiden 1430* (SPF); *Borges 263* (RB); *Heiden 812* (SPF); *Silva 17* (MBM). Illustration by João Iganci. ... 239
- Figure 16.** *Baccharis tarchonanthoides*. A. Habitat and habit in the high altitude tropical grasslands at Parque Nacional do Itatiaia, Itatiaia, Rio de Janeiro, Brazil. B. Habit in the tropical savannahs at Parque Estadual do Juquery, Franco da Rocha, São Paulo, Brazil. C. Female capitulescence. D. Male capitula. E. Female capitula. Photos by G. Heiden. .... 240
- Figure 17.** *Baccharis gnaphalioides*. A. Fertile shoot of pistillate plant. B. Leaves. C. Portion of tomentose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A, C, G–K: *Heiden 1051* (SPF). B (from left to right): *Klein 8801* (FLOR); *Falkenberg 6091* (MBM); *Hatschbach 41007* (MBM); *Heiden 1554* (SPF); *Lindeman s.n.* (ICN20750); *Mauhs s.n.* (PACA94156); *Rambo 46789* (PACA); *Normann 950* (ICN); *Rambo 28923* (PACA); *Heiden 1059* (SPF); *Heiden 1195* (SPF); *Heiden 1250* (SPF); *Krapovickas 3435* (LIL);. D–F: *Heiden 1189* (SPF). Illustration by João Iganci. .... 241
- Figure 18.** *Baccharis gnaphalioides*. A. Habitat and decumbent habit in coastal vegetation on sand dunes at Balneário Mostardense, Parque Nacional da Lagoa do Peixe, Mostardas, Rio Grande do Sul, Brazil. B. Habitat and erect habit in temperate lowland grasslands at Cerrito, Rio Grande do Sul, Brazil. C. and D. Shoots. E. Male capitulescence. F. Female capitulescence. Photos by G. Heiden. .... 242
- Figure 19.** Distribution of *Baccharis gnaphalioides* (○) and *B. leucopappa* (△). .... 243



- Figure 20.** *Baccharis leucopappa*. A. Fertile shoot of pistillate plant. B. Leaves. C. Portion of villose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A, C, G–K: *Heiden 1975* (SPF). B (from left to right): *Heiden 2001* (SPF); *Heiden 1975* (SPF); *Heiden 2143* (SPF); *Rambo 37696* (PACA). D–F: *Heiden 1976* (SPF). Illustration by João Iganci. .... 244
- Figure 21.** *Baccharis leucopappa*. A. Habitat and habit in sandstone and basaltic outcrops in the low altitude temperate grasslands at São Francisco de Assis, Rio Grande do Sul, Brazil. B. Habit. C. Shoot. D. Male capitulescences. E. Female capitulescence. Photos by G. Heiden. .... 245
- Figure 22.** *Baccharis gibertii*. A. Fertile shoot of pistillate plant. B. Leaves. C. Portion of villose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A, C, G–K: *Heiden 1760* (SPF). B (from left to right): *Maria 23* (PEL); *Berro 1772* (MVFA); *Heiden 1759* (SPF); *Arechavaleta 4104* (LP). D–F: *Heiden 1759*(SPF). Illustration by João Iganci. .... 246
- Figure 23.** *Baccharis gibertii*. A. Habitat on a peat bog in the transitional zone of the temperate lowland grasslands and the maritime coastal vegetations at Balneario El Pinar, Ciudad de la Costa, Canelones, Uruguay. B. Habit. C. Shoots. D. Male capitulescence. E. Female capitulescence. Photos by G. Heiden. .... 247
- Figure 24.** Distribution of *Baccharis gibertii* (□) and *B. leucocephala* (○). .... 248
- Figure 25.** *Baccharis leucocephala*. A. Fertile shoot of pistillate plant. B. Leaves. C. Portion of villose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A, C, G–K: *Heiden 1787* (SPF). B (from left to right): *Heiden 1453* (SPF); *Heiden 1787* (MBM); *Rambo 54561* (PACA). D–F: *Heiden 1786* (SPF). Illustration by João Iganci. .... 249
- Figure 26.** *Baccharis leucocephala*. A. Habitat and habit on the forest edges of Ombrophilous Mixed forest at Santa Bárbara, Parque Nacional de São Joaquim, Urubici, Santa Catarina, Brazil. B. Male capitulescence. C. Male capitula. D. Female capitulescence. E. Female capitula. Photos by G. Heiden. .... 250
- Figure 27.** *Baccharis uleana*. A. Fertile shoot of pistillate plant. B. Leaves. C. Portion of tomentose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A, C, G–K: *Heiden 1813* (SPF). B (from left to right): *Heiden 1812* (SPF); *Brade 6639* (SP); *Klein 5908* (FLOR); *Rambo 2310* (PACA); *Ule 1510* (F). D–F: *Heiden 1812* (SPF). Illustration by João Iganci. .... 251

<b>Figure 28.</b> <i>Baccharis uleana</i> . A. Habitat and habit on acid swamps, in the transitional zone of the coastal scrubs with the lowland Ombrophilous Dense Forest at Massiambú, Palhoça, Santa Catarina, Brazil. B. Habit. C. Shoot. D. Male capitulescence. E. Female capitulescence. Photos by G. Heiden. ....	252
<b>Figure 29.</b> Distribution of <i>Baccharis uleana</i> (□) and <i>B. phyllicifolia</i> (○). ....	253
<b>Figure 30.</b> <i>Baccharis phyllicifolia</i> . A. Fertile shoot of pistillate plant. B. Leaves. C. Portion of tomentose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A, C, G–K: <i>Heiden 1333</i> (SPF). B (from left to right): <i>Heiden 999</i> (RB); <i>Meireles 2402</i> (RB); <i>Heiden 1582</i> (SPF); <i>Heiden 1528</i> (SPF); <i>Sobral 8815</i> (ICN); <i>Sehnem 4244</i> (PACA); <i>Heiden 1989</i> (SPF); <i>Heiden 1333</i> (SPF); <i>Silveira 9178</i> (HAS); <i>Schneider 1230</i> (SPF). D–F: <i>Heiden 1332</i> (SPF). Illustration by João Iganci. ....	254
<b>Figure 31.</b> <i>Baccharis phyllicifolia</i> . A. and B. Habitat and habit on moist highland subtropical grasslands at Morro da Igreja, Parque Nacional de São Joaquim, Urubici, Santa Catarina, Brazil. C. Male capitulescence. D. Female capitulescence. Photos by G. Heiden. ....	255
<b>Figure 32.</b> <i>Baccharis helichrysoides</i> . A. Fertile shoot of pistillate plant. B. Leaves. C. Portion of villose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A, C, G–K: <i>Heiden 1619</i> (SPF). B (from left to right): <i>Brade 14567</i> (RB); <i>Heiden 1691</i> (SPF); <i>Heiden 1619</i> (MBM); <i>Hassler 10240a</i> (LIL). D–F: <i>Heiden 1620</i> (SPF). Illustration by João Iganci. ....	256
<b>Figure 33.</b> <i>Baccharis helichrysoides</i> . A. Habitat on roadside vegetation in an area under influence of the tropical savannahs at Parque Nacional da Serra do Cipó, Jaboticatubas, Minas Gerais, Brazil. B. Shoots. C. Male capitulescence. D. Female capitulescence. E. Male capitula. F. Female capitula. Photos by G. Heiden. ....	257
<b>Figure 34.</b> Distribution of <i>Baccharis helichrysoides</i> (○). ....	258

## APPENDICES

### APPENDIX 1

<b>FIG. 1.</b> <i>Baccharis dichotoma</i> . A. Habit. B. Detail of abaxial leaf surface. C. Leaf. D. Male capitulum. E. Phyllaries from male capitulum. F. Male floret (sterile ovary and pappus removed). G. Female corolla (ovary and pappus removed). H. Cypsela (A – F: drawn from <i>Meireles 2400</i> ; G – H: <i>Meireles 2395</i> ) .....	277
<b>FIG. 2.</b> Geographic distribution of <i>Baccharis dichotoma</i> Heiden & L.D.Meireles in Southeastern Brazil. ....	278

## APPENDIX 2

**Figure 1.** *Baccharis hemiptera* G. Heiden & A. A. Schneid.: a. Fertile shoot; b. Detail of shoot; c. Male capitulum; d. Male flower (pappus removed); e. Female capitulum; f. Phyllaries of female capitulum (outer to inner); g. Female corolla and style. (a-d drawn from *Brade 17017*, RB; e-g drawn from *Leoni 7240*, RB) ..... 290

## APPENDIX 3

**FIGURE 1.** *Baccharis umbellata*. **A.** Fertile shoot. **B.** Capitulescence. **C.** Adaxial view of a leaf. **D.** Male capitulum. **E.** Phyllaries of male capitulum (outer to inner). **F.** Male floret. **G.** Female capitulum. **H.** Female floret. **I.** Corolla and style of female floret. **J.** Cypsela (pappus removed). **A–F:** *Ribas & Dittrich 2183* (MBM). **G–J:** *Imaguire 503* (PACA). Illustration by João Iganci. ... 303

**FIGURE 2.** Flowering shoot of a male specimen of *Baccharis umbellata* (*Felitto et al. 200*). Photo by B.C. Canestraro..... 304

**FIGURE 3.** Distribution of *Baccharis umbellata*: **A.** Overview map of South America highlighting the position of Paraná State in southern Brazil and the Serra do Ibitiraquire in eastern Paraná. **B.** Three-dimensional map of the Serra do Ibitiraquire plotting the peaks of Camapuã, Tucum and Paraná, where the new species is recorded from. .... 305

## APPENDIX 4

**FIGURE 1.** *Baccharis napaea*. **A.** Fertile shoot of pistillate plant, apical portion with capitulescence. **B.** Vegetative shoot. **C.** Stem indumentum. **D.** Leaf. **E.** Male capitulum. **F.** Phyllaries of male capitulum (outer to inner). **G.** Male floret. **H.** Female capitulum. **I.** Phyllaries of female capitulum (outer to inner). **J.** Female floret. **K.** Corolla and style of female floret. **L.** Cypsela (pappus removed). **M.** Enlarged detail of L. **A–D, H–K:** *Heiden et al. 1581* (SPF). **E–G:** *Heiden et al. 1580* (SPF). **L–M:** *Hatschbach 7044* (MBM). Illustration by João Iganci. .... 319

**FIGURE 2.** Distribution of *Baccharis napaea* in southern Brazil. .... 320

## APPENDIX 5

**FIGURE 1.** *Baccharis magnifica*. **A.** Fertile shoot. **B.** Leaf, abaxial view. **C.** Female capitulum. **D.** Phyllaries of female capitulum (outer to inner) and palea. **E.** Female floret. **F.** Corolla and style of female floret. **G.** Cypsela (pappus removed). **A–F:** *Souza et al. 23530* (ESA). **G:** *Brade 17005* (RB). Illustration by João Iganci. .... 333

**FIGURE 2.** *Baccharis magnifica*: **A.** Habit and habitat in the escarpments of Bandeira peak. **B.** Vegetative branches depicting the showy green and slightly wine-tinged foliage. **C.** Resinous dots and ciliate margins of the leaf, visible to the naked eye. .... 334

**FIGURE 3.** Distribution of *Baccharis magnifica*: **A.** Overview of South America. **B.** Southeastern Brazil and the Caparaó pinpointed. **C.** and **D.** Three dimensional maps depicting the Serra do Caparaó and plotting the Pico do Cristal, Pico da Bandeira and the córrego José Pedro, while the thin white line in D is the boundary between Espírito Santo (front) and Minas Gerais (behind) ..... 335

**FIGURE 4.** Habitats of *Baccharis magnifica* in the Parque Nacional do Caparaó: **A.** Pico da Bandeira. **B.** Pico do Cristal. **C.** Córrego José Pedro. .... 336

**APPENDIX 6**

**FIGURE 1.** *Baccharis obdeltata*. **A.** Fertile shoot. **B.** Leaf and female capitulum. **C.** Male capitulum. **D.** Phyllaries of male capitulum. **E.** Male floret. **F.** Female capitulum. **G.** Female floret. **H.** Corolla and style of female floret. **I.** Cypsela (pappus removed). **A–B, F–I:** *Heiden et al. 1385* (SPF). **C–E:** *Heiden et al. 1386* (SPF). Illustration by João Iganci. .... 351

**FIGURE 2.** *Baccharis obdeltata*. **A.** Habit. **B.** Flowering shoot of a male plant. **C.** Flowering shoot of a female plant. Photos by C.M. Siniscalchi. .... 352

**FIGURE 3.** Distribution of *Baccharis obdeltata* and *B. simplex*. **A.** Overview map of South America pinpointing the position of the Serra do Cipó in Southeastern Brazil. **B.** A highlight in Southeastern Brazil depicting the boundaries of Minas Gerais state and the position of Serra do Cipó. **C.** Three dimensional map showing part of the Serra do Cipó range, plotting the known distribution of *B. obdeltata* (Brumas do Espinhaço and Serra da Lapinha) and *B. simplex* (Alto do Palácio and Brumas do Espinhaço) . .... 353

**FIGURE 4.** *Baccharis simplex*. **A.** Fertile shoot. **B.** Leaf and male capitulum. **C.** Male capitulum. **D.** Phyllaries of male capitulum. **E.** Male floret. **F.** Female capitulum. **G.** Female floret. **H.** Corolla and style of female floret. **I.** Cypsela (pappus removed). **A–E:** *Heiden et al. 1610* (SPF). **F–I:** *Heiden et al. 1611* (SPF). Illustration by João Iganci. .... 354

**FIGURE 5.** *Baccharis simplex*. **A.** Habitat and habit. **B.** Flowering shoot of a male plant. **C.** Flowering shoot of a female plant. Photos by G. Heiden. .... 355

**APPENDIX 7**

**FIGURE 1.** *Baccharis nebularis*. **A.** Fertile shoot of pistillate plant. **B.** Leaves. **C.** Peduncle indumentum. **D.** Male capitulum. **E.** Phyllaries of male capitulum (outer to inner). **F.** Male floret. **G.** Female capitulum. **H.** Phyllaries of female capitulum (outer to inner). **I.** Female floret. **J.** Corolla and style of female floret. **K.** Cypsela. **A, C, G–K:** *Heiden 1449* (SPF). **B** (from left to right): *Roderjan 1510* (MBM); *Hatschbach 6835* (MBM); *Kummrow 2626* (MBM); *Santos 297* (MBM); *Heiden 1449* (SPF). **D–F:** *Heiden 1450* (SPF). Illustration by João Iganci. .... 369

**FIGURE 2.** *Baccharis nebularis*. **A.** Habitat. **B.** Habit. **C.** Leaves. **D.** Male capitula. **E.** Female capitula. .... 370

**FIGURE 3.** Distribution of *Baccharis nebularis* in southern Brazil. **A.** Overview map of South America highlighting the position of the Southern range of Serra do Mar. **B.** Known distribution in Paraná and Santa Catarina from north to south: Capivari, Ibitiraquire or Serra dos Órgãos, Graciosa, Araçatuba, and Quiriri. **C.** Southern range of Serra do Mar: the five massifs where the new species is recorded are pinpointed from left to right: Quiriri, Araçatuba, Graciosa, Ibitiraquire or Serra dos Órgãos and Capivari ..... 371



## RESUMO

### **Sistemática de *Baccharis* (Asteraceae: Astereae).**

Uma hipótese filogenética abrangente sobre *Baccharis*, um gênero Americano predominantemente Neotropical, é necessária para testar seu caráter monofilético e esclarecer suas relações infragenéricas. Devido a sua grande diversidade morfológica e ampla distribuição geográfica, estudos filogenéticos com base em dados moleculares para testar o monofilismo do gênero e investigar as relações de seus grupos infragenéricos foram aqui conduzidos, permitindo o reconhecimento e a revisão taxonômica de táxons menores e monofiléticos. Desta forma, uma hipótese filogenética sobre *Baccharis* é aqui apresentada, com base em 248 espécies amostradas, quatro regiões do genoma (ETS, ITS, *trnH-psbA*, *trnL-F*) e análises Bayesianas. Os resultados confirmam a subtribo Baccharidinae como uma linhagem monogenérica e sustentam uma definição ampla de *Baccharis s.l.*, monofilético e incluindo todos os gêneros que foram previamente segregados dele. Listagens abrangentes de táxons infragenéricos e de táxons aceitos ao nível de espécie foram compiladas com o objetivo de direcionar uma classificação infragenérica baseada nas relações filogenéticas de *Baccharis*. Sete linhagens principais foram reconhecidas e são tratadas aqui no nível taxonômico de subgênero, e neste processo todos os subgêneros anteriormente reconhecidos tiveram que ser recircunscritos para constituírem táxons monofiléticos. O levantamento de nomes publicados nas categorias taxonômicas de seção e série totalizaram 68 seções e 13 séries, novas seções e novos posicionamentos ao nível de seção são propostos para acomodar táxons que não correspondiam a qualquer das seções previamente descritas, enquanto que 22 seções foram sinonimizadas. Estes procedimentos permitiram reconhecer 47 seções, embora seja esperado que esse número diminua com a realização de futuros estudos baseados em maior amostragem. Os nomes aceitos ao nível de espécie totalizaram 433 táxons que foram posicionados na categoria infragenérica mais inclusiva possível à luz dos dados disponíveis atualmente. *Baccharis* subgen. *Tarchonanthoides* Heering, um grupo restrito aos campos e savanas do sudeste da América do Sul, foi definido como um alvo adequado para uma revisão taxonômica precursora devido ao número reduzido de espécies, área de ocorrência restrita quando comparado aos demais subgêneros e distinção morfológica. Esta é a primeira tentativa de proceder a revisão taxonômica de um subgênero de *Baccharis* em concordância com um sistema filogenético e livre de qualquer limitação geográfica. A recircunscrição de

*Baccharis* subgen. *Tarchonanthoides* envolve a sinonimização de *Lanugothamnus*, e a exclusão de uma seção do subgênero, no sentido de torná-lo monofilético. Outras ações nomenclaturais e taxonômicas são necessárias como a designação de lectótipos, a proposição de um novo status, novas combinações, novas sinonimizações e o esclarecimento de conceitos de espécie previamente aplicados de forma equivocada para alguns nomes de espécies. Duas seções recircunscritas e 13 espécies são aceitas nesta revisão taxonômica de *B.* subgen. *Tarchonanthoides*, um grupo diversificado nas vegetações abertas do Sudeste da América do Sul, ocorrendo no Brasil, Uruguai, Argentina e Paraguai. Descrições morfológicas dos táxons infragenéricos são fornecidas, assim como uma chave taxonômica, descrições, dados sobre etimologia, distribuição e habitats, fenologia, estado de conservação, nomes em vernáculo e listas de espécimes examinados, pranchas em nanquim, fotografias e mapas de distribuição para todas as espécies aceitas no subgênero. Paralelamente aos objetivos principais, expedições exploratórias a campo e o estudo de espécimes em herbários possibilitaram a descrição de oito novas espécies: *Baccharis dichotoma*, *B. hemiptera*, *B. magnifica*, *B. napaea*, *B. nebularis*, *B. obdeltata*, *B. simplex* e *B. umbellata*.



## ABSTRACT

### Systematics of *Baccharis* (Asteraceae: Astereae).

A comprehensive phylogenetic hypothesis for the predominantly Neotropical American genus *Baccharis* is necessary to test its monophyly and clarify the infrageneric relationships within the genus. Given its great morphological diversity and wide geographic distribution, phylogenetic studies based on molecular data to test the monophyly of the genus and investigate the relationships of its infrageneric groups are here proposed, allowing the recognition and taxonomic revision of smaller and monophyletic taxa. Therefore, a phylogenetic hypothesis for *Baccharis* is provided based on 248 species sampled, four molecular regions (ETS, ITS, *trnH-psbA*, *trnL-F*) and Bayesian analyses. The results confirm subtribe Baccharidinae as a monogeneric lineage, and support a wide definition of *Baccharis s.l.*, monophyletic and including all genera that were previously segregated from it. Comprehensive lists of infrageneric taxa and taxa accepted at species level were compiled to move towards a phylogeny-based infrageneric classification of *Baccharis*. Seven main lineages were recovered, treated here at subgeneric level, and in this process all subgenera recognized before had to be recircumscribed to constitute monophyletic taxa. A survey of names published in the ranks of sections and series accounted 68 sections and 13 series; new sections are described and new statuses at the rank of section are proposed to accommodate taxa not corresponding to any previously described section, while 22 sections were considered synonyms. This procedure allowed the recognition of 47 sections, though this number is supposed to decrease after future studies are accomplished with a larger sampling. The names accepted at species level totalize 433 taxa that were here assigned to the most inclusive infrageneric category possible in the light of the data currently available. *Baccharis* subgen. *Tarchonanthoides* Heering, a group restricted to the southeastern South American grasslands and savannas, was chosen as a good target to first tackle for a taxonomic revision, due its small size, restricted area of occurrence when compared to the remaining subgenera, and morphological distinctiveness. This is the first attempt to provide a taxonomic revision of a subgenus of *Baccharis* according to a phylogenetic framework, and under no geographic constraint. The recircumscription of *Baccharis* subgen. *Tarchonanthoides* involves the synonymization of *Lanugothamnus*, and the exclusion of one section in order to keep the subgenus monophyletic. Other taxonomic and nomenclatural actions necessary are designation of lectotypes, a new status and new combinations, new synonymizations and

clarification of the species concepts formerly misapplied to some names. Two recircumscribed sections and 13 species are accepted within the taxonomically revised *B.* subgen. *Tarchonanthoides*, which diversified mainly in open vegetations from southeastern South America in Brazil, Paraguay, Uruguay and Argentina. General morphological descriptions of the infrageneric taxa are provided, as well as a taxonomic key, descriptions, data on etymology, distribution and habitats, phenology, conservation status, ethnobotany and vernacular names, and a list of specimens examined, line drawings, pictures and maps of distribution for all accepted species within this subgenus. Alongside the main goals, exploratory fieldwork and study of herbaria specimens allowed the description of eight new species: *B. dichotoma*, *B. hemiptera*, *B. magnifica*, *B. napaea*, *B. nebularis*, *B. obdeltata*, *B. simplex* and *B. umbellata*.

# INTRODUCTION



## INTRODUCTION

### 1. Background

*Baccharis* (Asteraceae: Astereae: Baccharidinae) is an American, predominantly Neotropical, genus broadly characterized by the leaves and stems covered by a tufted indumentum, which is composed of trichomes with adjoining basal cells, and by the occurrence of dioecy (Müller 2006). The genus is profusely diversified in a variety of environments, usually as an important element in several plant formations (Giuliano 2001). The most important centers of species richness are the Andes from Colombia to central Chile and central Argentina, and the mountainous areas of southeastern Brazil, Uruguay, and eastern Paraguay (Müller 2006).

Despite its significance in Neotropical vegetations, since De Candolle (1836), *Baccharis* has never been target of an overall taxonomic revision. The most comprehensive works are compilations of accepted scientific names and synonyms. The number of species recognized within the genus is controversial, ranging from 354 fide Müller (2013) to ca. 500 species fide Malagarriga (1976). Most of the contemporary studies on *Baccharis* appeared as part of floras and geographically limited taxonomic works. Recent alterations in the circumscription of *Baccharis* do not rely on extensive taxonomic revisions, neither in phylogenies. Broad circumscriptions of *Baccharis* were proposed by Nesom (1988) and Müller (2006) with the merging of monoecious (*Baccharidastrum* Cabrera), gynodioecious (*Heterothalamus* Less.), and polygamous taxa (*Baccharidiopsis* G.M. Barroso). On the other hand, Hellwig (1993, 1996) proposed some generic segregates from *Baccharis*. These proposals of segregation were not followed by the subsequent authors, except Deble et al. (2004) and Deble (2012), who accepted most of the previously published generic segregates of *Baccharis* and separated *B. wagenitzii* (F.H. Hellw.) Joch.Müll. into the monospecific genus *Heterothalamulopsis* Deble, A.S. Oliveira & Marchiori, and *Baccharis* subgen. *Tarchonanthoides* sensu Müller (2006), segregated into the genus *Lanugothamnus* Deble.

Concerning the infrageneric classification, the most recent proposals were published by Giuliano (2001, 2005, 2011), Giuliano and Nesom (2003) or Nesom (1990), on a sectional basis focusing mainly in Argentinean or North American taxa, while Müller (2006), focused on a subgeneric scheme, first concentrating on the Bolivian species, accepting four out of five subgenera established by Heering (1904, 1905) and rejecting the sectional classification proposed by Cuatrecasas (1967), who relied mostly on the Colombian species. Müller (2006) assumed as a starting point the infrageneric taxa of Nesom (1990) and the genera segregated

by Hellwig (1993, 1996), accepting four out of five subgenera established by Heering (1904a, b; Heering 1905). In his scheme, Müller (2006) recognized three subgenera as probably monophyletic (*Baccharis* subgen. *Baccharis*, *B.* subgen. *Pteronioides* Heering and *B.* subgen. *Tarchonanthoides* Heering), while he considered *B.* subgen. *Molina* (Pers.) Heering as a possible paraphyletic assemblage. Later, Müller (2010, 2013) expanded the subgeneric classification formerly applied to Bolivian species to its list of accepted species, subspecies and varieties of the whole genus.

Zanowiak (1991) conducted a cpDNA RFLP phylogenetic study of 23 representatives of the subtribe Baccharidinae. The phylogenetic analysis made by Zanowiak (1991) placed *B. vanessae* R.M.Beauch. as sister of a clade composed by *Conyza* L., *Erigeron* L., *Exostigma* Sancho and the remaining of the subtribe Baccharidinae, where *Archibaccharis* and *Heterothalamus* Less. emerged as a clade sister to the remaining species of *Baccharis*, while *Baccharidastrum* nested within *Baccharis*. Later, the analysis performed by Karaman-Castro & Urbatsch (2009) placed *Baccharis* and *Heterothalamus* as sisters in a clade basal to the polytomy which contains *Hinterhubera* Sch.Bip. ex Wedd., while in the analysis of Sancho & Karaman-Castro (2008), Baccharidinae emerged as a monophyletic group, sister of the South-American Podocominae. Recently, Brouillet et al. (2009) published the largest phylogeny of Astereae based on ITS markers and stated that the results did not support the monophyly of Baccharidinae (comprising *Archibaccharis*, *Baccharis* and *Heterothalamus*), nor of *Baccharis s.l.*. However, only nine species of the subtribe in its traditional circumscription (e.g. including *Archibaccharis* and *Baccharis s.l.*) and six of *Baccharis*, in a narrow sense, were sampled, hence the authors assumed that a thorough phylogenetic study within the genus is in need to corroborate or refuse its alleged monophyly.

A comprehensive phylogenetic hypothesis for *Baccharis* is necessary to test its monophyly and clarify the infrageneric relationships within the genus. Given its great morphological diversity and wide geographic distribution, I propose to perform phylogenetic studies based on molecular data to test the monophyly of the genus and investigate the relationships of its infrageneric groups, allowing the recognition and taxonomic revision of smaller and monophyletic taxa. *Baccharis* subgen. *Tarchonanthoides* Heering, a group restricted to the southeastern South American grasslands and savannas, is a good target to first tackle for a taxonomic revision due its small size, restricted area of occurrence when compared to the remaining subgenera, and morphological distinctiveness.

## 2. Aims

- Test the monophyly of *Baccharis* and its infrageneric taxa, investigate the relationships among them, and provide the first phylogeny based proposal of infrageneric classification for the genus, including an updated checklist of taxa accepted at species level.

- Prepare the taxonomic revision of *Baccharis* subgen. *Tarchonanthoides*, a group from the Southeastern South American open vegetations, including general morphological description of the infrageneric taxa, a taxonomic key, descriptions, data on etymology, distribution and habitat, phenology, conservation status, ethnobotany and vernacular names, and list of specimens examined, as well as line drawings, pictures and maps of distribution for each accepted species.

- Proceed to the description of new species found alongside the previous main goals of the proposed work.

## 3. Structure of the thesis

The thesis is composed by the Introduction, two chapters, the Conclusion and the appendices. The new names and new combinations of taxa presented in this thesis were or will be published in scientific journals.

- Chapter 1 presents the first step towards an infrageneric classification for the genus *Baccharis* based on robust phylogenetic data (plastidial and nuclear), including an updated checklist of accepted names classified under the new infrageneric framework proposed. The manuscript is planned to be submitted to the journal *Taxon* and is co-authored by Daniele Silvestro, Alexandre Antonelli and José Rubens Pirani.

- Chapter 2 is an assembly of two already published papers and one manuscript planned to be submitted, all of them dealing with taxonomic studies in *Baccharis* subgen. *Tarchonanthoides*, a group from the southeastern South American open vegetations. Part 2.1 is a synopsis and notes for *Baccharis* subgen. *Tarchonanthoides* (Asteraceae: Astereae), published in *Phytotaxa* in co-authorship with José Rubens Pirani. Part 2.2 regards to two new combinations in *Baccharis* (Asteraceae: Astereae) published in *Phytoneuron*. Part 2.3 is the taxonomic revision of the recircumscribed *Baccharis* subgen. *Tarchonanthoides* in co-authorship with José Rubens Pirani and planned to be submitted to *Phytotaxa*.

- The appendices comprise a compilation of seven published papers or accepted manuscripts dealing with eight new species of *Baccharis* described along the development of

the current work. Appendix 1 describes a new dwarf shrubby species of *Baccharis* from southeastern Brazil, published in *Brittonia* in co-authorship with Leonardo Dias Meireles. Appendix 2 describes a new species of *Baccharis* from the high altitude grasslands of Parque Nacional do Caparaó, Southeastern Brazil, published in *Candollea* along with Ângelo Alberto Schneider. Appendix 3 describes a new species of *Baccharis* endemic to the highest summits of Paran , Southern Brazil, published in *Phytotaxa* and co-authored by Osmar dos Santos Ribas. Appendix 4 describes a new species from the subtropical highlands of southern Brazil, published in *Phytotaxa* with Jos  Rubens Pirani. Appendix 5 describes a striking new species of *Baccharis* endemic to the summits of Serra do Capara , southeastern Brazil, in collaboration with L cio de Souza Leoni and Jimi Naoki Nakajima, accepted for publication in *Phytotaxa*. Appendix 6 describes two new species of *Baccharis* with single-flowered female capitula from the Serra do Cip , Minas Gerais, Brazil, and Appendix 7 describes a new species of *Baccharis* from the mountains of southern Brazil, both co-authored by Jos  Rubens Pirani and accepted for publication in *Phytotaxa*.

#### 4. References

- BROUILLET, L.; LOWREY, T.K.; URBATSCH, L. ; KARAMAN-CASTRO, V.; SANCHO, G.; WAGSTAFF, S.; SEMPLE, J.C. 2009. Astereae. In: V.A. Funk,; A. Susana; T.F. Stuessy; R.J. Bayer (eds.). Systematics, Evolution, and Biogeography of Compositae. Vienna, Austria: International Association for Plant Taxonomy (IAPT). Pp. 587-629.
- CANDOLLE, A.P. de. 1836. *Prodromus systematis naturalis regni vegetabilis*. 5 - Sistens Calycereas et Compositarum tribus priores. Treuttel & W rtz, Paris.
- CUATRECASAS, J. 1967. Revisi n de las especies Colombianas del g nero *Baccharis*. *Revista de la Academia Colombiana de Ciencias Exactas, F sicas y Naturales* 13: 5–102.
- DEBLE, L.P.; OLIVEIRA, A.S. & MARCHIORI, J.N. 2004. *Heterothalamulopsis*, g nero novo da subtribe Baccharinae Lessing (Astereae-Asteraceae). *Ci ncia Florestal* 14(1): 1–7.
- DEBLE, L.P. 2012. Studies in Baccharidinae (Asteraceae: Astereae). I: *Lanugothamnus* a new genus from South America. *Balduinia* 37: 2–25.
- GIULIANO, D. 2001. Classificaci n infragen rica de las especies Argentinas de *Baccharis* (Asteraceae, Astereae). *Darwiniana* 39: 131-154.
- GIULIANO, D. 2005. New Infragenera in *Baccharis* (Asteraceae, Astereae). *Novon* 15(4): 539.
- GIULIANO, D.A. & FREIRE, S. E. 2011. Nuevas secciones en *Baccharis* (Asteraceae, Astereae) de Am rica Del Sur. *Annals of the Missouri Botanical Garden* 98: 331–347.
- GIULIANO, D. & NESOM, G. 2003. A new section of *Baccharis* (Asteraceae: Astereae), and notes on



- allied taxa. *Sida* 20: 1481-1484.
- HEERING, W. 1904A. Über einige Arten der Gattung *Baccharis* besonders des Kieler Herbars. *Schriften Naturwissenschaften Vereins Schleswig-Holstein* 13: 39-55.
- HEERING, W. 1904B. Die *Baccharis*-Arten des Hamburger Herbars. *Jahrbuch der Hamburgischen Wissenschaftlichen Anstalten* 21: 1-46.
- HEERING, W. 1905. *Baccharis* L. In: Reiche, C. Estudios críticos sobre la flora de Chile. *Anales de la Universidad de Chile* 111: 151-196.
- HELLWIG, F. 1993. The genera *Pingraea* Cassini and *Neomolina* Hellwig (Compositae-Astereae). *Candollea* 48: 203-219.
- HELLWIG, F. 1996. Taxonomy and evolution of Baccharidinae (Compositae). Vol. 1, pp. 575-590. In: D.J.N. Hind,; H.J. Beentje (eds.). *Compositae: systematics*. Royal Botanic Gardens, Kew.
- KARAMAN-CASTRO, V.; URBATSCH, L. 2009. Phylogeny of *Hinterhubera* Group and Related Genera (Hinterhuberinae: Astereae) based on the nrDNA ITS and ETS Sequences. *Systematic Botany* 34(4): 805-817.
- MALAGARRIGA HERAS, R.P. [1976] 1977. Nomenclator baccharidinarum omnium. *Memórias da Sociedade de Ciências Naturais La Salle* 37: 129-224.
- MÜLLER, J. 2006. Systematics of *Baccharis* (Compositae- Astereae) in Bolivia, including an overview of the genus. *Systematic Botany Monographs* 76: 1-341.
- MÜLLER, J. 2010. World checklist of *Baccharis* L. (Compositae–Astereae). Version 2010-04-19. Available from: <http://www2.uni-jena.de/biologie/spezbot/herbar/Baccharis.htm>.
- MÜLLER, J. 2013. World checklist of *Baccharis* L. (Compositae–Astereae). Version 2013-09-03. Available from: <http://www.spezbot.uni-jena.de/wp-content/uploads/2013/09/World-checklist-of-Baccharis-L..pdf>.
- NESOM, G.L. 1988. *Baccharis* sect. *Baccharidastrum* (Compositae: Astereae), including two monoecious and one dioecious species. *Phytologia* 65 (3):169- 173.
- NESOM, G.L. 1990. Infrageneric taxonomy of North and Central American *Baccharis* (Asteraceae: Astereae). *Phytologia* 68(6): 40-46.
- SANCHO, G.; KARAMAN-CASTRO, V. 2008. A phylogenetic study in american Podocominae (Asteraceae) based on morphological and molecular data. *Systematic Botany* 33: 762-775.
- ZANOWIAK, D.J. 1991. *An analysis of systematic and phyletic relationships within the Baccharidinae (Asteraceae: Astereae)*. Tese de doutorado. Texas A&M University, 82p.



# CHAPTER 1

## **A novel infrageneric classification of *Baccharis* (Asteraceae: Astereae)**



**A novel infrageneric classification of *Baccharis* (Asteraceae: Astereae)**

Gustavo Heiden<sup>1</sup>, Alexandre Antonelli<sup>2</sup> & José Rubens Pirani<sup>1</sup>.

<sup>1</sup> *Departamento de Botânica, Instituto de Biociências, Universidade de São Paulo, Rua do Matão Travessa 14, 321, São Paulo, SP 05508-090, Brasil. gustavo.heidem@gmail.com*

<sup>2</sup> *Department of Biological and Environmental Sciences, University of Gothenburg, Carl Skottsbergs gata 22B, 413 19 Göteborg, Sweden.*



**Abstract.** A phylogenetic hypothesis for the mostly Neotropical American genus *Baccharis* is provided based on 248 species sampled, four molecular regions (ETS, ITS, *trnH-psbA*, *trnL-F*), and Bayesian analyses. The results confirm subtribe Baccharidinae as monogeneric, and support a wide definition of *Baccharis s.l.*, monophyletic and including all genera that were previously segregated from it. Comprehensive lists of infrageneric taxa and taxa accepted at species level were compiled to move towards a phylogeny-based infrageneric classification of *Baccharis*. Seven main lineages were recovered, treated here at subgeneric level, and in this process all subgenera recognized before had to be recircumscribed to constitute monophyletic taxa. *Baccharis* subgen. *Baccharis*, *B.* subgen. *Molina* and *B.* subgen. *Tarchonanthoides* roughly match previous subgeneric concepts, while *B.* subgen. *Pteronioides* and *B.* subgen. *Stephananthus* are synonyms of *B.* subgen. *Molina*. Two earlier segregated genera (*Heterothalamus* and *Heterothalamulopsis*) and two formerly existing sections (*B.* sect. *Coridifoliae* and *B.* sect. *Oblongifoliae*) are moved to the subgeneric rank. The survey of names published in the ranks of sections and series accounted 68 sections and 13 series; four new sections are here described and three new statuses at the rank of section are proposed to accommodate taxa not corresponding to any previously described section, while 22 sections were considered synonyms. This procedure allowed the recognition of 47 sections, though this number is supposed to decrease after future studies with a larger sampling. The names accepted at species level totalize 433 taxa that were here assigned to the most inclusive infrageneric category possible in the light of the data currently available.

**Keywords:** Baccharidinae, Classification, Compositae, ETS, ITS, Phylogeny, Taxonomy, *trnH-psbA*, *trnL-F*, Systematics.





## INTRODUCTION

*Baccharis* (Asteraceae: Astereae, Baccharidinae) is a New World genus characterized by a tufted indumentum of the leaves and stems, composed by trichomes with adjoining basal cells, and by the occurrence of dioecy (Müller, 2006). Since De Candolle (1836), *Baccharis* has never been revised taxonomically as a whole. The number of species recognized within the genus ranges from 354 (Müller, 2013) to ca. 500 species (Malagarriga, 1976).

Recent alterations in the circumscription of *Baccharis* have been proposed, but they are based neither on extensive taxonomic revisions nor phylogenies. Broad circumscriptions of *Baccharis* were proposed by Nesom (1988) and Müller (2006), with the merging of monoecious (*Baccharidastrum* Cabrera), gynodioecious (*Heterothalamus* Less.), and polygamous taxa (*Baccharidiopsis* G. M. Barroso). On the other hand, Hellwig (1993, 1996), Deble et al. (2004), and Deble (2012) proposed some generic segregates from *Baccharis*. Concerning the infrageneric classification, the most recent proposals were published by Nesom (1990), Giuliano (2001, 2005), Giuliano and Nesom (2003), and Giuliano & Freire (2011), on a sectional basis, while Müller (2006) focused on a subgeneric scheme, assuming as a starting point Nesom's infrageneric taxa and the genera segregated by Hellwig (1993, 1996), accepting four out of five subgenera established by Heering (1904a, b; 1905).

Zanowiak (1991) performed a cpDNA RFLP phylogenetic analysis of 23 representatives of subtribe Baccharidinae. In her analysis, *Baccharis vanessae* R.M.Beauch. emerged as sister of a clade composed by *Conyza* L., *Erigeron* L., *Exostigma* Sancho and the remaining subtribe, where *Archibaccharis* Heering and *Heterothalamus* Less. were the sister clade of the remaining species of *Baccharis* and *Baccharidastrum* Cabrera nested within the genus. Brouillet et al. (2009) published the largest phylogeny of Astereae, based on ITS markers, and stated that the results did not support the monophyly of Baccharidinae (including *Archibaccharis*, *Baccharis* and *Heterothalamus*) nor of *Baccharis*. Hence the authors concluded that a thorough phylogenetic study of the genus is in need to corroborate or refuse its alleged monophyly.

A comprehensive phylogenetic hypothesis for *Baccharis* is necessary to test its monophyly, refusing or accepting segregated genera, and clarifying the infrageneric relationships within the genus. By the mean of phylogenetic analyses based on nuclear and plastidial molecular data we aim to: (1) test the monophyly of *Baccharis* and its infrageneric taxa; (2) apply the results to move towards a phylogeny based infrageneric classification of the genus, and (3) update the list of taxa of *Baccharis* accepted at species level assigning them to infrageneric taxa accepted in the current study.

## MATERIALS AND METHODS

**List of segregate genera, infrageneric taxa and taxa recognized as species.** — Lists of genera segregated from *Baccharis* (Table S1) and infrageneric taxa as subgenera (Table S2), sections (Table S3) and series (Table S4) were compiled from the taxonomic literature and are presented as supplementary materials. A list of taxa recognized at species level, including subspecies and varieties with no specific name available, or even unpublished taxa, in this case cited by the mean of a voucher specimen, was also produced. The list of taxa accepted at the rank of species is presented following the new infrageneric classification proposed in the current work (Table 1).

**Outgroup choice and taxon sampling.** — *Bellis perennis* L. (Astereae: subtribe Bellidinae) was used as outgroup based on the phylogeny of Brouillet et al. (2009). The choice of *B. perennis* is justified by its phylogenetic position, out of the huge polytomy composed by *Callistephus chinensis* Benth, the Australasian lineage, the North American clade, and the twelve South American lineages recovered in the analysis of tribe Astereae based solely on ITS. Twenty one species from 17 genera, comprising 11 species from 10 genera of five subtribes belonging to the North American clade and 10 species from seven genera of two subtribes belonging to the South American lineages were also included in the current analysis, since the monophyly of *Baccharis* was not confirmed prior to this work and the sister group of the genus remains unknown. These lineages emerged in previous analyses as the closest ones related to *Baccharis* (Karaman-Castro & Urbatsch, 2006; Sancho & Karaman-Castro, 2008; Zanowiak, 1991) or in the same polytomy with species of the genus (Brouillet et al., 2009). Though occurring in South America or Europe, the sampled taxa of the North American clade undoubtedly are closer related to the North American clade species than to its South American counterparts of tribe Astereae. The ingroup sampling comprises 248 species of *Baccharis* (57.3% of the accepted species). The sampling within the ingroup was designed to represent the three lineages that emerged in the polytomy of South American lineages plus additional clades recovered by Brouillet et al. (2009). As much as possible, sampling focused on the type species of generic segregates, infrageneric taxa and *incertae sedis* species of *Baccharis*. The geographic bias of sampling was avoided with the inclusion in the analysis of species from the entire range of distribution of *Baccharis*, from North America to Southern Patagonian species. A summary of the sampling is giving in Table S5.

**DNA extraction, amplification and sequencing.** — All the samples for DNA extraction were collected during fieldwork and dehydrated and conserved in silica-gel. A list of vouchers and complementary associated information is presented in Appendix 1. Total genomic DNA was extracted using the commercial kit Invisorb® Spin Plant Mini Kit (Invitek, Berlin, Germany), following the manufacturer protocol. After extraction, the total genomic DNA was quantified and all the samples were standardized to a concentration between 40–50 ng/μL.

Primers ETS1f and 18S-2L (Linder et al., 2000) were used to amplify and sequence the ETS region. Primers ITS4 (White et al., 1990) and ITS5A (Downie & Katz-Downie, 1996) based on White et al. (1990) fungal primer ITS5 and corrected at two positions for angiosperms were used to amplify

and sequence the ITS region. Primers *trnH*-GUG and *psbA* (Shaw et al., 2005) were used to amplify and sequence the *trnH-psbA* region. Primers *trnL*f and *trnL*c (Taberlet et al., 1991) were used to amplify and sequence the *trnL*-F region.

PCR amplifications were carried out in 25  $\mu$ L reactions using 10  $\mu$ L of the reaction mix PROMEGA GoTaq Hot Start Green Master Mix (Promega, Madison, WI, USA), 1  $\mu$ L of D.M.S.O. (Sigma, St. Louis, MO, USA) only for ITS and ETS, 1  $\mu$ L of a 10  $\mu$ M concentration of the forward primer, 1  $\mu$ L of a 10  $\mu$ M concentration of the reverse primer, 11-12  $\mu$ L of DNase free sterile water and 1  $\mu$ L of 40–50 ng/ $\mu$ L template DNA. The PCR program for ETS region followed a 5 min initial denaturation at 95°C, 30 cycles of 45 sec denaturation at 94°C, 45 sec annealing at 46°C, 40 sec extension at 72°C, finished by a last extension of 10 min at 72°C. The PCR program for ITS region followed a 5 min initial denaturation at 95°C, 30 cycles of 1 min denaturation at 95°C, 1 min annealing at 52°C, 1 min extension at 72°C, finished by a last extension of 10 min at 72°C. The PCR program for *trnH-psbA* region followed a 5 min initial denaturation at 95°C, 30 cycles of 30 sec denaturation at 94°C, 30 sec annealing at 56°C, 1 min extension at 72°C, finished by a last extension of 10 min at 72°C. The PCR program for *trnL*-F region followed a 5 min initial denaturation at 95°C, 30 cycles of 1 min denaturation at 95°C, 1 min annealing at 52°C, 45 sec extension at 72°C, finished by a last extension of 7 min at 72°C.

The PCR products were purified using the QIAquick PCR Purification Kit (Qiagen Inc.). Sequencing of the amplified DNA segments was performed by Macrogen Inc. (Seoul, South Korea) with the same primers used for PCR amplifications. Sequences obtained for both strands of each PCR product were contiged, compared, examined for quality and corrected using Geneious v.6.1.5 (Biomatters, 2013). All the 1080 sequences included in the analysis are inedited and were produced in the current work. These sequences are going to be published in GenBank and the accession numbers provided in Appendix 1 are provisional.

**Alignments.** — Alignments of the sequences were made using the default settings and the L-INS-i algorithm in MAFFT v7.017 (Kato & Toh, 2008) implemented within Geneious v.6.1.5 (Biomatters, 2013). The aligned data matrix comprised a total of 5,041 characters that were analysed independently by origin (nuclear or plastidial) and together in a partitioned analysis of all molecular data divided in nuclear and plastidial subsets. The nuclear subset totalized 3,099 characters (2,429 from ETS and 670 from ITS) and the plastidial subset 1,942 characters (812 from *trnH-psbA* and 1,130 from *trnL*-F).

**Bayesian analysis.** — MrBayes 3.2.2 (Huelsenbeck & Ronquist, 2001) was used to perform the analysis of Bayesian inference of phylogeny with posterior probabilities (PP) running in CIPRES (Miller et al., 2010) for individual or combined datasets (nuclear, plastidial and all molecular data partitioned). Models of molecular evolution were selected using the Akaike Information Criterion (AIC) as implemented in jModelTest v.2.1.3. (Darriba et al., 2012). The chosen models were GTR+G (*trnH-psbA*) and GTR+I+G (ETS, ITS, nuclear, *trnL*-F, plastidial). Searches used default settings for all parameters. Partitioned analyses of nuclear and plastidial data subsets was carried out, and the

most likelihood genealogical species tree was reconstructed using a multi species coalescent approach implemented in MrBayes 3.2.2. Four simultaneous independent runs initiated from random start trees were run for 10 million generations, sampling from the posterior distribution of trees every 1,000 generations totalizing 10,000 sampled trees. The following strategies were employed to confirm that chains have reached stationarity: the overall INL was plotted, the standard deviation of split frequencies was examined and the convergence of the MCMC was checked graphically by monitoring the cumulative posterior split probabilities and among-run variability of split frequencies using the AWTY tool (Wilgenbusch et al., 2004). A total of 25% of the samples were discarded as burn-in. In the following sections, support will be referred by arbitrarily defined intervals as strong for nodes with posterior probability (PP) > 0.9, as moderate for nodes with PP between 0.85–0.9 and ambiguous or low support for nodes with PP < 0.85.

## RESULTS

The Bayesian analyses with the nuclear subset (ETS+ITS) (supplementary Figure S1: Part 1, Part 2, Part 3) resulted in a basal polytomy composed by the North American clade grouping representatives of subtribes Chrysopsidinae, Conyzinae, Solidaginae and Symphyotrichinae; three independent South American lineages, the first comprising the two sampled species of *Diplostephium* Kunth (subtribe Hinterhuberinae), the second composed by *Inulopsis scaposa* (DC.) O. Hoffm. and two species of *Podocoma* (subtribe Podocominae), and the third by *Asteropsis megapotamica* (Spreng.) Marchesi *et al.* and *Sommerfeltia spinulosa* (Spreng.) Less. (subtribe Podocominae), which emerged as sister to a clade of the two known species of *Exostigma* G. Sancho, that are considered of uncertain position within the South American Lineages of tribe Astereae. Baccharidinae (=Baccharis) emerged with a moderate support (PP=0.89) and the support is moderate or ambiguous in several high level internal nodes, though the clades that contain the type species of *B.* subgen. *Tarchonanthoides* (PP=0.94), *B.* sect. *Oblongifoliae* (PP=1), *B.* subgen. *Molina* (PP=1) and *B.* sect. *Coridifoliae* (PP=1) have strong support by PP values, while *B.* sect. *Heterothalamus* and *B.* subgen. *Baccharis* emerged as monophyletic groups only if adopting a narrow circumscription to these groups. The position of the South Brazilian cloud forest species *Baccharis wagenitzii* (F. H. Hellw.) Joch. Müll. represents an incongruence between the nuclear tree and the tree with all molecular data discussed later. This species grouped with the Argentinean species from arid provinces Altoandina, Puna and Monte, belonging to *B.* sect. *Pseudobaccharis* (*B. boliviensis* (Wedd.) Cabrera, *B. spartioides* (Hook. & Arn. ex DC.) Remy and *Baccharis* sp. GH1873) in the nuclear tree, while in the all molecular data tree, *B. wagenitzii* emerges as sister to a clade composed by *B.* subgen. *Coridifolia* and an expanded *B.* subgen. *Baccharis*, while *B.* sect. *Pseudobaccharis* is included in *B.* subgen. *Molina*.

The Bayesian analyses with the plastidial subset (*trnH-psbA+trnL-F*) (supplementary Figure S2: Part 1, Part 2, Part 3) resulted in a large polytomy where few discernible groups with weak morphological meaning emerged, such as the clades composed mostly by representatives of the North

American clade of Astereae, *B. sect. Heterothalamus*, *B. sect. Caulopterae*, *B. sect. Coridifoliae*, *B. sect. Molinae*, *B. sect. Baccharis* and *B. sect. Oblongifoliae*, along with several smaller clades without any putative close relationship.

The maximum likelihood genealogical species tree reconstructed using a multi species coalescent approach, with all molecular data partitioned in a nuclear and a plastidial subset (supplementary Figure S3: Part 1, Part 2, Part 3), resulted in the placement of the North American clade (PP=1) in a basal polytomy, while the South American lineages of subtribes Hinterhuberinae and Podocominae grouped into a clade with low support (PP=0.72), which is sister with low support as well (PP=0.69) to the Baccharidinae, a highly supported clade (PP=0.99). Despite the low information of the plastidial subset when considered separately, the combined analyses of nuclear and plastidial data lead to the resolution of high level polytomies and to the increasing of the support to strong values in most of the high level internal nodes, reinforcing the importance of plastidial data to solve deep relationships within the tribe Astereae.

The all molecular data tree retrieved is better resolved and its clades present higher support values than the trees inferred from individual subsets. This tree (Fig. 1) is chosen to discuss the phylogenetic relationships within *Baccharis*, and to build a new infrageneric classification for the genus based on strong supported clades of the phylogeny, also incorporating morphological information available from previous works. The new classification is designed to match with previously published infrageneric taxa whenever possible, in order to minimize changes of rank and circumscription in well-established groups.

## DISCUSSION

**Molecular data supports Baccharidinae s.s. and *Baccharis* s.l.** — Subtribe Baccharidinae has traditionally comprised the genera *Archibaccharis* and *Baccharis* (including its more commonly recognized generic segregates as *Baccharidastrum*, *Baccharidiopsis* and *Heterothalamus*) (Nesom & Robinson, 2007). *Archibaccharis* is a North and Central American genus including about 32 functionally dioecious species (Jackson, 1975), that differs from *Baccharis* by the presence of hermaphrodite florets in the centre of the female capitulum and by its compressed 2-ribbed cypselae (vs. female capitula of only pistillate florets and cylindrical 5-20-ribbed cypselae in *Baccharis*). *Archibaccharis* and *Heterothalamus* have been interpreted as “evolutionary steps” to reach the dioecy in *Baccharis* (Barroso, 1976; Jackson, 1975, Nesom 2000). Karaman-Castro & Urbatsch (2009) and Brouillet et al. (2009) demonstrated that *Archibaccharis* is closely related to *Plagiocheilus* Arn. ex DC., a genus of subtribe Grangeinae fide Nesom & Robinson (2007). In an expanded investigation looking for the sister relationships of *Baccharis* within tribe Astereae by the mean of ETS and ITS data and Bayesian approaches Heiden *et al.* (in preparation) also recovered *Archibaccharis* as sister to *Plagiocheilus* with strong support (PP=1), belonging to a clade nested in a polytomy with several lineages of subtribes Hinterhuberinae and Podocominae. This corroborates that *Archibaccharis* is not closely related to *Baccharis* and does not belong to Baccharidinae,

and also indicate that *Plagiocheilus* should be removed from Grangeinae and placed along with *Archibaccharis* in Hinterhuberinae or Podocominae, while these two subtribes need a thorough phylogenetic study to redefine their limits. In the analyses of Brouillet et al. (2009), *Heterothalamus spartioides* (= *Baccharis spartioides*) and *Baccharis boliviensis* (= *Heterothalamus boliviensis*) did not form a clade with the remaining species of *Baccharis* sampled in the analyses, falling isolated to each other in a polytomy of South American lineages, while they group with *Podocoma hirsuta* in some more restricted analyses. The authors concluded that in no instance these species are related to *Baccharis s.str.* and stated that the occurrence of paleate female capitula and female corollas with short laminae plus the results found supports the distinctiveness of these species from *Baccharis* and do not support the monophyly of *Baccharis s.l.*, as proposed by Müller (2006). However, paleate female capitula and female corollas with short laminae are homoplastic characters found in several other lineages of *Baccharis s.l.* *Baccharis spartioides* is the type species of the segregated genus *Pseudobaccharis* Cabrera, removed from *Baccharis* due the presence of paleate female capitula. In the current analyses including 16 of the 18 type species of all the genera ever segregated from *Baccharis*, *Baccharis s.l.* is strongly supported (PP=0.99), with *B. boliviensis* and *B. spartioides* being placed in *B. sect. Pseudobaccharis* within *B. subgen. Molina*. These evidences support the exclusion of *Archibaccharis* from Baccharidinae accepting the tribe in its narrower sense (e.g. comprising exclusively *Baccharis*), while the acceptance of *Baccharis s.l.* is strengthened, including all its generic segregates as proposed by Müller (2006) and rejecting Brouillet et al. (2009) statements that *Baccharis s.l.* is not monophyletic.

**Infrageneric classification should be revisited to represent monophyletic taxa.** — Even though *Baccharis s.l.* as proposed by Müller (2006) is strongly supported by our phylogenetic analyses, the number of accepted subgenera and their circumscription should be altered in different levels to build an infrageneric system reflecting monophyletic taxa recognized based on phylogenetic evidences. The six clades containing the type species of *B. subgen. Tarchonanthoides* (PP=1), *B. sect. Oblongifoliae* (PP=1), *B. subgen. Molina* (PP=1), *Heterothalamulopsis* (PP=1), *B. sect. Coridifoliae* (PP=1) and *B. subgen. Baccharis* (PP=0.96), all with strong support, and the clade containing the type species of *B. sect. Heterothalamus* (PP=0.88), with moderate support (Fig. 1), should be considered in the rank of subgenus and are subject of new combinations or new circumscriptions to reflect the phylogeny inferred from all the molecular data available and to reflect the current knowledge of the morphology of these groups. Clades with strong support recognized within these groups were assigned the rank of sections trying to match the supported clades to previously existing names at the rank of section. During this procedure we had to describe four new sections. A comparison of the previously published sectional proposals is complicate because they were mostly geographically limited to country level, while the infrageneric system here proposed aims to be the first step towards a comprehensive sectional classification of *Baccharis*, congregating all the species belonging to the genus without geographical constraints. The proposals of Cuatrecasas (1967) focused on the Colombian species, Nesom (1990) for North America, Giuliano (2001, 2005) and Giuliano & Freire

(2011) mainly referring to Argentinean or Southern Cone species and Giuliano and Nesom (2003) with a geographically broader reach than the previous proposals are largely overlapping concerning morphological circumscriptions and disagrees to each other in the species assigned to each section in different levels. Moreover, most of the known species of *Baccharis* were not assigned to any of the described sections until now. Several of the well-supported clades recovered through the current analyses correspond to previously existing infrageneric taxa ranked at diverse levels, but many of them have to be applied with different concepts. The circumscriptions of accepted sections attained to the nomenclatural types rather than to the original circumscription provided in the protologues, and several sections compositions differ largely from their original proposals. The most significant changes in morphological circumscription and species composition of subgenera and sections are discussed case by case in the summary of accepted infrageneric taxa. The recognition of smaller and monophyletic infrageneric taxa within a megadiverse genus as *Baccharis* is a critical step to allow the progress of future taxonomic revisionary works focusing on monophyletic groups.

**A synopsis of *Baccharis* and its accepted infrageneric taxa.** — Infrageneric taxa accepted here are based on the results of the Bayesian analyses of all molecular data and are strongly supported by PP values, except for the moderately supported *Baccharis* subgen. *Heterothalamus*. Morphological diagnosis for each infrageneric taxon is provisional and based on the study of herbarium specimens and natural populations during fieldwork, or relies on literature, remaining to be confirmed by deeper and broader morphological studies associated with search for novel or complementary synapomorphies characterizing clades. The complete infrageneric classification of *Baccharis* comprising the subgenera, sections and taxa accepted at species level is presented in Table 1.

*Baccharis* L., Sp. pl.: 860. 1753. —TYPE, conserved: *Baccharis halimifolia* L. (Hellwig 1989).

*Sergilus* Gaertn., Fruct. Sem. Pl. 2: 409. 1791. —TYPE: *Sergilus scoparius* (L.) Gaertner [= *Baccharis scoparia* (L.) Swartz].

*Tursenia* Cass. in Cuvier, Dict. Sci. Nat., ed. 2, 37: 480. 1825. —SYNTYPES: *Baccharis humifusa* Kunth, *Baccharis sinuata* Kunth.

*Pingraea* Cass. in Cuvier, Dict. sci. nat., ed. 2, 41: 57. 1826. —TYPE *Pingraea angustifolia* Cass. [= *Baccharis glutinosa* Pers.].

*Stephananthus* Lehm., Sem. horto bot. hamburg. 14: 18. 1826. *Baccharis* subgen. *Stephananthus* (Lehm.) Heering, Schriften Naturwiss. Vereins Schleswig-Holstein 13: 39. 1904. —TYPE: *Stephananthus junceus* Lehm. [= *Baccharis juncea* (Caas.) Desf.].

*Arrhenachne* Cass. in Cuvier, Dict. sci. nat., ed. 2, 53: 253. 1828. —TYPE: *Arrhenachne juncea* Cass. [= *Baccharis juncea* (Cass.) Desf.].

*Heterothalamus* Less., Linnaea 5: 145. 1830. —TYPE: *Marshallia aliena* Spreng. [*Baccharis aliena* (Spreng.) Joch.Müll.].

- Polypappus* Less., *Linnaea* 4: 314. 1831. —TYPE: *Vernonia triplinervia* Spreng., *Syst. Veg.* 3: 435. 1826 [= *Baccharis trineura* Soria & Zardini].
- Molina* Ruiz & Pav., *Prodr. fl. peruv.*, p. 111, t. 24. 1794, non *Molinia* Schrank (Poaceae), 1789, nec *Molina* Cavanilles (Malpighiaceae), 1790, nec *Molina* Gay (Euphorbiaceae), 1833. —TYPE: *Molina latifolia* Ruiz & Pav. [= *Baccharis latifolia* (Ruiz & Pav.) Pers.].
- Icma* Phil., *Anales de la Universidad de Chile* 41: 740. 1872. —TYPE: *Icma involucrata* Phil. [= *Baccharis gilliesii* A.Gray].
- Psila* Phil., *Anales Mus. Nac. Chile*, secc. 2, Bot. 7: 36. 1891. *Baccharis* sect. *Psila* (Phil.) Cuatrec., *Phytologia* 52: 168. 1982. —TYPE: *Psila cespitosa* Phil. [= *Baccharis acaulis* (Wedd. ex R.E.Fries) Cabrera].
- Palenia* Phil., *Anales Univ. Chile* 90: 7. 1895. —TYPE: *Palenia delfini* Phil. [= *Baccharis nivalis* (Wedd.) Sch.Bip. ex Phil.].
- Baccharidastrum* Cabrera, *Notas Mus. La Plata, Bot.* 2: 175. 1937. *Baccharis* sect. *Baccharidastrum* (Cabrera) G.L.Nesom, *Phytologia* 65: 170. 1988. —TYPE: *Baccharidastrum triplinerveum* (Less.) Cabrera [= *Baccharis glutinosa* Pers.].
- Pseudobaccharis* Cabrera, *Notas Mus. La Plata* 9: 246. 1944. *Baccharis* sect. *Pseudobaccharis* (Cabrera) Cuatrec., *Phytologia* 52: 168. 1982. —TYPE: *Pseudobaccharis spartioides* (Hook. & Arn. ex DC.) Cabrera [*Baccharis spartioides* (Hook. & Arn. ex DC.) Remy].
- Baccharidiopsis* G.M.Barroso, *Sellowia* 26: 95. 1975. —TYPE: *Baccharidiopsis pohlii* (Baker) G.M.Barroso [= *Baccharis pohlii* (Baker) Deble & A.S.Oliveira].
- Neomolina* F.H.Hellw., *Candollea* 48: 211. 1993. —TYPE: *Neomolina racemosa* (Ruiz & Pav.) F. H. Hellw. [= *Baccharis racemosa* (Ruiz & Pav.) Pers.].
- Heterothalamulopsis* Deble, A.S.Oliveira & Marchiori, *Ci. Florest. (Santa Maria)* 14(1): 1. 2004. —TYPE: *Heterothalamulopsis wagenitzii* (F.H.Hellw.) Deble, A.S.Oliveira & Marchiori [*Baccharis wagenitzii* (F.H.Hellw.) Joch.Müll.].
- Lanugothamnus* Deble, *Balduinia* 37: 2–25. 2012. —TYPE: *Lanugothamnus helichrysoides* (DC.) Deble [= *Baccharis helichrysoides* DC.]. **Syn. nov.**

The functionally unisexual florets usually disposed in distinct specimens (dioecy) is traditionally considered a diagnostic character of *Baccharis* and it is present in all the early divergent lineages of the genus, while the known deviations from dioecy are scattered in derived and non related lineages. As stated by Müller (2006), the known deviations from dioecy found in a few species of *Baccharis* are not reason to discard this as a basal character of a monophyletic group. The few monoecious (the sister species *B. breviseta* and *B. vulneraria*, as well as the not so closely related *B. monoica*, all belonging to *B.* subgen. *Molina* sect. *Molinae*), gynodioecious (*B.* subgen. *Heterothalamus* sect. *Heterothalamus* comprising *B. aliena*, *B. hyemalis* and *B. psiadioides*) and polygamous species (*B. pohlii* unplaced within *B.* subgen. *Molina*, but probably close related to *B. hirta*, provisionally placed in *B.* subgen. *Molina* sect. *Aristidentes*) found in *Baccharis* are distributed in distinct clades and are



sisters to perfectly dioecious taxa. On the other hand, the tufted indumentum of leaves and stem, advocated by Müller (2006) as a possible further synapomorphic character of *Baccharis s.l.* cannot be considered unambiguously as a synapomorphy of the genus, since it is absent in *B.* subgen. *Tarchonanthoides*, which is the earliest diverging lineage within the genus. This subgenus shares the functionally unisexual florets with its sister clade composed by the remaining species of *Baccharis*, but lacks the tufted indumentum common to most species of *Baccharis*. The absence of the tufted indumentum in *B.* subgen. *Tarchonanthoides* could be explained by an event of loss, in the case the tufted indumentum is a simplesiomorphy of *Baccharis*, or to the retention of a plesiomorphic character in *B.* subgen. *Tarchonanthoides* with gain of tufted indumentum only in the clade composed by the remaining species of *Baccharis*, with a posterior reversal in *B.* sect. *Coridifoliae*.

The phylogenetic analyses support that all the previously genera segregated from *Baccharis* are better considered as synonyms under the genus, although the type species of *Baccharidiopsis*, *Sergilus* and *Tursenia* were not included in the analyses. *Baccharis pohlii*, the type species of *Baccharidiopsis*, is currently assigned to *B.* subgen. *Molina*; *B. scoparia*, the type species of *Sergilus*, and *B. humifusa* and *B. sinuata*, the syntype species of *Tursenia*, are assigned to *B.* subgen. *Baccharis*. These three segregates are traditionally accepted as synonyms of *Baccharis*. *Lanugothamnus* Deble emerged as a polyphyletic assemblage and thus is also confirmed as a new synonym of *Baccharis*. *Baccharis helichrysoides*, the type species of *Lanugothamnus*, is nested within *B.* subgen. *Tarchonanthoides*, while *Lanugothamnus* subgen. *Toxicothamnus* equals to *B.* subgen. *Coridifolia*, which occupies a central position in the phylogeny of the genus (Fig. 1).

The 433 taxa now accepted at species level in *Baccharis* are here classified in seven subgenera (Fig. 1) and 47 accepted sections; except for *B. asperula* whose infrageneric position within the genus still remains unknown. The accepted taxa assigned to each infragenera and those of uncertain placement are listed in Table 1.

*Baccharis* is originally distributed in the Americas, from Southeastern Canada (Fielding 2001) to Southern Patagonia, with species native to the Falkland/Malvinas islands, and endemic species in the Galápagos archipelago and in the Caribbean islands. *Baccharis halimifolia* from North America was introduced as an ornamental plant in Europe, Africa and Australasia, and became naturalized in coastal environments. Müller (2006) stated that the eastern slope of the Andes along Bolivia and the northern half of Argentina might be regarded as the main center of radiation for *Baccharis*. However, the topology recovered in the current phylogenetic analyses points rather to the mountains of eastern Brazil as the likely main area for the early radiations of the genus, as attested by the distribution of several of the early divergent lineages of *Baccharis* (Fig. 2). Anyway, the eastern slope of the Andes is an important area for the radiation of several lineages of *B.* subgen. *Molina* (Fig. 3).

**I. *Baccharis* subgen. *Tarchonanthoides*** Heering, Jahrb. Hamburg. Wiss. Anst. 21(3): 26. 1904 [as “*Tarchonantoides*”]. —TYPE: *Baccharis tarchonanthoides* DC.

*Baccharis* subgen. *Tarchonanthoides* can be recognized by the combination of the following characters: indumentum of shoots and leaves composed mostly of filiform trichomes, male florets with pistillodium apex nearly fully cleft into linear-lanceolate branches bearing sweeping hairs of equal length, female florets with 5-denticulate corollas and cypselae generally covered by twin trichomes.

*Baccharis* sect. *Coridifoliae* Giuliano is not close related to *B.* subgen. *Tarchonanthoides* (Fig. 2). The section is removed from the subgenus to keep it monophyletic and is elevated to the subgeneric rank, since it represents a distinct lineage considered here at that level.

*Baccharis* subgen. *Tarchonanthoides* comprises 13 species classified into two sections and all of them are sampled in the current analysis (Fig. 2). The group has diversified mainly in open vegetations of Southeastern South America, occurring in Brazil, Paraguay, Uruguay and Argentina. Its main center of species richness is found in the southern Brazilian highlands along the states of Paraná, Santa Catarina and Rio Grande do Sul. Nonetheless, endemic taxa also occur in the rocky grasslands (*campos rupestres*) of Minas Gerais, in Southeastern Brazil, and in the lowland temperate grasslands from the pampas of Argentina, Uruguay and Southern Brazil.

#### **Sections assigned to *Baccharis* subgen. *Tarchonanthoides*:**

**i. *Baccharis* sect. *Tarchonanthoides*** (Heering) Cuatrec., Rev. Acad. Colomb. Ci. Exact. 13(49): 89. 1967. —TYPE: *Baccharis tarchonanthoides* DC.

*Baccharis* sect. *Curitybenses* Giuliano, Novon 15(4): 536. 2005. *Lanugothamnus* subgen. *Curitybenses* (Giuliano) Deble, Balduinia 37: 15. 2012. —Type: *Baccharis curitybensis* Heering ex Malme. **Syn. nov.**

*Lanugothamnus* subgen. *Curitybenses* (Giuliano) Deble, Balduinia 37: 15. 2012. —Type: *Lanugothamnus curitybensis* (Heering ex Malme) Deble [= *Baccharis curitybensis* Heering ex Malme]. **Syn. nov.**

*Lanugothamnus* subgen. *Tarchonanthoides* (Heering) Deble, Balduinia 37: 16. 2012 [as “*Tarchonantoides*”]. —TYPE: *Lanugothamnus tarchonanthoides* [= *Baccharis tarchonanthoides* DC.]. **Syn. nov.**

The circumscription of *Baccharis* sect. *Tarchonanthoides* (Fig. 2) is reassessed by Heiden & Pirani (in preparation) to include species presenting a nano to mesophanerophyte life form and pappus of female florets not accrescent. Consequently, species of *B.* subgen. *Tarchonanthoides* formerly placed in *B.* sect. *Curitybenses*, which is proposed as a synonym of *B.* sect. *Tarchonanthoides*, and one species in *B.* sect. *Canescentes* (*B. patens*) by Giuliano (2005) are transferred to *B.* sect. *Tarchonanthoides*. As currently defined, the section comprises six species occurring in savannahs and grasslands from Southeastern Brazil to Southern Uruguay.

ii. *Baccharis* sect. *Canescentes* Giuliano, Novon 15(4): 535–536. 2005.—TYPE: *Baccharis helichrysoides* DC.

*Lanugothamnus* subgen. *Lanugothamnus*, Balduinia 37: 12. 2012. *Lanugothamnus* sect. *Lanugothamnus*, Balduinia 37: 12. 2012. —TYPE: *Lanugothamnus helichrysoides* (DC.) Deble [= *Baccharis helichrysoides* DC.]. **Syn. nov.**

*Lanugothamnus* sect. *Sericicarpus* Deble, Balduinia 37: 13. 2012. —TYPE: *Lanugothamnus leucocephalus* (Dusén) Deble [= *Baccharis leucocephala* Dusén]. **Syn. nov.**

The circumscription of *Baccharis* sect. *Canescentes* (Fig. 2) is reassessed by Heiden & Pirani (ined.) to include only species presenting a chamaephyte life form and pappus of female florets accrescent. This circumscription results in a slightly narrower delimitation, with the exclusion of *B. patens*, that is transferred to *B.* sect. *Tarchonanthoides*. As currently defined, the section differs minimally from the original proposition by Giuliano (2005), and comprises seven species occurring in a wide array of ecosystems in Southeastern South America, from Eastern Paraguay and Southeastern Brazil south to the province of Buenos Aires in Argentina.

II. *Baccharis* subgen. *Oblongifolia* (DC.) G. Heiden, *stat. nov.* Basionym: *Baccharis* sect.

*Oblongifoliae* DC., Prodr. 5: 416. 1836. —LECTOTYPE, designated by Cuatrecasas, 1967: *Molina oblongifolia* Ruiz & Pav. [= *Baccharis oblongifolia* (Ruiz & Pav.) Pers.].

*Baccharis* subgen. *Oblongifolia* is characterized by the combination of female capitula with plane paleae, apically 5-dentate female corollas, pappus not accrescent at cypsela maturity and pistilodium apex of male florets rhombic, bearing sweeping hairs of unequal size. For an extensive description of *B.* subgen. *Oblongifolia* as “*Baccharis oblongifolia* group”, see Müller (2006).

*Baccharis* subgen. *Oblongifolia* (Fig. 2) is recognized at subgeneric rank and the new status is here provided. The subgenus comprises 17 species occurring mostly in the very summits of the main mountainous ranges of South America, with the highest diversity found in southeastern Brazil. Some species as *B. oblongifolia* and *B. rufidula* also occur in submontane forests. *Baccharis myricifolia*, a rheophilous species with narrow leaves, was previously placed in *B.* sect. *Racemosae*, probably due to the misapplication of this name to specimens of *B. dracunculifolia* by several authors, but it in fact belongs to *B.* subgen. *Oblongifolia*. *Baccharis* sect. *Oblongifoliae* is the only known section to this subgenus.

**Sections assigned to *Baccharis* subgen. *Oblongifolia*:**

i. *Baccharis* sect. *Oblongifoliae* DC., Prodr. 5: 416. 1836. —LECTOTYPE, designated by Cuatrecasas, 1967: *Molina oblongifolia* Ruiz & Pav. [= *Baccharis oblongifolia* (Ruiz & Pav.) Pers.].

Same composition of the subgenus, as stated above.

**III. *Baccharis* subgen. *Heterothalamus*** (Less.) G. Heiden, *comb. et stat. nov.* Basionym: *Heterothalamus* Less., *Linnaea* 5: 145. 1830. —TYPE: *Marshallia aliena* Spreng. [= *Baccharis aliena* (Spreng.) Joch.Müll.].

*Baccharis* subgen. *Heterothalamus* is roughly characterized by the combination of glandular-punctate leaves crowded at the distal parts of branches, capitula borne in corymbiform racemes or panicles, rarely isolate capitula, male florets with pistilodium style apex bearing short lanceolate lobes, paleate female capitula, apically irregularly denticulate short-rayed female corollas and cypselae 3–7-ribbed.

*Baccharis* subgen. *Heterothalamus* is recognized at subgeneric rank and the new status is here provided. The subgenus has a moderate support in the phylogeny (Fig. 2), but some shared morphological characters suggest that it indeed is composed by somewhat related lineages. Further morphological investigation and inclusion of more molecular data in future analyses are encouraged to test the monophyly of the group. The subgenus comprises three sections and only seven species. The relationship of the sections here included in *B.* subgen. *Heterothalamus* was not formally recognized before. Albeit differing sharply from the species of *B.* sect. *Heterothalamus*, *B. acaulis* was originally described in the genus *Heterothalamus*, while the species assigned to the new *B.* sect. *Bradeanae* were named in herbarium labels as *Heterothalamus*, prior to the valid publication of the species in *Baccharis*. The three lineages are found disjunct, occurring in Serra do Caparaó, Southeastern Brazil, along the Andes and in Pampean mountains and hilly ranges of Argentina, southern Brazil and Uruguay.

**Sections assigned to *Baccharis* subgen. *Heterothalamus*:**

**i. *Baccharis* sect. *Bradeanae*** G. Heiden, *sect. nov.* —TYPE: *Baccharis dubia* Deble & A. S. Oliveira.

Similar to *Baccharis* sect. *Heterothalamus*, from which it differs by the functionally male capitula bearing cream to whitish florets with 1–2 series of neutral or functionally female short-rayed florets, and the female capitula bearing whitish short-rayed female florets.

The new section (Fig. 2) comprises two species (*Baccharis dubia* Deble & A. S. Oliveira and *B. magnifica* G. Heiden et al.), both endemic to the Serra do Caparaó in southeastern Brazil. The section is named to honor the German botanist Alexander Curt Brade (1881–1971) who worked at the Jardim Botânico do Rio de Janeiro and did extensive collections in Serra do Caparaó. The oldest known specimens of *B. dubia* and *B. magnifica* were collected by Brade. The Brazilian botanist Graziela Maciel Barroso (1912–2003) named *in schedula* specimens of *B. dubia* as *Heterothalamus bradei*, but did not describe the species. So to keep the original idea of Barroso's in honor Brade, the name of the section is dedicated to him.

ii. **Baccharis sect. *Psila*** (Phil.) Cuatrec., Phytologia 52(3): 168. 1982. —TYPE: *Psila caespitosa* Phil. [= *Baccharis acaulis* (Wedd. ex R. E. Fr.) Cabrera].

*Baccharis* sect. *Psila* (Fig. 2) is characterized by halophyllous, shrubby cryptophytes with long and multibranched subterraneous rhizomes bearing deciduous scales, and presenting ephemeral aerial branches bearing solitary capitula subtended by leafy rosettes. The section comprises two species restricted to salt plains, marshes and streams in high elevation areas along the Andes.

iii. **Baccharis sect. *Heterothalamus*** (Less.) Giuliano, Ann. Missouri Bot. 98(3): 343. 2011. *Heterothalamus* Less., Linnaea 5: 145. 1830. —TYPE: *Marshallia aliena* Spreng. [= *Baccharis aliena* (Spreng.) Joch.Müll.].

*Baccharis* sect. *Heterothalamus* (Fig. 2) is characterized by gynodioecious species, the functionally male capitula are heterogamous, and bear yellow florets with 1–2 series of neutral or functionally female long-rayed florets in the margins and functionally male tubular florets in the disc, the female capitula are homogamous and bears greenish short-rayed female florets. *Baccharis* (*Heterothalamus*) *boliviensis* (placed in *B.* sect. *Pseudobaccharis*) and *B.* (*Heterothalamus*) *wagenitzii* (placed in *B.* sect. *Heterothalamulopsis*) often associated to *Heterothalamus* are not related to the section. *Baccharis* sect. *Heterothalamus* comprises three species occurring in central Argentina, southern Brazil and Uruguay.

IV. **Baccharis subgen. *Molina*** (Pers.) Heering, Schriften Naturwiss. Vereins Schleswig-Holstein 13: 40. 1904. *Molina* Ruiz & Pav., Prodr. fl. peruv., p. 111, t. 24. 1794, non *Molinia* Schrank (Poaceae), 1789, nec *Molina* Cavanilles (Malpighiaceae), 1790, nec *Molina* Gay (Euphorbiaceae), 1833. *Baccharis* “group” *Molina* Pers., Syn. pl. 2: 424. 1807. —LECTOTYPE, designated by Cuatrecasas 1967: *Molina latifolia* Ruiz & Pav. [= *Baccharis latifolia* (Ruiz & Pav.) Pers.].

*Baccharis* subgen. *Stephananthus* (Lehm.) Heering, Schriften Naturwiss. Vereins Schleswig-Holstein 13: 39. 1904. *Stephananthus* Lehm., Sem. horto bot. hamburg. 14: 18. 1826. —TYPE: *Stephananthus junceus* Lehm. [= *Baccharis juncea* (Caas.) Desf.]. **Syn. nov.**

*Baccharis* subgen. *Pteronioides* Heering, Jahrb. Hamburg. Wiss. Anst. 21(3): 15. 1904. —TYPE: *Baccharis pteronioides* DC. **Syn. nov.**

*Baccharis* ser. *Uniflorae* Giuliano, Novon 15(4): 537–538. 2005. —TYPE: *Baccharis uniflora* (Ruiz & Pav.) Pers. **Syn. nov.**

*Baccharis* subgen. *Molina* seems to be the most morphologically diverse group of *Baccharis*, and with the merging of *B.* subgen. *Pteronioides* it is the second most species-rich subgenus. The style apex of the pistilodium of the male florets is almost always entirely cleft into lanceolate branches, the female florets mostly presents female corollas with truncate apex and a subapical wreath of trichomes. The cypselae are generally covered by uniseriate or twin trichomes. However all these characters are

found outside the subgenus and investigation of morphological synapomorphies to circumscribe the clade are in urgent need.

The type species of *Baccharis* subgen. *Pteronioides* was not sampled in the current phylogenetic analyses, but the species of *B. sect. Australes* and *B. sect. Bogotenses* are largely recognized as somewhat related to *B. pteronioides* and the clade containing them emerged nested within *B. subgen. Molina* (Fig. 3). Additionally, some of the remaining species previously placed in *B. subgen. Pteronioides* and sampled in the current analysis are now placed in *B. sect. Angustifoliae*, which seems ambiguously closely related to other lineages that were traditionally assigned to *B. subgen. Molina*. The type species of *B. ser. Uniflorae* was not included in the analysis, but morphologically it also belonged to the former *B. subgen. Pteronioides*.

*Baccharis* subgen. *Stephananthus* is an additional new synonym to *B. subgen. Molina*. The type species of this subgenus was considered in the unplaced “*B. juncea* group” of Müller (2006). This group *fide* Müller (2006) revealed to be a polyphyletic assemblage, as the four species included on it are dispersed in our phylogenetic reconstruction. *Baccharis juncea* is nested within *B. sect. Molinae*, *B. arenaria* and *B. nivalis* stands isolated in monospecific sections not related to each other and with unclear affinities within *B. subgen. Molina*, while *B. acaulis* is placed in *B. subgen. Heterothalamus* along with *B. davidsonii*.

Several species within this subgenus are still placed in *incertae sedis* sections and others still lack hypothesis of relationships with any of the remaining species of the section. This is the relatively least sampled clade in the current analyses. Expanding the sampling within *B. subgen. Molina* is critical to solve the several pending polytomies and to clarify relationships among unplaced species and sections. Future analyses based on increased sampling shall recover better topologies and will allow recircumscriptions and reductions in the number of sections here accepted. As currently circumscribed, *B. subgen. Molinae* comprises 21 sections and 145 species, occurring from southwestern USA to southern South America. Mexico, The Andes and Southeastern Brazil are the main centers of species richness of the subgenus.

#### **Sections assigned to *Baccharis* subgen. *Molina*:**

**i. *Baccharis* sect. *Palenia*** Giuliano, Ann. Missouri Bot. 98(3): 344-345. 2011. —TYPE: *Palenia delfinii* Phil. [= *Baccharis nivalis* (Wedd.) Sch.Bip. ex Phil.].

For a description of *Baccharis* sect. *Palenia* see Giuliano & Freire (2011). *Baccharis nivalis* is the only species assigned to the section, occurring in Argentinean and Chilean Patagonia. The relationships of the section within *B. subgen. Molina* are unclear (Fig. 3) and further morphological analyses and a better sampling of the subgenus are necessary to clarify its position.

**ii. *Baccharis* sect. *Subliguliflorae*** Giuliano, Darwiniana 39(1-2): 145. 2001. —TYPE: *Baccharis niederleinii* Heering.

For a description of *Baccharis* sect. *Subliguliflorae* (Fig. 3) see Giuliano (2001) and Müller (2006) as “*B. polifolia* group”. *Baccharis cabreræ*, *B. niederleinii* and *B. niederleinii* var. *potrerillana* were originally assigned to the section and the species included by Müller (2006) in the “*B. polifolia* group”, except for *B. polifolia*, are included in this section. Increasing the sampling of representatives of *B. sect. Subliguliflorae* and further morphological studies are necessary to confirm the inclusion of the additional taxa. The species belonging to the section occur mostly in the monte, prepuna and puna vegetations from northwestern Argentina and Bolivia.

**iii. *Baccharis* sect. *Thymifoliae*** Giuliano, Ann. Missouri Bot. 98(3): 342-343. 2011. —TYPE: *Baccharis thymifolia* Hook. & Arn.

For a description of *Baccharis* sect. *Thymifoliae* (Fig. 3) see Giuliano & Freire (2011). *Baccharis thymifolia* was the only species originally assigned to the section. *Baccharis grisebachii*, previously suggested as related to *B. sect. Subliguliflorae* by Müller (2006), is now positioned in this section. The section is probably related, if not a synonym, of *B. sect. Subliguliflorae*. This supposition remains to be confirmed after increasing the sampling of representatives of *B. sect. Subliguliflorae* and by further morphological studies. The two species belonging to the section occurs in the prepuna and puna vegetations from northwestern Argentina.

**iv. *Baccharis* sect. *Trinervatae*** DC., Prodr. 5: 399. 1836. —TYPE: *Baccharis trinervis* Pers.

*Baccharis* sect. *Paleatae* Giuliano, Novon 15(4): 536–537. 2005. —TYPE: *Baccharis retamoides* Phil. *Syn. nov.*

*Baccharis* sect. *Trinervatae* (Fig. 3) is characterized by the habit of mostly climbing vines, sometimes erect subshrubs, with entire leaves, paleate female capitula and female flowers bearing apically truncate corollas. The section comprises 13 species, most of them are widespread and distributed on forest edges of tropical Central and South America. *Baccharis pedunculata* and *B. trinervis* are widespread species, while *B. steetzii* is endemic to the Galápagos, and *B. acutata*, *B. nipensis* and *B. orientalis* are endemic to Cuba. *Baccharis retamoides* constitutes an odd addition to the section; it was placed by Giuliano (2005) in the monospecific section *B. sect. Paleatae*, here considered a new synonym of *B. sect. Trinervatae*. This species is vegetatively very distinctive, being a desert subshrub from central Argentina, with reduced leaves and capitula concentrated at the distal parts of branches, but it shares the paleate capitula and truncate corollas with the remaining species of the section.

**v. *Baccharis* sect. *Australes*** Giuliano, Ann. Missouri Bot. 98(3): 338–339. 2011. —TYPE: *Molina racemosa* Ruiz & Pav. [= *Baccharis racemosa* (Ruiz & Pav.) Pers.].

For a description of *B. sect. Australes* (Fig. 3) see Giuliano & Freire (2011). *Baccharis racemosa* is the only species assigned to the section, occurring in Chilean Patagonia. It is possibly a synonym of

*B. sect. Bogotenses*, but confirmation of such supposition depends on a better sampling of *B. subgen. Molina* and further morphological analyses.

**vi. *Baccharis sect. Bogotenses*** Cuatrec., Rev. Acad. Colomb. Ci. Exact. 13(49): 85. 1967. —TYPE: *Baccharis bogotensis* Kunth.

*Baccharis sect. Glandulicarpae* G. L. Nesom, Phytologia 69(1): 43. 1990. —TYPE: *Baccharis wrightii* A.Gray. **Syn. nov.**

*Baccharis sect. Bogotenses* (Fig. 3) shows a wide array of vegetative characters, comprising cryptophytic subshrubs, as well as phanerophytic shrubs and vines. Reproductive characters that help to recognize the species of this section are: male florets with pistilodium apex cleft into lanceolate branches, female capitula always epaleate, female corollas truncate with a subapical wreath of trichomes, and generally dark cypselae that are conspicuously visible in mature capitula. But a thorough morphological study is still necessary for a better circumscription of the section. It was originally described by Cuatrecasas (1967) to accommodate two Colombian closely related species (*B. bogotensis* and *B. mutisiana*). The section is now expanded based on phylogenetic grounds. The type species of the section is sister to the clade containing the type species of the North American section *B. sect. Glandulicarpae*, and they are nested in the same strongly supported clade with previously unplaced species of the “*B. saliens* group” of Müller (2006), plus two Brazilian species that were placed in *B. sect. Aristidentes* and *B. sect. Tubulatae* before. *Baccharis sect. Bogotenses* probably has to be expanded to include some unplaced species in *B. subgen. Molina* as well as most or all the representatives of *B. sect. Aristidentes* and *B. sect. Tubulatae*, since most of the morphological characters that have been used to characterize these three sections are overlapping. Alternatively, the species composition of these sections is likely to be greatly altered in the future. As currently circumscribed, *B. sect. Bogotenses* comprises 17 species occurring from Argentina and Uruguay to North America, where its greatest centre of diversity lies.

**vii. *Baccharis sect. Paniculatae*** Heering, Jahrb. Hamburg. Wiss. Anst. 21(3): 19. 1904. —TYPE: *Baccharis paniculata* DC.

*Baccharis sect. Effusae* Giuliano, Ann. Missouri Bot. 98(3): 336. 2011. —TYPE: *Baccharis effusa* Griseb. **Syn. nov.**

The circumscription of *Baccharis sect. Paniculatae* (Fig. 3) was highly variable since its description. Our phylogenetic data show the close relationship between *B. paniculata*, from Chile, and *B. effusae*, from northwestern Argentina and southwestern Bolivia. Both species are shrubs with linear leaves and strongly accrescent pappus of female florets. Thus, *Baccharis sect. Effusae* is here considered a synonym of *B. sect. Paniculatae*, but additional morphological characters shared by the two species need to be searched for, and the relationships of this clade to the remaining species of *B. subgen. Molina* continue unclear.



viii. ***Baccharis* sect. *Arenariae*** Giuliano, Ann. Missouri Bot. 98(3): 340. 2011. —TYPE: *Baccharis arenaria* Baker.

For a description of *B. sect. Arenariae* (Fig. 3) see Giuliano & Freire (2011). *Baccharis arenaria* is the only species assigned to the section, occurring in riverine and lake shores vegetation in northeastern Argentina, Southern Brazil and Uruguay. The sister relationships of the section are still unknown.

ix. ***Baccharis* sect. *Polifoliae*** G. Heiden, *sect. nov.* —TYPE: *Baccharis polifolia* Griseb.

*Baccharis* sect. *Polifoliae* differs from *Baccharis* sect. *Subliguliflorae* by the 1-nerved leaves with tomentose abaxial surface (vs. 3-nerved leaves and puberulous abaxial surface).

*Baccharis* sect. *Polifoliae* (Fig. 3) comprises, by now, only *B. polifolia*, which was previously positioned by Giuliano & Freire (2011) in *B. sect. Subliguliflorae*, but our phylogenetic evidences show that *B. polifolia* is not close related to this section, neither to any other of the described sections with confidence. Instead, *B. polifolia* is placed in a clade with *B. sect. Arenariae* and *B. sect. Pseudobaccharis*, showing ambiguous relationships due to the low support of the branches. Further morphological studies and a better sampling of *B. subgen. Molina* are necessary for a better understanding of the relationships of this section. *Baccharis polifolia* occurs in the Andes from northwestern Argentina to southwestern Bolivia.

x. ***Baccharis* sect. *Pseudobaccharis*** (Cabrera) Cuatrec., Phytologia 52(3): 168. 1982. —TYPE: *Heterothalamus spartioides* Hook. & Arn. ex DC. [= *Baccharis spartioides* (Hook. & Arn. ex DC.) Remy].

*Baccharis* sect. *Pseudobaccharis* (Fig. 3) can be roughly characterized by the minute leaves, paleate female capitula and female florets bearing short-rayed corollas. Additional characters are described in Cuatrecasas (1982), who originally assigned *B. spartioides* and *B. boliviensis* to the section along with other taxa with paleate female capitula currently positioned in diverse sections. *Baccharis alpina* was considered by Müller (2006) as included in the “*B. genistelloides* group”, but is placed in *B. sect. Pseudobaccharis* following the available data. The three species occur in puna, prepuna and altoandina vegetations in northwestern Argentina and Bolivia.

xi. ***Baccharis* sect. *Angustifoliae*** Baker in Mart., Flora Brasiliensis 6(3): 55. 1882. *Baccharis* ser. *Angustifoliae* (Baker) Giuliano, Novon 15(4): 538. 2005. —TYPE: *Baccharis ulicina* Hook. & Arn.

*Baccharis* sect. *Icma* (Phil.) Giuliano, Ann. Missouri Bot. 98(3): 344. 2011. *Icma* Phil., Anales de la Universidad de Chile 41: 740. 1872. —TYPE: *Icma involucrata* Phil. [= *Baccharis gilliesii* A.Gray].  
***Syn. nov.***

Most species included in *Baccharis* sect. *Angustifoliae* (Fig. 3) are subshrubs with rhizomes or lignotubers, presenting small 1-veined leaves with dentate, pectinate or pinnatifid margins, while the

capitula are generally borne solitary in the apex of erect branches, but *B. arguta* is a shrub with large pinnately-veined leaves and capitula born in corymbiform panicles. The sister relationship of *B. arguta* to the remaining species in the section could be due to an undersampling in this clade, and maybe the species is not so closely related to the others as shown in the present analyses. A better sampling and further morphological studies could improve the resolution on its relationships. *Baccharis gilliesii* was placed in the monospecific *B. sect. Icma* by Giuliano & Freire (2011), but our phylogenetic analyses confirm that this section shall be considered as a synonym of *B. sect. Angustifoliae*. The species of *B. sect. Angustifoliae* occurs from northern Andes (*B. arguta*) to Patagonia, where most of the species are found, with one species (*B. orbignyana*) in the central Brazilian tropical savannahs (Cerrado).

**xii. *Baccharis sect. Serrulatae*** Cuatrec., Rev. Acad. Colomb. Ci. Exact. 13(49): 74. 1967. —TYPE: *Baccharis caldasiana* Cuatrec.

*Baccharis sect. Revolutae* Cuatrec., Rev. Acad. Colomb. Ci. Exact. 13(49): 76. 1967. —TYPE: *Baccharis revoluta* Kunth. **Syn. nov.**

For a description of *Baccharis sect. Serrulatae* (Fig. 3) see Cuatrecasas (1967). Only two species were assigned to the section in the protologue, but the current phylogeny allowed us to merge *B. sect. Revolutae* and to transfer *B. rupicola* from *B. sect. Molinae* to *B. sect. Serrulatae*. Further species were assigned to this section based on morphology. All the species of the section occur on paramos vegetation of northern Andes, mainly Colombia and Ecuador.

**xiii. *Baccharis sect. Molinae*** (Ruiz & Pav.) Cuatrec., Rev. Acad. Colomb. Ci. Exact. 13(49): 15. 1967. *Molina* Ruiz & Pav., Prodr. fl. peruv., p. 111, t. 24. 1794, non *Molinia* Schrank (Poaceae), 1789, nec *Molina* Cavanilles (Malpighiaceae), 1790, nec *Molina* Gay (Euphorbiaceae), 1833. *Baccharis* “group” *Molina* Pers., Syn. pl. 2: 424. 1807. —TYPE: *Molina latifolia* Ruiz & Pav. [= *Baccharis latifolia* (Ruiz & Pav.) Pers.].

*Baccharis sect. Stephananthus* (Lehm.) Cuatrec., Rev. Acad. Colomb. Ci. Exact. 13(49): 89. 1967. —TYPE: *Stephananthus junceus* Lehm. [= *Baccharis juncea* (Cass.) Desf.]. **Syn. nov.**

*Baccharis sect. Corymbosae* Heering, Flora de Chile 4: 5. 1903. —TYPE: *Baccharis marginalis* DC. [= *Baccharis salicifolia* (Ruiz & Pav.) Pers.].

*Baccharis sect. Scandentes* Cuatrec., Rev. Acad. Colomb. Ci. Exact. 13(49): 42. 1967. —TYPE: *Baccharis decussata* Klatt. **Syn. nov.**

*Baccharis sect. Baccharidastrium* (Cabrera) G. L. Nesom, Phytologia 65(3): 170. 1988. —TYPE: *Baccharidastrium triplinervium* (Less.) Cabrera [= *Baccharis vulneraria* Baker]. **Syn. nov.**

*Baccharis sect. Lilloanae* Giuliano, Ann. Missouri Bot. 98(3): 337. 2011. —TYPE: *Baccharis lilloi* Heering. **Syn. nov.**

*Baccharis* sect. *Molinae* (Fig. 3) is roughly characterized by shrubs with large generally 3-nerved leaves, broad corymbiform capitulescences, female capitula that are always epaleate, and by female flowers bearing apically truncate corollas with a subapical wreath of trichomes. For further morphological characters of the section see Müller (2006) as “*B. latifolia* group”. Four sections (*B. sect. Baccharidastrum*, *B. sect. Lilloanae*, *B. sect. Scandentes* and *B. sect. Stephananthus*) are here confirmed as new synonyms of *B. sect. Molinae*, since they are deeply embedded within the clade. *Baccharis* sect. *Stephananthus* is a peculiar inclusion in the section, since *B. juncea* and *B. juncea* subsp. *clavata* are subshrubs occurring in seashores or highland somewhat salty lakes and streams, and they present fleshy, 1-nerved, linear leaves, while their female capitula and corollas are in agreement with the remaining species of the section. *Baccharis famatinensis* was placed before in *B. subgen. Baccharis* sect. *Tucumanenses* (= *B. sect. Baccharis*), probably due to a misinterpretation of this name, since the species clearly belongs to *B. sect. Molinae*, but some specimens of *B. kurtziana* identified as *B. famatinensis* are found in herbaria. The section comprises 37 species occurring from southwestern USA to central Argentina and Chile, but two centres of diversity can be detected: one along the eastern slope of the Andes, the other along the mountain ranges of southeastern Brazil.

#### **Unplaced sections of *B. subgen. Molina***

**xiv. *Baccharis* sect. *Albidae*** Giuliano, Ann. Missouri Bot. 98(3): 334–335. 2011. —TYPE: *Baccharis albida* Hook. & Arn.

For a description of *Baccharis* sect. *Albidae* see Giuliano & Freire (2011). *Baccharis albida*, is the only species assigned to the section, occurring on marshes in northeastern Argentina. It is probably related to *B. sect. Molinae*. This supposition remains to be confirmed.

**xv. *Baccharis* sect. *Aristidentes*** G. L. Nesom, Phytologia 69(1): 42. 1990. —TYPE: *Baccharis multiflora* Kunth.

For a description of *Baccharis* sect. *Aristidentes* see Nesom (1990) and Giuliano & Nesom (2003). From the species assigned to this section by Nesom (1990) and Giuliano & Nesom, seven remain. They occur mostly in North America, except for *B. hirta* from Southeastern Brazil and Uruguay. However, the section seems to be related to *B. sect. Bogotenses*, and could be a synonym of the later, but these suppositions remain to be confirmed.

**xvi. *Baccharis* sect. *Gladiatae*** Cuatrec., Rev. Acad. Colomb. Ci. Exact. 13(49): 85. 1967. —TYPE: *Baccharis marcetiifolia* Benth.

For a description of *Baccharis* sect. *Gladiatae* see Cuatrecasas (1967). *Baccharis marcetiifolia* is the only species assigned to the section, occurring in the Andes from southern Colombia and Ecuador. It is probably related to *B. sect. Serrulatae*, but this supposition remains to be confirmed.

**xvii. *Baccharis* sect. *Pinnatae*** Cuatrec., Rev. Acad. Colomb. Ci. Exact. 13(49): 65. 1967. —TYPE: *Baccharis buddleioides* Kunth.

For a description of *Baccharis* sect. *Pinnatae* see Cuatrecasas (1967). *Baccharis buddleioides* was the only species originally assigned to the section, but *B. ayacuchensis* and *B. raulii* seems to be related to it and to each other. The section occurs in the northern Andes from Colombia to Ecuador. The species composition of the section and its putative close relationship to *B.* sect. *Serrulatae* and *B.* sect. *Molinae* remain to be confirmed.

**xviii. *Baccharis* sect. *Punctatae*** Giuliano & G. L. Nesom, Sida 20(4): 1481. 2003. —TYPE: *Baccharis bigelovii* A. Gray

For a description of *Baccharis* sect. *Punctatae* see Giuliano & Nesom (2003). The section comprises six North American species, from Mexico and southwestern USA. It is probably related to *B.* sect. *Bogotenses*. This supposition remains to be confirmed by further morphological and phylogenetic studies.

**xix. *Baccharis* sect. *Rodrigueziana*** Giuliano, Ann. Missouri Bot. 98(3): 341. 2011. —TYPE: *Baccharis rodriguezii* Ariza

For a description of *Baccharis* sect. *Rodrigueziana* see Giuliano & Freire (2011). *Baccharis rodriguezii*, is the only species assigned to the section, occurring in the prepuna vegetation in northwestern Argentina. It is probably related to *B.* sect. *Thymifoliae*. This supposition remains to be confirmed.

**xx. *Baccharis* sect. *Tenellae*** Giuliano, Ann. Missouri Bot. 98(3): 342. 2011. —TYPE: *Baccharis tenella* Hook. & Arn.

For a description of *Baccharis* sect. *Tenellae* see Giuliano & Freire (2011). *Baccharis tenella*, is the only species assigned to the section, occurring in central and southern Argentina. It is probably related to *B.* sect. *Pseudobaccharis*. This supposition remains to be confirmed.

**xxi. *Baccharis* sect. *Tubulatae*** Cuatrec., Rev. Acad. Colomb. Ci. Exact. 13(49): 82. 1967. —TYPE: *Baccharis grandiflora* Kunth.

For descriptions of *Baccharis* sect. *Tubulatae* see Cuatrecasas (1967), Giuliano & Nesom and Müller (2006) as “*B. grandiflora* group”. *Baccharis fraterna*, *B. granadina* and *B. klattii* (= *B. granadina*) were originally assigned to the section. Müller (2006) placed *B. argunta* (= *B. puchella*) in the “*B. grandiflora* group”, but this species is placed in *B.* sect. *Angustifoliae*. Increasing the sampling of representatives of *B.* sect. *Tubulatae* and further morphological studies are necessary to confirm the current taxa assigned to this section. The species belonging to the section occur mostly in the northern Andes, mainly between Peru and Venezuela.

**V. *Baccharis* subgen. *Heterothalamulopsis*** (Deble et al.) G. Heiden, *comb. et stat. nov.* Basionym: *Heterothalamulopsis* Deble, A.S.Oliveira & Marchiori, Ci. Florest. (Santa Maria) 14(1): 1. 2004. —TYPE: *Heterothalamulopsis wagenitzii* (F.H.Hellw.) Deble, A.S.Oliveira & Marchiori [= *Baccharis wagenitzii* (F.H.Hellw.) Joch.Müll.].

*Baccharis* subgen. *Heterothalamulopsis* is characterized by the capitula borne in terminal glomerules, pistilodium apex of male florets with short ovate branches, paleate female capitula and female florets bearing apically rayed corollas.

Hellwig (2003) described *Heterothalamus wagenitzii* as a dioecious species belonging to a gynodioecious group of Baccharidinae. Later, Deble et al. (2004) segregated *Heterothalamulopsis* as a monospecific genus distinct of *Heterothalamus* based on its dioecy. Müller (2006) synonymized *Heterothalamus* in *Baccharis* arguing that sexual expression does not justify the segregation of genera within Baccharidinae, and provided the new combination *B. wagenitzii* (F.H. Hellw.) Joch. Müll. including this species with the dioecious *B. boliviensis* (Wedd.) Cabrera, originally described in *Heterothalamus*, plus the gynodioecious species *B. aliena* and *B. psiadioides* in the “*Heterothalamus* group”. Giuliano & Freire (2011) provided the new combination and status *Baccharis* sect. *Heterothalamus* including the same species of Müller (2006) plus *B. hyemalis* Deble (= *Heterothalamus rupestris* Deble et al.). The available phylogenetic data demonstrate that the three gynodioecious species described in *Heterothalamus* are close related to each other and belong to *B.* subgen. *Heterothalamus* sect. *Heterothalamus*, while the two dioecious species describe in *Heterothalamus* are not close related to this lineage. *Baccharis boliviensis* belongs to *B.* subgen. *Molina* sect. *Pseudobaccharis*, while *B. wagenitzii* occupies a conflicting position when comparing the nuclear phylogeny (Fig. S1.Part2, sister to *B.* sect. *Pseudobaccharis*) and the all molecular data phylogeny (Fig. 4, an isolated lineage sister with strong support to the weakly supported clade *B.* subgen. *Coridifolia* + *B.* subgen. *Baccharis*). Due its intriguing and conflicting phylogenetic position, the new combinations and statuses *B.* subgen. *Heterothalamulopsis* sect. *Heterothalamulopsis* are provided to accommodate this species. Thus, *B.* sect. *Heterothalamulopsis* is the only known section to belong to the subgenus and *B. wagenitzii*, a rupicolous shrub found in basaltic cliffs in southern Brazil, is the only species know belonging to this isolated and intriguing lineage.

**Section assigned to *Baccharis* subgen. *Heterothalamulopsis*:**

**I. *Baccharis* sect. *Heterothalamulopsis*** (Deble et al.) G. Heiden, *comb. et stat. nov.* Basionym: *Heterothalamulopsis* Deble, A.S.Oliveira & Marchiori, Ci. Florest. (Santa Maria) 14(1): 1. 2004. —TYPE: *Heterothalamulopsis wagenitzii* (F.H.Hellw.) Deble, A.S.Oliveira & Marchiori [*Baccharis wagenitzii* (F.H.Hellw.) Joch.Müll.].

A monospecific section, as stated above.

**VI. *Baccharis* subgen. *Coridifolia*** (DC.) G. Heiden, *stat. nov.* Basionym: *Baccharis* sect. *Coridifoliae* Giuliano, Ann. Missouri Bot. 98(3): 339. 2011. —Type: *Baccharis coridifolia* DC.

*Baccharis* subgen. *Coridifolia* can be recognized by the usually linear leaves, capitulescences paniculate or racemose, pistilodium of male florets with short ovate branches, broad corollas of female florets with five papillose teeth and a short style, and cypselae with twin trichomes.

The lack of the tufted indumentum and common occurrence of an indumentum of filiform trichomes is one of the main reasons why the species of *Baccharis* sect. *Coridifoliae* Giuliano have been traditionally assigned to *B.* subgen. *Tarchonanthoides*. However, our phylogenetic analyses showed that *B.* sect. *Coridifoliae* is not close related to the clade containing the type species of *B.* subgen. *Tarchonanthoides*, being instead the sister-group (with weak support - Fig. 4) of a newly recircumscribed *B.* subgen. *Baccharis*. It is now evident that the absence of tufted indumentum is a homoplasy within *Baccharis* and cannot be taken into account alone to circumscribe monophyletic taxa. *Baccharis* sect. *Coridifoliae* Giuliano is not closely related to *B.* subgen. *Tarchonanthoides* fide Müller (2006). Consequently, the section is here removed from *B.* subgen. *Tarchonanthoides* to keep it monophyletic, and due to its position in the phylogeny and morphological distinctiveness, it is given rank of subgenus.

*Baccharis* subgen. *Coridifolia* comprises two sections and ten species occurring in moist or dry grasslands and savannahs from Bolivia and central Brazil, south to central Argentina.

#### **Sections assigned to *Baccharis* subgen. *Coridifolia*:**

**i. *Baccharis* sect. *Pluricephalae*** (Deble) G. Heiden, *comb. et stat. nov.* Basionym: *Lanugothamnus* sect. *Pluricephalae* Deble, Balduinia 37: 15. 2013. —TYPE: *Lanugothamnus scabrifolius* (G. Heiden) Deble [= *Baccharis scabrifolia* G. Heiden].

*Baccharis* sect. *Pluricephalae* (Fig. 4) is characterized by the shrubby habit and the uniseriate pappus of female florets not accrescent at maturity. It comprises two narrow endemic species from southern Brazil, occurring in highland marshes and peat bogs.

**ii. *Baccharis* sect. *Coridifoliae*** Giuliano, Ann. Missouri Bot. 98(3): 339. 2011.—TYPE: *Baccharis coridifolia* DC.

*Lanugothamnus* subgen. *Toxicothamnus* Deble, Balduinia 37: 14. 2012. *Lanugothamnus* sect. *Toxicothamnus* Deble, Balduinia 37: 14. 2012. —TYPE: *Lanugothamnus montevidensis* (Spreng.) Deble [= *Baccharis coridifolia* DC.]. **Syn. nov.**

*Baccharis* sect. *Coridifoliae* (Fig. 4) is characterized by the subshrubby habit with common presence of lignotubers or rhizomes, and by the pluriseriate pappus of female florets strongly accrescent at maturity. It comprises eight species occurring in grasslands and savannahs from Bolivia and central Brazil, south to central Argentina.

## VII. *Baccharis* subgen. *Baccharis*.

*Baccharis* subgen. *Baccharis* can be recognized by the male florets with pistilodium apex bearing sweeping hairs distinctly longer than the basal and terminal ones, corollas of female florets without a subapical wreath of trichomes, mostly deciduous pappus of female florets and cypselae glabrous,  $\geq 5$ -ribbed.

The subgenus concept is broadened in the current work to include *Baccharis* sect. *Caulopterae* and *B.* sect. *Aphyllae*, formerly placed in *B.* subgen. *Molina* and now recognized as sister early divergent lineages of the core of *B.* subgen. *Baccharis* (Fig. 5, 6, 7, 8). The glabrous cypselae is a putative synapomorphy of an expanded *B.* subgen. *Baccharis*, and the search for additional synapomorphies to characterize the subgenus is highly desirable. Müller (2006) circumscribed *B.* subgen. *Baccharis* on the basis of the pistilodium apex of male florets with the median sweeping hairs distinctly longer than the basal and terminal ones and the deciduous pappus of female florets. The characters used by Müller (2006) to circumscribe *B.* subgen. *Baccharis* are still useful to recognize the species of the core of the subgenus.

Some species within *Baccharis* subgen. *Baccharis* are still placed in *incertae sedis* sections or do not have any hypothesis of relationships to any of the remaining species of the subgenus. Expanding the sampling within *B.* subgen. *Baccharis* focusing on the remaining type species of sections and unplaced species is necessary to solve some nomenclatural questions, and to resolve polytomies retrieved in the core of the subgenus. There are distinct centers of species richness of *B.* subgen. *Baccharis*, in North America, the Caribbean islands, the Andes, Patagonia and eastern Brazil, and reducing the geographical bias of sampling is also desirable to achieve a better understanding of the subgenus infrageneric relationships. Future analyses based on increased sampling shall recover a better topology and will allow recircumscription and reduction of the number of monophyletic sections presently accepted. As currently defined, *B.* subgen. *Baccharis* comprises 17 sections (Fig. 5) and 238 species, occurring from southeastern Canada to southern South America.

### Sections assigned to *Baccharis* subgen. *Baccharis*:

i. *Baccharis* sect. *Caulopterae* DC., Prodr. 5: 424. 1836. —TYPE: *Baccharis genistelloides* (Lam.) Pers.

*Baccharis* sect. *Caulopterae* (Fig. 6) comprises subshrubs with winged stems, leaves generally reduced to scales, female florets with glabrous short-rayed corollas and 12–20-ribbed cypselae. The section composition is now greatly modified in relation to its traditional circumscription. Our phylogenetic analyses shows that the winged stems, the leaves reduced to scales and the female florets with glabrous short-rayed corollas are homoplastic characters shared with *B.* sect. *Aphyllae*, and only the number of ribs of the cypselae is a probable synapomorphy of this group. The section comprises 14 species occurring from Colombia to central Argentina, with the greatest diversity in southeastern and southern Brazil.

ii. ***Baccharis* sect. *Aphyllae*** Baker in Mart., Flora Brasiliensis 6(3): 45. 1882. —TYPE: *Baccharis aphylla* (Vell.) DC.

*Baccharis* sect. *Megapotamicae* Giuliano, Ann. Missouri Bot. 98(3): 338. 2011. —TYPE: *Baccharis megapotamica* Spreng. ***Syn. nov.***

*Baccharis* sect. *Aphyllae* (Fig. 6) comprises shrubs and subshrubs bearing female florets with glabrous short-rayed, truncate or denticulate corollas and 5–10-ribbed cypselae, although these characters are also found outside the group. The section as emerged in our phylogenetic study is hardly characterized vegetatively and no synapomorphies are known yet. Contrary to the type species *B. aphylla*, most representatives of the section have winged or at least striate stems and developed leaves. The section composition is here enlarged to include either several species with winged stems previously placed in *B. sect. Caulopterae* as wingless species that were thought to be closely related to species with alate stems and placed in that same section. Further morphological studies to better differentiate and characterize *B. sect. Aphyllae* and *B. sect. Caulopterae* are required. Giuliano & Freire (2011) described *B. sect. Megapotamicae* to include only *B. megapotamica*, discussing the close relationship of this species with the ones placed in *B. sect. Caulopterae*. *Baccharis megapotamica* and the similar *B. weiri*, both with striate stems and habitat in marshes or peat bogs, were now recovered as sister species nested in a clade of winged species typical from similar swampy habitats. The section comprises 33 species found along a diverse array of habitats, from sand dunes and dry grasslands to edges of forests and swampy environments, reaching its greatest diversity in southern Brazil, but with many endemic taxa in marginal areas of distribution like Bolivia, Peru and Argentinean Patagonia.

iii. ***Baccharis* sect. *Agglomeratae*** Giuliano, Novon 15(4): 535. 2005. —TYPE: *Baccharis platypoda* DC.

*Baccharis* sect. *Agglomeratae* (Fig. 7) comprises shrubs with generally resinous and serrate leaves, but it is a group difficult to characterize vegetatively, since these characters are common outside the section. Capitula arrangement varies greatly from solitary capitula to dense glomerules and secondary heads. *Baccharis* sect. *Agglomeratae* was defined by Giuliano (2005) on the bases of the congested dimorphic capitulescences of *B. platypoda*, which was the only species included in the section since *B. condensata* is a synonym of the former. As *B. platypoda* nested in a clade composed by several species previously assigned to *B. sect. Cylindricae*, but not related to it, the name *B. sect. Agglomeratae* has to be applied to the section, although a probable synapomorphy for this clade is still unknown. Secondary heads are also found in *B. itatiaiae* within the section, but this species is not the most closely related to *B. platypoda*. The section comprises 34 species with a high level of diversity and endemisms in southeastern Brazil, mainly in the tropical savannahs, *campos rupestres* and tropical high altitude grasslands, with some species reaching the subtropical highland grasslands from southern Brazil, while *B. platypoda* has a disjunct distribution occurring in the eastern slope of the



Andes close to the Bolivian and Peruvian border and along the main mountain chains of southeastern Brazil.

**iv. *Baccharis* sect. *Axillares*** (Giuliano) G. Heiden, *stat. nov.* Basionym: *Baccharis* ser. *Axillares* Giuliano, *Novon* 15(4): 538–539. 2005. —TYPE: *Baccharis axillaris* DC.

*Baccharis* sect. *Axillares* (Fig. 7) comprises shrubs and subshrubs with solitary pauciflorous capitula in leaf axils, generally disposed in leafy racemes or panicles of leafy racemes, except for *B. umbellata* that have an umbelliform capitulescence. *Baccharis axillaris* was not sampled in the phylogeny, but it is morphologically close related to *B. cultrata*, *B. incisa* and *B. axillaris* var. *dentata*. The section was originally described as a series subordinated to *B.* sect. *Cylindricae* by Giuliano (2005), but our phylogenetic data show that these taxa belong to unrelated lineages, and hence the new status is here proposed. The section differs somewhat from Giuliano's original proposition, since some species are repositioned in the expanded *B.* sect. *Agglomeratae*. *Baccharis* sect. *Axillares* is a lineage comprising fourteen species that diversified on the high altitude tropical and subtropical grasslands and on the low altitude temperate grasslands from Brazil and Uruguay.

**v. *Baccharis* sect. *Cuneifoliae*** DC., *Prodr.* 5: 405. 1836. —TYPE: *Baccharis cuneifolia* (Lam.) DC. [= *Baccharis patagonica* Hook. & Arn.].

*Baccharis* sect. *Macrophyllae* Heering, *Flora de Chile* 4: 16. 1904. —TYPE: *Baccharis elaeoides* Remy.

*Baccharis* sect. *Microphyllae* Heering, *Flora de Chile* 4: 17. 1904. —TYPE: *Baccharis patagonica* Hook. & Arn.

*Baccharis* sect. *Cuneifoliae* (Fig. 7) is characterized by shrubs bearing leaves usually small, with capitula solitary in the apex of branches, subtended by a leafy pseudoinvolucre. The section comprises 14 species, all occurring in Argentinean and Chilean Patagonia.

**vi. *Baccharis* sect. *Illinitae*** G. Heiden, *sect. nov.* —TYPE: *Baccharis illinita* DC.

*Baccharis* sect. *Illinitae* comprises xylopodiferous subshrubs with subopposite, 3-nerved and toothed leaves, differing from *B.* sect. *Tridentatae* by the paniculate capitulescences (vs. capitulescences in corymbose or spike-like racemes).

The species included in *B.* sect. *Illinita* (Fig. 8) were previously assigned to *B.* sect. *Tridentatae* by Giuliano (2005). *Baccharis* sect. *Illinitae* comprises two species of moist or flooded grasslands from southern and central Brazil and eastern Paraguay.

vii. *Baccharis* sect. *Racemosae* Ariza, Bol. Acad. Nac. Ci. 50(1-4): 183. 1973. —TYPE: *Baccharis dracunculifolia* DC.

*Baccharis* sect. *Lanuginosae* Giuliano, Novon 15(4): 540. 2005. —TYPE: *Baccharis calvescens* DC.  
*Syn. nov.*

*Baccharis* sect. *Racemosae* (Fig. 8) is composed by aromatic shrubs or trees with solitary, axillary capitula, generally disposed in leafy racemes or panicles of racemes, except for *B. amambayensis* and *B. rivularis*, which have capitula in axillary leafless racemes or spikes, subtended by a leaf. The uniseriate trichomes with the terminal cell bifurcated once or several times is probably a synapomorphy of the section. The section comprises nine species, most of them occurring in northeastern Argentina, southeastern Brazil, eastern Paraguay and Uruguay in grasslands, forests and savannahs. *Baccharis dracunculifolia* has a wider distribution and is also recorded to the Bolivian Andes.

viii. *Baccharis* sect. *Tridentatae* Giuliano, Novon 15(4): 137. 2001. —TYPE: *Baccharis tridentata* Vahl.

*Baccharis* ser. *Hirsutae* Giuliano, Novon 15(4): 540. 2005. —TYPE: *Baccharis muelleri* Baker [= *Baccharis urvilleana* Brongn.]. *Syn. nov.*

*Baccharis* sect. *Spicatae* Giuliano, Ann. Missouri Bot. 98(3): 333. 2011. —TYPE: *Baccharis spicata* (Lam.) Baill. *Syn. nov.*

*Baccharis* sect. *Tridentatae* (Fig. 8) comprises treelets, shrubs or xylopodiferous subshrubs with opposite leaves (subopposite in *B. caprariifolia*), producing capitulescences in corymbose or spike-like racemes. *Baccharis caprariifolia*, *B. nummularia*, *B. spicata* and *B. urvilleana* are added to the section, while *B. illinita* and *B. illinitoides* are transferred to the new *B. sect. Illinitae*. *Baccharis* sect. *Spicatae* was described by Giuliano & Freire (2011) to include only *B. spicata*, which is embedded within the clade of *B. sect. Tridentatae* and thus considered as a new synonym of the expanded *B. sect. Tridentatae*. This section comprises six species occurring from Bolivia and southeastern Brazil south to Eastern Argentina, with most of the species occurring in southern Brazil.

ix. *Baccharis* sect. *Caespitosae* Giuliano, Ann. Missouri Bot. 98(3): 332. 2011. —TYPE: *Molina caespitosa* Ruiz & Pav. [= *Baccharis caespitosa* (Ruiz & Pav.) Pers.].

For descriptions of the two subclades of *B. caespitosae* see Giuliano & Freire (2011) and Müller (2006) as “*B. caespitosa* group” and partially “*B. phyllicoides*” group. *Baccharis* sect. *Caespitosae* (Fig. 8) was circumscribed by Giuliano comprising the same species of the “*B. caespitosa* group” of Müller (2006). In the current phylogeny, the “*B. caespitosa* group” is sister to a clade composed by *B. buchtienii*, which is nested within the taxa lumped into *B. papillosa*. Müller (2006) positioned the taxa of *B. papillosa* s.l. in the “*B. phyllicoides* group”. *Baccharis phyllicoides* is the type species of *B. sect. Discolores*, not sampled in the current analysis. The taxa of *B. papillosa* and *B. buchtienii* are

provisionally considered as part of *B. sect. Caespitosae*, though a morphological characterization of the group is not yet achieved. If *B. phylloides* belongs to the same clade of the taxa of *B. pappilosa*; as suggested by Müller (2006) the name *B. sect. Discolores* has priority upon *B. sect. Caespitosae* or the species of *B. pappilosa* have to be assigned to *B. sect. Discolores*, for the sake of better morphological characterization of these groups. As currently recognized, *B. sect. Caespitosae* comprises 20 taxa accepted.

**x. *Baccharis* sect. *Baccharis*.**

*Baccharis* sect. *Sergilae* DC., Prodr. 5: 424. 1836. —TYPE: *Baccharis scoparia* (L.) Pers.

*Baccharis* sect. *Involucratae* Heering, Jahrb. Hamburg. Wiss. Anst. 21(3): 17. 1904. —TYPE: *Baccharis conferta* Kunth.

*Baccharis* sect. *Glomeruliflorae* Heering, Jahrb. Hamburg. Wiss. Anst. 21(3): 32. 1904. —TYPE: *Baccharis glomeruliflora* Pers.

*Baccharis* sect. *Tucumanenses* Giuliano, Ann. Missouri Bot. 98(3): 334. 2011. —TYPE: *Baccharis tucumanensis* Hook. & Arn. **Syn nov.**

*Baccharis* sect. *Baccharis* (Fig. 8) is characterized by shrubs or treelets with capitula in axillary or terminal glomerules. The section lacks a better characterization and morphological studies looking for synapomorphies are encouraged. Species in the section show a wide array of variation, from broom-like shrubs with leaves reduced to scales to leafy treelets. Within the section, South American *B. notosergila* is sister to the clade of North American and Caribbean species while the remaining South American species are grouped in another sister clade which contains *B. tucumanensis*, the type species of *B. sect. Tucumanenses*, which is synonymized to *B. sect. Baccharis* here. The section comprises 23 species, most of them from North America and the Caribbean.

**xi. *Baccharis* sect. *Andina* G. Heiden, *sect. nov.* —TYPE: *Baccharis lehmannii* Klatt.**

*Baccharis* sect. *Andina* is characterized by shrubs or treelets with capitula in terminal glomerules or secondary capitula and differs from *B. sect. Agglomeratae* by capitula with 20–115 florets (vs. 3–15).

A group of species from the Páramos of Northern Andes emerged as a monophyletic group in the current analyses (Fig. 8). Some of these species were included by Cuatrecasas (1967) in *B. sect. Involucratae*, whose type is *B. conferta*, a species belonging to *B. sect. Baccharis*, while *B. tricuneata* was considered in *B. sect. Cuneifoliae*, a not closely related section of species with solitary capitula occurring in Patagonia. *Baccharis* sect. *Andina* comprises 15 species of shrubs and treelets occurring mostly in subpáramo and páramos from northern Andes, from Venezuela to Ecuador.

**xii. *Baccharis* sect. *Nitidae*** Cuatrec., Rev. Acad. Colomb. Ci. Exact. 13(49): 70. 1967. *Baccharis* ser. *Nitidae* (Cuatrec.) Giuliano —TYPE: *Baccharis nitida* (Ruiz & Pav.) Pers.

*Baccharis* sect. *Nitidae* (Fig. 8) is characterized by shrubs with pinnately veined leaves and capitula borne in generally axillary, sometimes terminal, racemes or corymbs, male capitula with pistilodium apex slightly capitate, and female florets with strongly accrescent pappus. The section comprises four species occurring along the edges of tropical rainforests, in the Atlantic Rainforest of Brazil or in the Yungas from northern Andes.

**xiii. *Baccharis* sect. *Cylindrica*** Heering, Flora de Chile 4: 16. 1903. *Baccharis* ser. *Cylindrica* (Heering) Giuliano, Novon 15(4): 539. 2005. —TYPE: *Baccharis santiagensis* Heering.

*Baccharis* sect. *Cylindrica* (Fig. 8) is characterized by shrubs or xylopodiferous subshrubs with capitula arranged in leafy glomerules usually disposed in racemes. There was a sharp contrast on the number of species considered within the section: Müller (2006) accepted only four species of the section in his “*B. linearifolia* group”, while Giuliano (2005) considered 31 taxa comprising the species included in *B. ser. Cylindrica*. Our phylogenetic analyses support acceptance of 25 taxa within *B. sect. Cylindrica*, which is a widespread group in South America with the highest diversity in the grasslands and savannahs from Argentina, Brazil and Uruguay.

#### **Unplaced sections of *B. subgen. Baccharis***

**xiv. *Baccharis* sect. *Discolores*** DC., Prodr. 5: 414. 1836. —TYPE: *Baccharis phyllicoides* Kunth.

For a description of *Baccharis* sect. *Discolores* see Müller (2006) in “*B. phyllicoides* group”. Currently the section comprises uniquely *B. phyllicoides*, occurring along the Andes from Ecuador to Bolivia. The type species of the section could be closely related to *B. sect. Caespitosae*; in this case, the name *B. sect. Discolores* has priority over *B. sect. Caespitosae*. However, the close relationships of these two sections should be evaluated by further morphological studies and sampling of *B. phyllicoides* in future phylogenetic analyses.

**xv. *Baccharis* sect. *Divaricatae*** Giuliano, Ann. Missouri Bot. 98(3): 335. 2011. —TYPE: *Baccharis divaricata* Hauman.

For a description of *B. sect. Divaricatae* see Giuliano & Freire (2011). *Baccharis divaricata* is the only species assigned to the section, occurring in coastal dunes from Argentinean Patagonia. It was assigned to *B. subgen. Molina* by Giuliano & Freire (2011) and Müller (2006). It is now transferred to *B. subgen. Baccharis*, since *B. divaricata* is probably related to *B. sect. Aphyllae*. This supposition remains to be confirmed.

**xvi. *Baccharis* sect. *Frenguellianae*** Giuliano, Ann. Missouri Bot. 98(3): 332–333. 2011. —TYPE: *Baccharis frenguellii* Cabrera.

For a description of *Baccharis* sect. *Frenguellianae* see Giuliano & Freire (2011). *Baccharis frenguellii* is the only species assigned to the section, occurring on riverine vegetation in northeastern Argentina and Paraguay. It is probably related to *B.* sect. *Cylindricae*, but this supposition remains to be confirmed.

**xvii. *Baccharis* sect. *Pedicellatae*** Heering, Flora de Chile 4: 16. 1904. —TYPE: *Baccharis lycioides* Remy.

For a description of *Baccharis* sect. *Pedicellatae* see Heering (1904). The composition of this section remains relatively the same since its original description, and it comprises seven close related taxa occurring in Chile.

**Towards a phylogenetic infrageneric classification of *Baccharis*.** — Table 1 presents a list of all taxa accepted at species level within *Baccharis* according to their position in the more inclusive infrageneric category fide the data presently available. This is the first attempt to classify all the taxa accepted in the genus at subgeneric and sectional ranks based on phylogenetic evidence.

Seven subgenera and 47 sections are recognized, from 13 subgenera and 69 sections names existing (though type species of 12 subgenera names and type species of 51 sections names were sampled). This demonstrates that at least six subgeneric concepts and 22 sections were redundant. Series are not considered in the current treatment, since this would require an almost fully sampling of *Baccharis* to a better assessment of the concepts of the 13 series that have been described so far. Considering only the currently 47 accepted sections, 35 of them were sampled in the phylogeny, while 12 sections were not sampled yet, but could be provisionally assigned to a subgenus based on morphological evidence. While the decrease in number of infrageneric taxa now accepted reflects a better understanding concerning infrageneric and specific relationships within *Baccharis*, the high number of sections still remaining is in part due to the persistence of a partially poor knowledge of the relationships of several groups and species within the genus. It is expected that the increasing of sampling for the next phylogenetic analyses and complementary morphological studies will result in a better understanding of sectional relationships mainly within *B.* subgen. *Baccharis* and *B.* subgen. *Molina* leading to broader sectional concepts in the near future, reducing the number of accepted sections within these subgenera.

Currently, from the 433 accepted species, 432 are assigned to subgenera, while 362 are assigned to sections covered at least partially by the phylogenetic analyses; 37 species are assigned to sections not sampled in the phylogeny (four unplaced sections of unclear relationships comprising ten taxa accepted as species within *B.* subgen. *Baccharis* and eight unplaced sections of unclear relationships comprising 27 taxa accepted as species within *B.* subgen. *Molina*), and 33 species remain as *incertae*

*sedis* since they could not be assigned to any section (15 in *B.* subgen. *Baccharis* and 18 in *B.* subgen. *Molina*). Only one species (*B. asperula* S. Schauer) was not assigned to any subgenus because we were not able so far to access neither its protologue nor specimens referring to this species. Anyway, any taxon not sampled in the current phylogenetic study has a pending infrageneric position to be confirmed in future approaches with expanded samplings.

#### ACKNOWLEDGEMENTS

GH acknowledges FAPESP (processes 2010/00519-8, 2011/18385-0 and 2012/17911-3), IAPT Research Grants in Plant Systematics 2010, and the Smithsonian Institution's 2011 Cuatrecasas Fellowship Award for providing financial support. JRP is supported by a CNPq research grant. Authors are grateful to Ana Claudia Fernandes, Benoît Loeuille, Carolina M. Siniscalchi, Caetano Troncoso Oliveira, Carol Kellof, Fabio Ávila, G. Felitto, Gisela Sancho, Mauricio Bonifacino, Mélica Muñoz-Schick, Paulo Takeo Sano, Vanessa Rivera, and Vicki Funk for providing additional samples for DNA extraction. We also thanks Benoît Loeuille, Carolina Moriani Siniscalchi, Caetano Troncoso Oliveira, Cíntia Luz, Clarisse Bolfe Poliquesi, Guilherme Heiden, João Iganci, Joel Morais da Silva, Joel Vaz, Mariana Bünger, Osmar dos Santos Ribas, Rosa Lía Barbieri, Vanessa Leite Rezende for helping with fieldworks in Brazil; Gisela Sancho and Santiago Catalano for helping with fieldworks in Argentina; Christine Bacon, Daniel Mauricio Diaz Rueda, Fabio Ávila, Jose Aguilar Cano, Juan Carlos Copete Maturana and Mauricio Diazgranados for helping with research logistics in Colombia; and José Mauricio Bonifacino from Universidad de la República for helping with fieldwork in Uruguay.

#### LITERATURE CITED

- Barroso, G.M.** 1976. Compositae, Subtribo Baccharidinae Hoffmann. Estudo das espécies ocorrentes no Brasil. *Rodriguésia* 28: 3-273.
- Brouillet, L.; Lowrey, T.K.; Urbatsch, L. ; Karaman-Castro, V.; Sancho, G.; Wagstaff, S.; Semple, J.C.** 2009. Astereae. In: V.A. Funk,; A. Susana; T.F. Stuessy; R.J. Bayer (eds.). Systematics, Evolution, and Biogeography of Compositae. Vienna, Austria: International Association for Plant Taxonomy (IAPT). Pp. 587-629.
- Candolle, A.P. de.** 1836. *Prodromus systematis naturalis regni vegetabilis*. 5 - Sistens Calycereas et Compositarum tribus priores. Treuttel & Würtz, Paris.
- Cuatrecasas, J.** 1967. Revisión de las especies Colombianas del género *Baccharis*. *Revista de la Academia Colombiana de Ciencias Exactas, Físicas y Naturales* 13: 5–102.
- Darriba D; Taboada, G.L.; Doallo, R. & Posada D.** 2012. "jModelTest 2: more models, new heuristics and parallel computing". *Nature Methods* 9(8), 772.
- Deble, L.P.; Oliveira, A.S. & Marchiori, J.N.** 2004. *Heterothalamulopsis*, gênero novo da

- subtribe Baccharinae Lessing (Astereae-Asteraceae). *Ciência Florestal* 14(1): 1–7.
- Deble, L.P.** 2012. Studies in Baccharidinae (Asteraceae: Astereae). I: *Lanugothamnus* a new genus from South America. *Balduinia* 37: 2–25.
- Downie, S.R. & Katz-Downie, D.S.** 1996. A molecular phylogeny of Apiaceae subfamily Apioideae: evidence from nuclear ribosomal DNA internal transcribed spacer sequences. *American Journal of Botany* 83: 234-251.
- Fielding, R.R.** 2001. *Baccharis*: a genus of the Asteraceae new to Canada. *Proceedings of the Nova Scotian Institute of Science* 41(4): 214-215.
- Giuliano, D.** 2001. Clasificación infragenérica de las especies Argentinas de *Baccharis* (Asteraceae, Astereae). *Darwiniana* 39: 131-154.
- Giuliano, D.** 2005. New Infragenera in *Baccharis* (Asteraceae, Astereae). *Novon* 15(4): 539.
- Giuliano, D.A. & Freire, S. E.** 2011. Nuevas secciones en *Baccharis* (Asteraceae, Astereae) de América Del Sur. *Annals of the Missouri Botanical Garden* 98: 331–347.
- Giuliano, D. & Nesom, G.** 2003. A new section of *Baccharis* (Asteraceae: Astereae), and notes on allied taxa. *Sida* 20: 1481-1484.
- Heering, W.** 1904a. Über einige Arten der Gattung *Baccharis* besonders des Kieler Herbars. *Schriften Naturwissenschaften Vereins Schleswig-Holstein* 13: 39-55.
- Heering, W.** 1904b. Die *Baccharis*-Arten des Hamburger Herbars. *Jahrbuch der Hamburgischen Wissenschaftlichen Anstalten* 21: 1-46.
- Heering, W.** 1905. *Baccharis* L. In: Reiche, C. Estudios críticos sobre la flora de Chile. *Anales de la Universidad de Chile* 111: 151-196.
- Hellwig, F.** 1993. The genera *Pingraea* Cassini and *Neomolina* Hellwig (Compositae-Astereae). *Candollea* 48: 203-219.
- Hellwig, F.** 1996. Taxonomy and evolution of Baccharidinae (Compositae). Vol. 1, pp. 575-590. In: D.J.N. Hind.,; H.J. Beentje (eds.). *Compositae: systematics*. Royal Botanic Gardens, Kew.
- Huelsenbeck, J.P. & Ronquist, F.** 2001. MrBayes: Bayesian inference of phylogenetic trees. *Bioinformatics* 17: 754-755.
- Jackson, J.D.** 1975. A revision of the genus *Archibaccharis* Heering (Compositae-Astereae). *Phytologia* 32: 81-194.
- Karaman–Castro, V. & Urbatsch, L.** 2009. Phylogeny of *Hinterhubera* Group and Related Genera (Hinterhuberinae: Astereae) based on the nrDNA ITS and ETS Sequences. *Systematic Botany* 34(4): 805-817.
- Katoh, K. & Toh, H.** 2008. Recent developments in the MAFFT multiple sequence alignment program. *Briefings in Bioinformatics* 9: 286-298.

- Linder, C.R.; Goertzen, L.R.; Van den Heuvel, B.; Francisco-Ortega, J. & Jansen, R. K.** 2000. The complete external transcribed spacer of 18S-26S rDNA: amplification and phylogenetic utility at low taxonomic levels in Asteraceae and closely allied families. *Molecular Phylogenetics and Evolution* 14:285-303
- Malagarriga Heras, R.P.** [1976] 1977. Nomenclator baccharidinarum omnium. *Memórias da Sociedade de Ciências Naturais La Salle* 37: 129-224.
- Miller, M.A.; Pfeiffer, W. & Schwartz, T.** 2010. "Creating the CIPRES Science Gateway for inference of large phylogenetic trees" in Proceedings of the Gateway Computing Environments Workshop (GCE), 14 Nov. 2010, New Orleans, LA pp 1 - 8.
- Müller, J.** 2006. Systematics of *Baccharis* (Compositae- Astereae) in Bolivia, including an overview of the genus. *Systematic Botany Monographs* 76: 1-341.
- Müller, J.** 2010. World checklist of *Baccharis* L. (Compositae–Astereae). Version 2010-04-19. Available from: <http://www2.uni-jena.de/biologie/spezbot/herbar/Baccharis.htm>.
- Müller, J.** 2013. World checklist of *Baccharis* L. (Compositae–Astereae). Version 2013-09-03. Available from: <http://www.spezbot.uni-jena.de/wp-content/uploads/2013/09/World-checklist-of-Baccharis-L..pdf>.
- Nesom, G.L.** 1988. *Baccharis* sect. *Baccharidastrum* (Compositae: Astereae), including two monoecious and one dioecious species. *Phytologia* 65 (3):169-173.
- Nesom, G.L.** 1990. Infrageneric taxonomy of North and Central American *Baccharis* (Asteraceae: Astereae). *Phytologia* 68(6): 40-46.
- Nesom, G.L.; Robinson, H.** [2006] 2007. XV. Tribe Astereae Cass. In: Kedereit, J.W.; Jeffrey, C. *The families and genera of vascular plants* (K. Kubitzki), Vol. VIII. Flowering plants: Eudicots: Asterales. Springer, Berlin, pp. 284-342.
- Sancho, G. & Karaman-Castro, V.** 2008. A phylogenetic study in american Podocominae (Asteraceae) based on morphological and molecular data. *Systematic Botany* 33: 762-775.
- Shaw, J.; Lickey, E.B.; Beck, J.T.; Farmer, S.B.; Liu, W.; Miller, J.; Siripun, K.C.; Winder, C.T.; Schilling, E.E. & Small, R.L.** 2005. The tortoise and the hare II: relative utility of 21 noncoding chloroplast DNA sequences for phylogenetic analysis. *American Journal of Botany* 92: 142–166.
- Taberlet, P. ; Gielly, L.; Pautou, G. & Bouvet, J.** 1991. Universal primers for amplification of three non-coding regions of chloroplast DNA. *Plant Molecular Biology* 17(5): 1105.
- Wilgenbusch, J.C.; Warren, D.L. & Swofford, D.L.** 2004. AWTY: A system for graphical exploration of MCMC convergence in Bayesian phylogenetic inference. <http://ceb.csit.fsu.edu/awty>.



**White, T.J.; Bruns, T.; Lee, S. & Taylor, J.** 1990. Amplification and direct sequencing of fungal ribosomal RNA genes for phylogenetics. Pp. 315-322. In: Innics, M.; Glfand, D.; Sninsky, J. & White, T.J. (eds), *PCR protocols: a guide to methods and applications*. San Diego: Academic Press.

**Zanowiak, D.J.** 1991. *An analysis of systematic and phyletic relationships within the Baccharidinae (Asteraceae: Astereae)*. Tese de doutorado. Texas A&M University, 82p.



**Table 1. Part 1.** Summary of subgenera, sections and taxa accepted at the rank of species following the new infrageneric classification of *Baccharis*. Numbers outside brackets are total number of taxa accepted per category, numbers within brackets are sampled taxa.

<b>Taxon</b>	<b>Subgen.</b>	<b>Sections</b>	<b>Species</b>
<b><i>Baccharis</i> L.</b>	<b>7 (7)</b>	<b>47 (35)</b>	<b>433 (248)</b>
<b>I. Subgen. <i>Tarchonanthoides</i> Heering</b>		<b>2 (2)</b>	<b>13 (13)</b>
<b>i. Sect. <i>Tarchonanthoides</i> (Heering) Cuatrec.</b>			<b>6 (6)</b>
<i>B. chionolaenoides</i> D. B. Falkenb. & Deble			(1)
<i>B. curitybensis</i> Heering ex Malme			(1)
<i>B. lychnophora</i> Gardner			(1)
<i>B. nebularis</i> G. Heiden			(1)
<i>B. patens</i> Baker			(1)
<i>B. tarchonanthoides</i> DC.			(1)
<b>ii. Sect. <i>Canescentes</i> Giuliano</b>			<b>7 (7)</b>
<i>B. gibertii</i> Baker			(1)
<i>B. gnaphalioides</i> Spreng.			(1)
<i>B. helichrysoides</i> DC.			(1)
<i>B. leucocephala</i> Dusén			(1)
<i>B. leucopappa</i> DC.			(1)
<i>B. phyllicifolia</i> DC.			(1)
<i>B. uleana</i> Malag.			(1)
<b>II. Subgen. <i>Oblongifolia</i> (DC.) G. Heiden</b>		<b>1 (1)</b>	<b>18 (11)</b>
<b>i. Sect. <i>Oblongifoliae</i> DC.</b>			<b>18 (11)</b>
<i>B. alpestris</i> Gardner			(0)
<i>B. antioquensis</i> Killip & Cuatrec.			(1)
<i>B. ciliata</i> Gardner			(1)
<i>B. coronata</i> Giuliano			(1)
<i>B. crassipappa</i> Deble & A.S. Oliveira			(0)
<i>B. cutervensis</i> Hieron.			(0)
<i>B. densa</i> (N. E. Br.) V. M. Badillo			(1)
<i>B. dichotoma</i> G. Heiden & L. D. Meireles			(0)
<i>B. friburgensis</i> G. Heiden, Baumgratz & Esteves			(0)
<i>B. grandimucronata</i> I. L. Teodoro & J. Vidal			(1)
<i>B. ligustrina</i> DC.			(1)
<i>B. macrophylla</i> Dusén			(1)
<i>B. meridensis</i> Steyerem.			(0)
<i>B. myricifolia</i> DC.			(1)
<i>B. oblongifolia</i> (Ruiz & Pav.) Pers.			(1)
<i>B. rufidula</i> (Spreng.) Joch. Müll.			(1)
<i>B. vismioides</i> DC.			(1)

**Table 1. Part 2.** Summary of subgenera, sections and taxa accepted at the rank of species following the new infrageneric classification of *Baccharis*. Numbers outside brackets are total number of taxa accepted per category, numbers within brackets are sampled taxa.

<b>Taxon</b>	<b>Subgen.</b>	<b>Sections</b>	<b>Species</b>
<b>III. Subgen. <i>Heterothalamus</i> (Less.) G. Heiden</b>		<b>3 (3)</b>	<b>7 (6)</b>
<b>i. Sect. <i>Bradeanae</i> G. Heiden</b>			<b>2 (2)</b>
<i>B. dubia</i> Deble & A. S. Oliveira			(1)
<i>B. magnifica</i> G. Heiden, Leoni & Nakajima			(1)
<b>ii. Sect. <i>Psila</i> (Phil.) Cuatrec.</b>			<b>2 (2)</b>
<i>B. acaulis</i> (Wedd. ex R. E. Fr.) Cabrera			(1)
<i>B. davidsonii</i> Cuatrec.			(0)
<b>iii. Sect. <i>Heterothalamus</i> (Less.) Giuliano</b>			<b>3 (3)</b>
<i>B. aliena</i> (Spreng.) Joch. Müll.			(1)
<i>B. hyemalis</i> Deble			(1)
<i>B. psiadioides</i> (Less.) Joch. Müll.			(1)
<b>IV. Subgen. <i>Molina</i> (Pers.) Heering</b>		<b>21 (13)</b>	<b>145 (60)</b>
<b>i. Sect. <i>Palenia</i> Giuliano</b>			<b>1 (1)</b>
<i>B. nivalis</i> (Wedd.) Sch. Bip. ex Phil.			1 (1)
<b>ii. Sect. <i>Subliguliflorae</i> Giuliano</b>			<b>7 (1)</b>
<i>B. beckii</i> Joch. Müll.			(0)
<i>B. cabrerarum</i> Ariza			(0)
<i>B. niederleinii</i> Heering			(0)
<i>B. niederleinii</i> var. <i>potrerillana</i> Ariza			(1)
<i>B. potosiensis</i> H. Rob.			(0)
<i>B. torricoi</i> Joch. Müll.			(0)
<i>B. woodii</i> Joch. Müll.			(0)
<b>iii. Sect. <i>Thymifoliae</i> Giuliano</b>			<b>2 (2)</b>
<i>B. grisebachii</i> Hieron.			(1)
<i>B. thymifolia</i> Hook. & Arn.			(1)
<b>iv. Sect. <i>Trinervatae</i> DC.</b>			<b>13 (7)</b>
<i>B. acutata</i> (Alain) Borhidi			(0)
<i>B. bifrons</i> Baker			(1)
<i>B. cinerea</i> DC.			(1)
<i>B. debilis</i> Rusby			(1)
<i>B. nervosa</i> DC.			(0)
<i>B. nipensis</i> Urb.			(0)
<i>B. orientalis</i> Alain			(0)
<i>B. pedunculata</i> (Mill.) Cabrera			(1)
<i>B. quitensis</i> Kunth			(1)
<i>B. retamoides</i> Phil.			(1)
<i>B. spartea</i> Benth.			(0)
<i>B. steetzii</i> Andersson			(0)
<i>B. trinervis</i> Pers.			(1)

**Table 1. Part 3.** Summary of subgenera, sections and taxa accepted at the rank of species following the new infrageneric classification of *Baccharis*. Numbers outside brackets are total number of taxa accepted per category, numbers within brackets are sampled taxa.

<b>Taxon</b>	<b>Subgen.</b>	<b>Sections</b>	<b>Species</b>
<b>v. Sect. <i>Australes</i> Giuliano</b>			<b>1 (1)</b>
<i>B. racemosa</i> (Ruiz & Pav.) DC.			(1)
<b>vi. Sect. <i>Bogotenses</i> Cuatrec.</b>			<b>17 (7)</b>
<i>B. bogotensis</i> Kunth			(1)
<i>B. brachyphylla</i> A. Gray			(0)
<i>B. erosoricola</i> Rzed.			(0)
<i>B. gracilis</i> DC.			(1)
<i>B. macrocephala</i> Sch. Bip. ex Greenm.			(0)
<i>B. maxima</i> Baker			(1)
<i>B. mutisiana</i> Cuatrec.			(0)
<i>B. occidentalis</i> S. F. Blake			(0)
<i>B. plummerae</i> A. Gray			(1)
<i>B. plummerae</i> subsp. <i>glabrata</i> Hoover			(0)
<i>B. pteronioides</i> DC.			(0)
<i>B. ramiflora</i> A. Gray			(0)
<i>B. saliens</i> Rusby			(1)
<i>B. serranoi</i> H. Rob.			(0)
<i>B. solomonii</i> H. Rob.			(1)
<i>B. texana</i> (Torr. & A. Gray) A. Gray			(0)
<i>B. wrightii</i> A. Gray			(1)
<b>vii. Sect. <i>Paniculatae</i> Heering</b>			<b>2 (2)</b>
<i>B. effusa</i> Griseb.			(1)
<i>B. paniculata</i> DC.			(1)
<b>viii. Sect. <i>Arenariae</i> Giuliano</b>			<b>1 (1)</b>
<i>B. arenaria</i> Baker			(1)
<b>ix. Sect. <i>Polifoliae</i> G. Heiden</b>			<b>1 (1)</b>
<i>B. polifolia</i> Griseb.			(1)
<b>x. Sect. <i>Pseudobaccharis</i> (Cabrer) Cuatrec.</b>			<b>3 (3)</b>
<i>B. boliviensis</i> (Wedd.) Cabrera			(1)
<i>B. spartioides</i> (Hook. & Arn. ex DC.) Remy			(1)
<i>Baccharis</i> sp. GH1873			(1)
<b>xi. Sect. <i>Angustifoliae</i> Baker</b>			<b>7 (5)</b>
<i>B. arguta</i> Gillies ex Hook.			(1)
<i>B. darwinii</i> Hook. & Arn.			(1)
<i>B. gilliesii</i> A. Gray			(1)
<i>B. melanopotamica</i> Speg.			(0)
<i>B. orbignyana</i> Klatt			(1)
<i>B. petrophila</i> R. E. Fr.			(0)
<i>B. ulicina</i> Hook. & Arn.			(1)

**Table 1. Part 4.** Summary of subgenera, sections and taxa accepted at the rank of species following the new infrageneric classification of *Baccharis*. Numbers outside brackets are total number of taxa accepted per category, numbers within brackets are sampled taxa.

<b>Taxon</b>	<b>Subgen.</b>	<b>Sections</b>	<b>Species</b>
<b>xii. Sect. <i>Serrulatae</i> Cuatrec.</b>			<b>8 (4)</b>
<i>B. arbutifolia</i> Vahl			(0)
<i>B. caldasiana</i> Cuatrec.			(1)
<i>B. ledifolia</i> Kunth			(0)
<i>B. padifolia</i> Hieron.			(0)
<i>B. prunifolia</i> Kunth			(1)
<i>B. revoluta</i> Kunth			(1)
<i>B. rupicola</i> Kunth			(1)
<i>B. vacciniifolia</i> Cuatrec.			(0)
<b>xiii. Sect. <i>Molinae</i> (Pers.) Cuatrec.</b>			<b>37 (25)</b>
<i>B. alnifolia</i> Meyen & Walp.			(0)
<i>B. anomala</i> DC.			(1)
<i>B. auriculigera</i> Hieron.			(0)
<i>B. breviseta</i> DC.			(1)
<i>B. calliprinos</i> Griseb.			(1)
<i>B. cana</i> Joch. Müll.			(0)
<i>B. capitalensis</i> Heering			(0)
<i>B. conyzoides</i> (Less.) DC.			(1)
<i>B. decussata</i> (Klatt) Hieron.			(1)
<i>B. densiflora</i> Wedd.			(1)
<i>B. famatinensis</i> Ariza			(1)
<i>B. floribundioides</i> Cuatrec.			(0)
<i>B. glutinosa</i> Pers.			(1)
<i>B. haitiensis</i> Heering			(0)
<i>B. imbricata</i> I. L. Teodoro & J. Vidal			(1)
<i>B. jelskii</i> Hieron.			(1)
<i>B. juncea</i> (Cass.) Desf.			(1)
<i>B. juncea</i> subsp. <i>clavata</i> Joch. Müll.			(0)
<i>B. latifolia</i> (Ruiz & Pav.) Pers.			(1)
<i>B. lewisii</i> (H. Rob.) Joch. Müll.			(0)
<i>B. lilloi</i> Heering			(1)
<i>B. monoica</i> G. L. Nesom			(0)
<i>B. multiflosculosa</i> Heering			(0)
<i>B. oxyodonta</i> DC.			(1)
<i>B. pentlandii</i> DC.			(1)
<i>B. perulata</i> Kuntze			(1)
<i>B. pingraea</i> DC.			(1)
<i>B. punctulata</i> DC.			(1)
<i>B. salicifolia</i> (Ruiz & Pav.) Pers.			(1)

**Table 1. Part 5.** Summary of subgenera, sections and taxa accepted at the rank of species following the new infrageneric classification of *Baccharis*. Numbers outside brackets are total number of taxa accepted per category, numbers within brackets are sampled taxa.

<b>Taxon</b>	<b>Subgen.</b>	<b>Sections</b>	<b>Species</b>
<i>B. salicifolia</i> subsp. <i>multibracteata</i> Joch. Müll.			(1)
<i>B. scandens</i> (Ruiz & Pav.) Pers.			(0)
<i>B. sculpta</i> Griseb.			(1)
<i>B. serrulata</i> (Lam.) Pers.			(1)
<i>B. sphaerocephala</i> Hook. & Arn.			(0)
<i>B. stenophylla</i> Ariza			(1)
<i>B. stylosa</i> Gardner			(1)
<i>B. vulneraria</i> Baker			(1)
<b>Unplaced sections of <i>B.</i> subgen. <i>Molina</i></b>		<b>8 (0)</b>	<b>27 (0)</b>
<b>xiv. Sect. <i>Albidae</i> Giuliano</b>			<b>1 (0)</b>
<i>B. albida</i> Hook. & Arn.			(0)
<b>xv. Sect. <i>Aristidentes</i> G. L. Nesom</b>			<b>7 (0)</b>
<i>B. brevipappa</i> (McVaugh) G. L. Nesom			(0)
<i>B. hirta</i> DC.			(0)
<i>B. malibuensis</i> R. M. Beauch. & J. Henrickson			(0)
<i>B. multiflora</i> Kunth			(0)
<i>B. multiflora</i> var. <i>herbacea</i> McVaugh			(0)
<i>B. serrifolia</i> DC.			(0)
<i>B. sordescens</i> DC.			(0)
<b>xvi. Sect. <i>Gladiatae</i> Cuatrec.</b>			<b>1 (0)</b>
<i>B. marceiifolia</i> Benth.			(0)
<b>xvii. Sect. <i>Pinnatae</i> Cuatrec.</b>			<b>3 (0)</b>
<i>B. ayacuchensis</i> Cuatrec.			(0)
<i>B. buddlejoides</i> Kunth			(0)
<i>B. raulii</i> Díaz & Cuatrec.			(0)
<b>xviii. Sect. <i>Punctatae</i> Giuliano &amp; G. L. Nesom</b>			<b>6 (0)</b>
<i>B. bigelovii</i> A. Gray			(0)
<i>B. crassicuneata</i> G. L. Nesom			(0)
<i>B. mexicana</i> Cuatrec.			(0)
<i>B. sulcata</i> DC.			(0)
<i>B. thesioides</i> Kunth			(0)
<i>B. zamoranensis</i> Rzed.			(0)
<b>xix. Sect. <i>Rodriguezianae</i> Giuliano</b>			<b>1 (0)</b>
<i>B. rodriguezii</i> Ariza			(0)
<b>xx. Sect. <i>Tenellae</i> Giuliano</b>			<b>1 (0)</b>
<i>B. tenella</i> Hook. & Arn.			(0)
<b>xxi. Sect. <i>Tubulatae</i> Cuatrec.</b>			<b>7 (0)</b>
<i>B. fraterna</i> Cuatrec.			(0)
<i>B. grandiflora</i> Kunth			(0)

**Table 1. Part 6.** Summary of subgenera, sections and taxa accepted at the rank of species following the new infrageneric classification of *Baccharis*. Numbers outside brackets are total number of taxa accepted per category, numbers within brackets are sampled taxa.

<b>Taxon</b>	<b>Subgen.</b>	<b>Sections</b>	<b>Species</b>
<i>B. grandiflora</i> subsp. <i>faralloensis</i> Cuatrec.			(0)
<i>B. huairacajensis</i> Hieron.			(0)
<i>B. klattii</i> Benoist			(0)
<i>B. volubilis</i> Kunth			(0)
<i>B. zumbadorensis</i> V. M. Badillo			(0)
<b>Unplaced species of <i>B.</i> subgen. <i>Molina</i></b>			<b>18 (0)</b>
<i>B. alamosana</i> S. F. Blake			(0)
<i>B. cymosa</i> Phil.			(0)
<i>B. gnidiifolia</i> Kunth			(0)
<i>B. hambatensis</i> Kunth			(0)
<i>B. hutchisonii</i> Cuatrec.			(0)
<i>B. johnwurdackiana</i> H. Rob.			(0)
<i>B. libertadensis</i> (S. B. Jones) H. Rob.			(0)
<i>B. mandonii</i> Klatt			(0)
<i>B. mollis</i> Kunth			(0)
<i>B. palmeri</i> Greenm.			(0)
<i>B. philippii</i> Heering			(0)
<i>B. pohlii</i> (Baker) Deble & A. S. Oliveira			(0)
<i>B. seemannii</i> A. Gray			(0)
<i>B. taltalensis</i> I. M. Johnst.			(0)
<i>B. tarmensis</i> Cuatrec.			(0)
<i>B. uniflora</i> (Ruiz & Pav.) Pers.			(0)
<i>B. vanessae</i> R. M. Beauch.			(0)
<i>B. zongoensis</i> Joch. Müll.			(0)
<b>V. Subgen. <i>Heterothalamulopsis</i> (Deble et al.) G. Heiden</b>		<b>1 (1)</b>	<b>1 (1)</b>
<b>i. Sect. <i>Heterothalamulopsis</i> (Deble et al.) G. Heiden</b>			<b>1 (1)</b>
<i>B. wagenitzii</i> (F. H. Hellw.) Joch. Müll.			(1)
<b>VI. Subgen. <i>Coridifolia</i> (DC.) G. Heiden</b>		<b>2 (2)</b>	<b>10 (9)</b>
<b>i. Sect. <i>Pluricephalae</i> (Deble) G. Heiden</b>			<b>2 (2)</b>
<i>B. pluricapitulata</i> (Deble) G. Heiden			(1)
<i>B. scabrifolia</i> G. Heiden			(1)
<b>ii. Sect. <i>Coridifoliae</i> DC.</b>			<b>8 (7)</b>
<i>B. albilanosa</i> A. S. Oliveira & Deble			(1)
<i>B. artemisioides</i> Hook. & Arn.			(1)
<i>B. bicolor</i> (Joch. Müll.) G. Heiden			(1)
<i>B. coridifolia</i> DC.			(1)
<i>B. erigeroides</i> DC.			(1)
<i>B. napaea</i> G. Heiden			(1)
<i>B. ochracea</i> Spreng.			(1)
<i>B. suberectifolia</i> A. S. Oliveira & Deble			(0)



**Table 1. Part 7.** Summary of subgenera, sections and taxa accepted at the rank of species following the new infrageneric classification of *Baccharis*. Numbers outside brackets are total number of taxa accepted per category, numbers within brackets are sampled taxa.

<b>Taxon</b>	<b>Subgen.</b>	<b>Sections</b>	<b>Species</b>
<b>VII. Subgen. <i>Baccharis</i></b>		<b>17 (13)</b>	<b>238 (148)</b>
<b>i. Sect. <i>Caulopterae</i> DC.</b>			<b>14 (12)</b>
<i>B. alpina</i> Kunth			(0)
<i>B. altimontana</i> G. Heiden, Baumgratz & Esteves			(1)
<i>B. crispa</i> Spreng			(1)
<i>B. dunensis</i> A. A. Schneid. & G. Heiden			(1)
<i>B. genistelloides</i> (Lam.) Pers.			(1)
<i>B. jocheniana</i> G. Heiden & Macias			(1)
<i>B. lorentzii</i> (Joch. Müll.) Deble			(1)
<i>B. microcephala</i> (Less.) DC.			(1)
<i>B. myriocephala</i> DC.			(1)
<i>B. opuntioides</i> Mart. ex Baker			(1)
<i>B. polygona</i> Baker			(1)
<i>B. riograndensis</i> I. L. Teodoro & J. Vidal			(1)
<i>B. scopulorum</i> A. A. Schneid. & G. Heiden			(1)
<i>B. triangularis</i> Hauman			(0)
<b>ii. Sect. <i>Aphyllae</i> Baker</b>			<b>33 (27)</b>
<i>B. aphylla</i> (Vell.) DC.			(1)
<i>B. apicifolia</i> A. A. Schneid. & Boldrini			(1)
<i>B. articulata</i> (Lam.) Pers.			(1)
<i>B. burchellii</i> Baker			(1)
<i>B. campos-portoana</i> Malag.			(0)
<i>B. chubutensis</i> Speg.			(0)
<i>B. deblei</i> A. S. Oliveira & Marchiori			(1)
<i>B. flexuosiramosa</i> A. A. Schneid. & Boldrini			(1)
<i>B. genistifolia</i> DC.			(1)
<i>B. glaziovii</i> Baker			(1)
<i>B. hemiptera</i> G. Heiden & A. A. Schneid			(1)
<i>B. junciformis</i> DC.			(1)
<i>B. megapotamica</i> Spreng.			(1)
<i>B. milleflora</i> (Less.) DC.			(1)
<i>B. organensis</i> Baker			(1)
<i>B. palustris</i> Heering			(1)
<i>B. paranensis</i> Heering & Dusén			(1)
<i>B. penningtonii</i> Heering			(1)
<i>B. pentaptera</i> (Less.) DC.			(1)
<i>B. phyteuma</i> Heering			(0)
<i>B. phyteumoides</i> (Less.) DC.			(1)
<i>B. pseudovillosa</i> I. L. Teodoro & J. Vidal			(1)

**Table 1. Part 8.** Summary of subgenera, sections and taxa accepted at the rank of species following the new infrageneric classification of *Baccharis*. Numbers outside brackets are total number of taxa accepted per category, numbers within brackets are sampled taxa.

<b>Taxon</b>	<b>Subgen.</b>	<b>Sections</b>	<b>Species</b>
<i>B. ramboi</i> G. Heiden & Macias			(1)
<i>B. regnellii</i> Sch. Bip. ex Baker			(1)
<i>B. reticulata</i> (Ruiz & Pav.) Pers.			(0)
<i>B. sagittalis</i> (Less.) DC.			(1)
<i>B. sphagnophila</i> A. A. Schneid. & G. Heiden			(1)
<i>B. subalata</i> Wedd.			(1)
<i>B. subalata</i> var. <i>vargasii</i> Joch. Müll.			(1)
<i>B. subbimera</i> Hieron.			(0)
<i>B. subtropicalis</i> G. Heiden			(1)
<i>B. vincifolia</i> Baker			(1)
<i>B. weirii</i> Baker			(1)
<b>iii. Sect. Agglomeratae Giuliano</b>			<b>34 (28)</b>
<i>B. alleluia</i> A.S. Oliveira & Deble			(1)
<i>B. angusticeps</i> Heering ex Malme			(1)
<i>B. claussenii</i> Baker			(0)
<i>B. concinna</i> G. M. Barroso			(1)
<i>B. elliptica</i> Gardner			(1)
<i>B. intermixta</i> Gardner			(1)
<i>B. itatiaiae</i> Wawra			(1)
<i>B. lateralis</i> Baker			(1)
<i>B. mesoneura</i> DC.			(1)
<i>B. obdeltata</i> G. Heiden			(1)
<i>B. orbiculata</i> Deble & A. S. Oliveira			(0)
<i>B. oreophila</i> Malme			(0)
<i>B. parvidentata</i> Malag.			(1)
<i>B. pauciflosculosa</i> DC.			(1)
<i>B. perlata</i> Sch. Bip. ex Baker			(1)
<i>B. platypoda</i> DC.			(1)
<i>B. polyphylla</i> Gardner			(1)
<i>B. pseudomyriocephala</i> Malag.			(0)
<i>B. pseudovaccinioides</i> I. L. Teodoro			(1)
<i>B. ramosissima</i> Gardner			(1)
<i>B. reticularia</i> DC.			(1)
<i>B. reticularioides</i> Deble & A. S. Oliveira			(1)
<i>B. retusa</i> DC.			(1)
<i>B. salzmännii</i> DC.			(0)
<i>B. schultzii</i> Baker			(0)
<i>B. serrula</i> Sch. Bip. ex Baker			(1)
<i>B. simplex</i> G. Heiden			(1)

**Table 1. Part 9.** Summary of subgenera, sections and taxa accepted at the rank of species following the new infrageneric classification of *Baccharis*. Numbers outside brackets are total number of taxa accepted per category, numbers within brackets are sampled taxa.

<b>Taxon</b>	<b>Subgen.</b>	<b>Sections</b>	<b>Species</b>
<i>B. truncata</i> Gardner			(1)
<i>B. sp.</i> ACF177			(1)
<i>B. sp.</i> ACF187			(1)
<i>B. sp.</i> ACF191			(1)
<i>B. sp.</i> ACF196			(1)
<i>B. sp.</i> ACF236			(1)
<i>B. sp.</i> VR102			(1)
<b>iv. Sect. Axillares (Giuliano) G. Heiden</b>			<b>14 (12)</b>
<i>B. aracatubaensis</i> Malag.			(1)
<i>B. axillaris</i> DC.			(0)
<i>B. axillaris</i> var. <i>dentata</i> DC.			(1)
<i>B. cultrata</i> Baker			(1)
<i>B. hypericifolia</i> Baker			(1)
<i>B. incisa</i> Hook. & Arn.			(1)
<i>B. leptospermoides</i> DC.			(1)
<i>B. lymanii</i> G. M. Barroso ex G. Heiden			(0)
<i>B. minutiflora</i> Mart. ex Baker			(1)
<i>B. sphenophylla</i> Dusén ex Malme			(1)
<i>B. trilobata</i> A. S. Oliveira & Marchiori			(1)
<i>B. trineura</i> Soria & Zardini			(1)
<i>B. umbellata</i> G. Heiden & Ribas			(1)
<i>B. sp.</i> GH1788			(1)
<b>v. Sect. Cuneifoliae DC.</b>			<b>14 (3)</b>
<i>B. elaeoides</i> Remy			(0)
<i>B. macraei</i> Hook. & Arn.			(0)
<i>B. magellanica</i> (Lam.) Pers.			(0)
<i>B. mylodontis</i> F. H. Hellw.			(0)
<i>B. neaei</i> DC.			(1)
<i>B. palenae</i> Phil.			(0)
<i>B. patagonica</i> Hook. & Arn.			(1)
<i>B. pilcensis</i> F. H. Hellw.			(0)
<i>B. rhomboidalis</i> Remy			(0)
<i>B. rhomboidalis</i> subsp. <i>truncata</i> (Heering) F. H. Hellw.			(0)
<i>B. umbelliformis</i> DC.			(1)
<i>B. vernalis</i> F. H. Hellw.			(0)
<i>B. zoellneri</i> F. H. Hellw.			(0)
<i>B. zoellneri</i> subsp. <i>minor</i> F. H. Hellw.			(0)

**Table 1. Part 10.** Summary of subgenera, sections and taxa accepted at the rank of species following the new infrageneric classification of *Baccharis*. Numbers outside brackets are total number of taxa accepted per category, numbers within brackets are sampled taxa.

<b>Taxon</b>	<b>Subgen.</b>	<b>Sections</b>	<b>Species</b>
<b>vi. Sect. <i>Illinitae</i> G. Heiden</b>			<b>2 (1)</b>
<i>B. illinita</i> DC.			(1)
<i>B. illinitoides</i> Malag.			(0)
<b>vii. Sect. <i>Racemosae</i> Ariza</b>			<b>9 (6)</b>
<i>B. amambayensis</i> Zardini & Soria			(0)
<i>B. calvescens</i> DC.			(1)
<i>B. dracunculifolia</i> DC.			(1)
<i>B. erioclada</i> DC.			(0)
<i>B. longiattenuata</i> A. S. Oliveira & Deble			(0)
<i>B. montana</i> DC.			(1)
<i>B. rivularis</i> Gardner			(1)
<i>B. semiserrata</i> DC.			(1)
<i>B. uncinella</i> DC.			(1)
<b>viii. Sect. <i>Tridentatae</i> Giuliano</b>			<b>6 (6)</b>
<i>B. caprariifolia</i> DC.			(1)
<i>B. deltoidea</i> Baker			(1)
<i>B. nummularia</i> Heering ex Malme			(1)
<i>B. spicata</i> (Lam.) Baill.			(1)
<i>B. tridentata</i> Vahl			(1)
<i>B. urvilleana</i> Brongn.			(1)
<b>ix. Sect. <i>Caespitosae</i> Giuliano</b>			<b>20 (9)</b>
<i>B. buchtienii</i> H. Rob.			(1)
<i>B. caespitosa</i> (Ruiz & Pav.) Pers.			(1)
<i>B. corymbosa</i> (Ruiz & Pav.) Pers.			(0)
<i>B. incarum</i> (Wedd.) Perkins			(1)
<i>B. lapidosa</i> Deble & A. S. Oliveira			(0)
<i>B. neorupestris</i> Deble & A. S. Oliveira			(1)
<i>B. odorata</i> Kunth			(1)
<i>B. papillosa</i> Rusby			(0)
<i>B. papillosa</i> subsp. <i>australis</i> Joch. Müll.			(0)
<i>B. papillosa</i> subsp. <i>chaparensis</i> Joch. Müll.			(1)
<i>B. papillosa</i> subsp. <i>integrifolia</i> Joch. Müll.			(1)
<i>B. papillosa</i> subsp. <i>kessleri</i> Joch. Müll.			(0)
<i>B. papillosa</i> subsp. <i>longipedicellata</i> Joch. Müll.			(0)
<i>B. papillosa</i> subsp. <i>yungensis</i> Joch. Müll.			(1)
<i>B. procumbens</i> Hieron.			(0)
<i>B. santelicis</i> Phil.			(0)
<i>B. santelicis</i> subsp. <i>chrysophylla</i> F. H. Hellw.			(0)
<i>B. tola</i> Phil			(1)

**Table 1. Part 11.** Summary of subgenera, sections and taxa accepted at the rank of species following the new infrageneric classification of *Baccharis*. Numbers outside brackets are total number of taxa accepted per category, numbers within brackets are sampled taxa.

<b>Taxon</b>	<b>Subgen.</b>	<b>Sections</b>	<b>Species</b>
<i>B. tola</i> subsp. <i>tol</i> a var. <i>viscosissima</i> (Kuntze) Joch. Müll.			(0)
<i>B. tola</i> subsp. <i>fimbriata</i> Joch. Müll.			(0)
<b>x. Sect. Baccharis</b>			<b>23 (13)</b>
<i>B. angustifolia</i> Michx.			(1)
<i>B. angustior</i> (DC.) Britton ex Malag.			(0)
<i>B. buxifolia</i> (Lam.) DC.			(1)
<i>B. conferta</i> Kunth			(0)
<i>B. confertoides</i> G. L. Nesom			(0)
<i>B. dioica</i> Vahl			(1)
<i>B. glandulifera</i> G. L. Nesom			(0)
<i>B. glomeruliflora</i> Pers.			(1)
<i>B. halimifolia</i> L.			(1)
<i>B. heterophylla</i> Kunth			(0)
<i>B. kurtziana</i> Ariza			(1)
<i>B. myrsinites</i> (Lam.) Pers.			(0)
<i>B. myrsinites</i> var. <i>mornicola</i> Urb.			(0)
<i>B. neglecta</i> Britton			(1)
<i>B. notoserghila</i> Griseb.			(1)
<i>B. pilularis</i> DC.			(1)
<i>B. salicina</i> Torr. & A. Gray			(1)
<i>B. sarothroides</i> A. Gray			(1)
<i>B. scoparia</i> (L.) Sw.			(0)
<i>B. scoparioides</i> Griseb.			(0)
<i>B. sergiloides</i> A. Gray			(1)
<i>B. shaferi</i> Britton			(0)
<i>B. tucumanensis</i> Hook. & Arn.			(1)
<b>xi. Sect. Andina G. Heiden</b>			<b>15 (6)</b>
<i>B. angelica</i> Benoist			(0)
<i>B. balnearia</i> Benoist			(0)
<i>B. boyacensis</i> Cuatrec.			(0)
<i>B. cochensis</i> Hieron.			(0)
<i>B. emarginata</i> (Ruiz & Pav.) Pers.			(0)
<i>B. grandicapitulata</i> Hieron.			(0)
<i>B. lehmannii</i> Klatt			(1)
<i>B. lloensis</i> Hieron.			(1)
<i>B. pachycephala</i> Hieron.			(0)
<i>B. paramicola</i> Cuatrec.			(0)
<i>B. sinuata</i> Kunth			(0)
<i>B. teindalensis</i> Kunth			(1)

**Table 1. Part 12.** Summary of subgenera, sections and taxa accepted at the rank of species following the new infrageneric classification of *Baccharis*. Numbers outside brackets are total number of taxa accepted per category, numbers within brackets are sampled taxa.

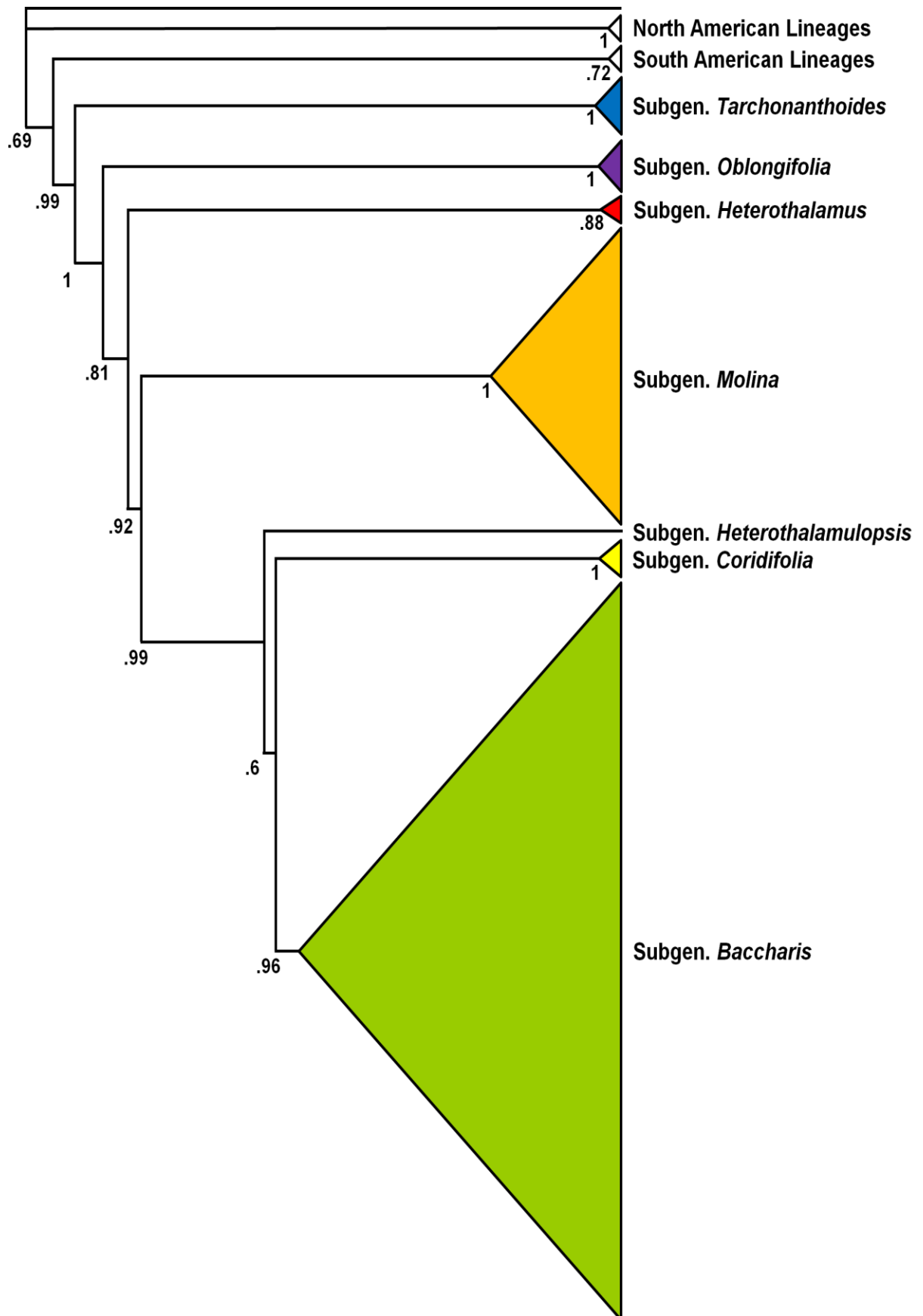
<b>Taxon</b>	<b>Subgen.</b>	<b>Sections</b>	<b>Species</b>
<i>B. tricuneata</i> (L.f.) Pers.			(1)
<i>B. tricuneata</i> var. <i>procumbens</i> Cuatrec.			(1)
<i>B. sp.</i> GH2091			(1)
<b>xii. Sect. <i>Nitidae</i> Cuatrec.</b>			<b>4 (4)</b>
<i>B. dentata</i> (Vell.) G. M. Barroso			(1)
<i>B. malmei</i> Joch. Müll.			(1)
<i>B. nítida</i> (Ruiz & Pav.) Pers.			(1)
<i>B. singularis</i> (Vell.) G. M. Barroso			(1)
<b>xiii. Sect. <i>Cylindricae</i> Heering</b>			<b>25 (20)</b>
<i>B. brevifolia</i> DC.			(1)
<i>B. chilco</i> Kunth			(0)
<i>B. cognata</i> DC.			(1)
<i>B. flabellata</i> Hook. & Arn.			(1)
<i>B. gracillima</i> Heering & Dusén			(0)
<i>B. humilis</i> Sch. Bip. ex Baker			(0)
<i>B. inexpectata</i> Deble & A. S. Oliveira			(1)
<i>B. linearifolia</i> (Lam.) Pers.			(1)
<i>B. maritima</i> Baker			(1)
<i>B. microdonta</i> DC.			(1)
<i>B. multifolia</i> A. S. Oliveira, Deble & Marchiori			(1)
<i>B. pampeana</i> A. S. Oliveira, Deble & Marchiori			(1)
<i>B. pedersenii</i> Cabrera			(1)
<i>B. pentodonta</i> Malme			(1)
<i>B. petraea</i> Heering			(1)
<i>B. polycephala</i> Wedd.			(1)
<i>B. saltensis</i> Baker			(0)
<i>B. santiagensis</i> Heering			(0)
<i>B. sessiliflora</i> Vahl			(1)
<i>B. subdentata</i> DC.			(1)
<i>B. subopposita</i> DC.			(1)
<i>B. vernicosa</i> Hook. & Arn.			(1)
<i>B. sp.</i> GH1146			(1)
<i>B. sp.</i> GH1460			(1)
<i>B. sp.</i> GH1560			(1)
<b>Unplaced sections of <i>B.</i> subgen. <i>Baccharis</i></b>		<b>4 (0)</b>	<b>10 (0)</b>
<b>xiv. Sect. <i>Discolores</i> DC.</b>			<b>1 (0)</b>
<i>B. phylcooides</i> Kunth			(0)
<b>xv. Sect. <i>Divaricatae</i> Giuliano</b>			<b>1 (0)</b>
<i>B. divaricata</i> Hauman			(0)

**Table 1. Part 13.** Summary of subgenera, sections and taxa accepted at the rank of species following the new infrageneric classification of *Baccharis*. Numbers outside brackets are total number of taxa accepted per category, numbers within brackets are sampled taxa.

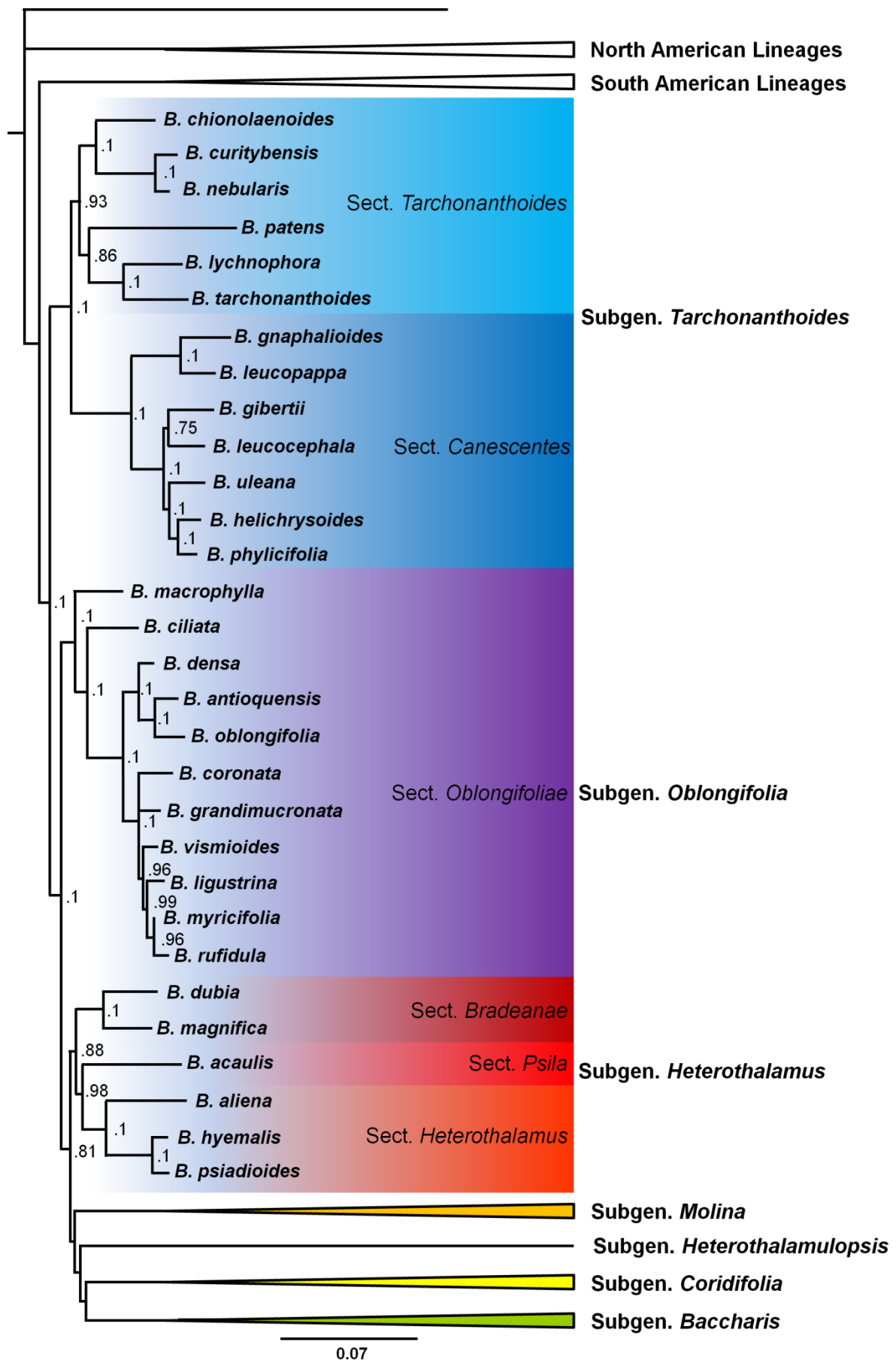
<b>Taxon</b>	<b>Subgen.</b>	<b>Sections</b>	<b>Species</b>
<b>xvi. Sect. <i>Frenguellianae</i> Giulianoa</b>			<b>1 (0)</b>
<i>B. frenguellii</i> Cabrera			(0)
<b>xvii. Sect. <i>Pedicellatae</i> Heering</b>			<b>7 (0)</b>
<i>B. linearis</i> (Ruiz & Pav.) Pers.			(0)
<i>B. linearis</i> subsp. <i>pycnocephala</i> F. H. Hellw.			(0)
<i>B. lycioides</i> Remy			(0)
<i>B. obovata</i> Hook. & Arn.			(0)
<i>B. ocellata</i> Phil.			(0)
<i>B. poeppigiana</i> DC.			(0)
<i>B. poeppigiana</i> subsp. <i>austropedicellata</i> F. H. Hellw.			(0)
<b>Unplaced species of <i>B.</i> subgen. <i>Baccharis</i></b>			<b>15 (0)</b>
<i>B. alaternoides</i> Kunth			(0)
<i>B. chachapoyasensis</i> Cuatrec.			(0)
<i>B. dependens</i> (Ruiz & Pav.) Pers.			(0)
<i>B. erectifolia</i> Steyerm.			(0)
<i>B. floccosa</i> Deble & A. S. Oliveira			(0)
<i>B. hieronymi</i> Heering			(0)
<i>B. humifusa</i> Kunth			(0)
<i>B. itapiroensis</i> A. S. Oliveira & Deble			(0)
<i>B. pseudoalpestris</i> I. L. Teodoro			(0)
<i>B. pumila</i> Joch. Müll.			(0)
<i>B. samensis</i> Joch. Müll.			(0)
<i>B. scabra</i> (Ruiz & Pav.) Pers.			(0)
<i>B. schomburgkii</i> Baker			(0)
<i>B. tenuicapitulata</i> Joch. Müll.			(0)
<i>B. tomentosa</i> (Ruiz & Pav.) Pers.			(0)
<b>VIII. Unplaced species of <i>Baccharis</i></b>			<b>1 (0)</b>
<i>B. asperula</i> S. Schauer			(0)

**Figure 1.** Schematic tree to the subgenera of *Baccharis* as clades recovered through Bayesian inference based on a partitioned analyses of all molecular data (nuclear ETS+ITS and plastidial *trnH-psbA+trnL-F*). Bayesian posterior probabilities are shown in the nodes. Collapsed branches within *Baccharis* represent the relative sampling size; branches lengths are not to scale.

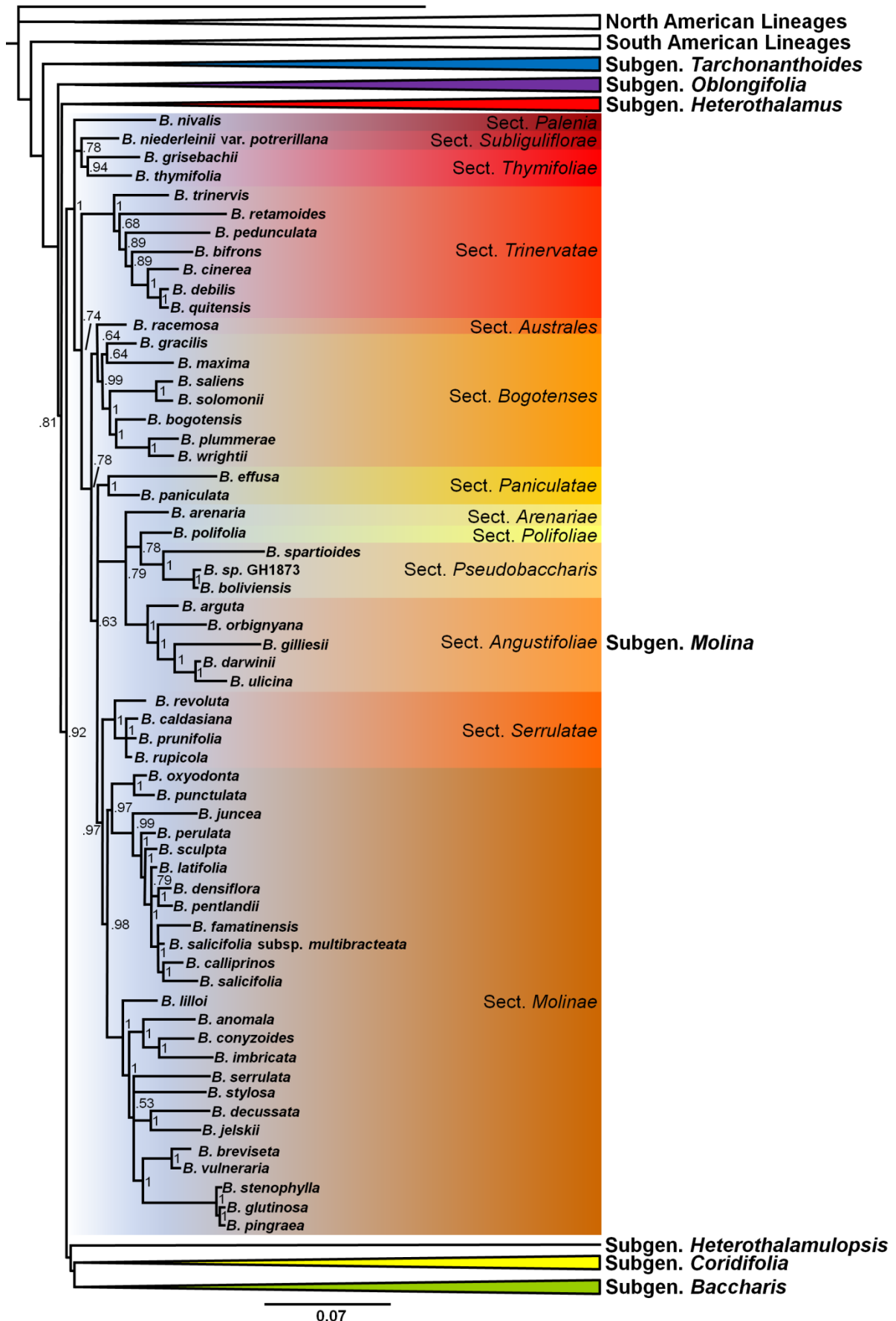




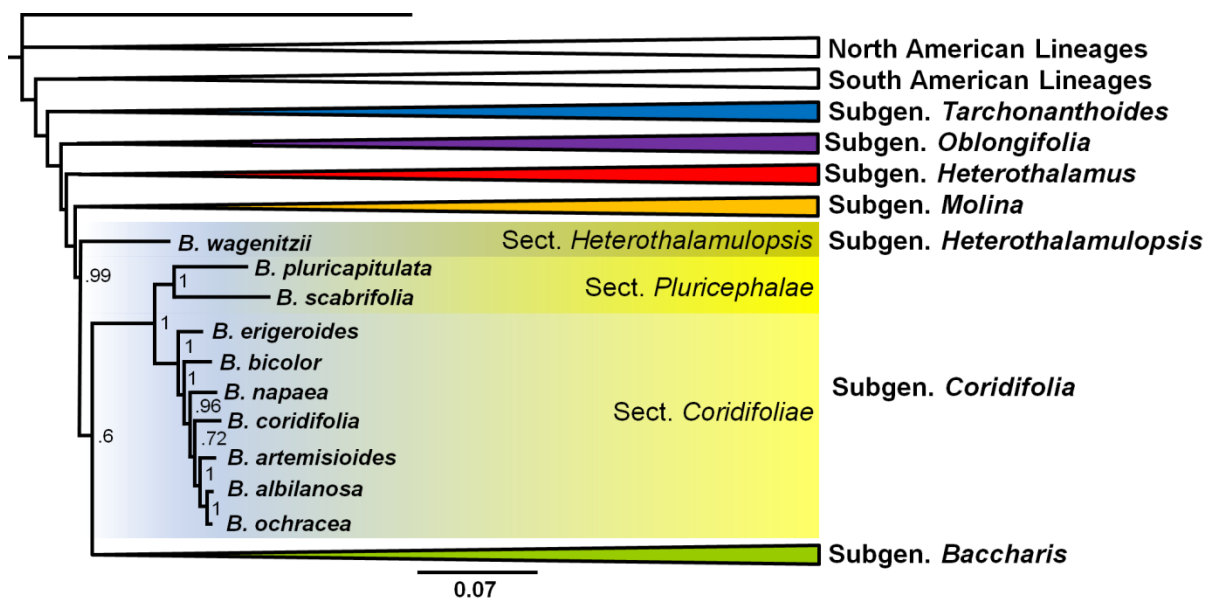
**Figure 2.** Early divergent lineages of *Baccharis*: *B.* subgen. *Tarchonanthoides*, *B.* subgen. *Oblongifolia* and *B.* subgen. *Heterothalamus*. Bayesian inference phylogram based on the partitioned analyses of all molecular data (nuclear ETS+ITS and plastidial *trnH-psbA*+*trnL-F*). Bayesian posterior probabilities are shown in the nodes. Collapsed branches are not to scale.



**Figure 3.** *Baccharis* subgen. *Molina*. Bayesian inference phylogram based on the partitioned analyses of all molecular data (nuclear ETS+ITS and plastidial *trnH-psbA+trnL-F*). Bayesian posterior probabilities are shown in the nodes. Collapsed branches are not to scale.

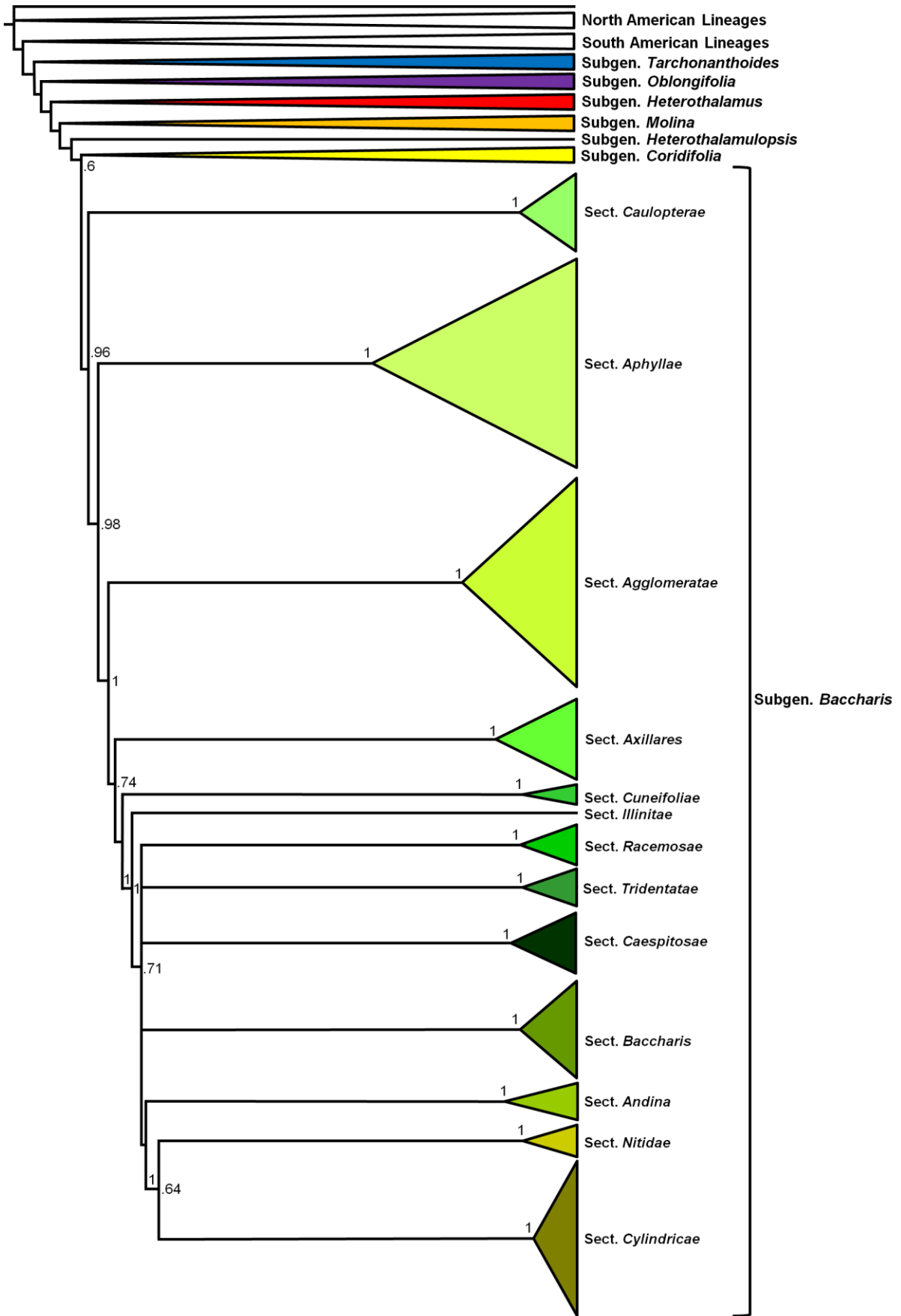


**Figure 4.** *Baccharis* subgen. *Heterothalamulopsis* and *B.* subgen. *Coridifolia*. Bayesian inference phylogram based on the partitioned analyses of all molecular data (nuclear ETS+ITS and plastidial *trnH-psbA+trnL-F*). Bayesian posterior probabilities are shown in the nodes. Collapsed branches are not to scale.

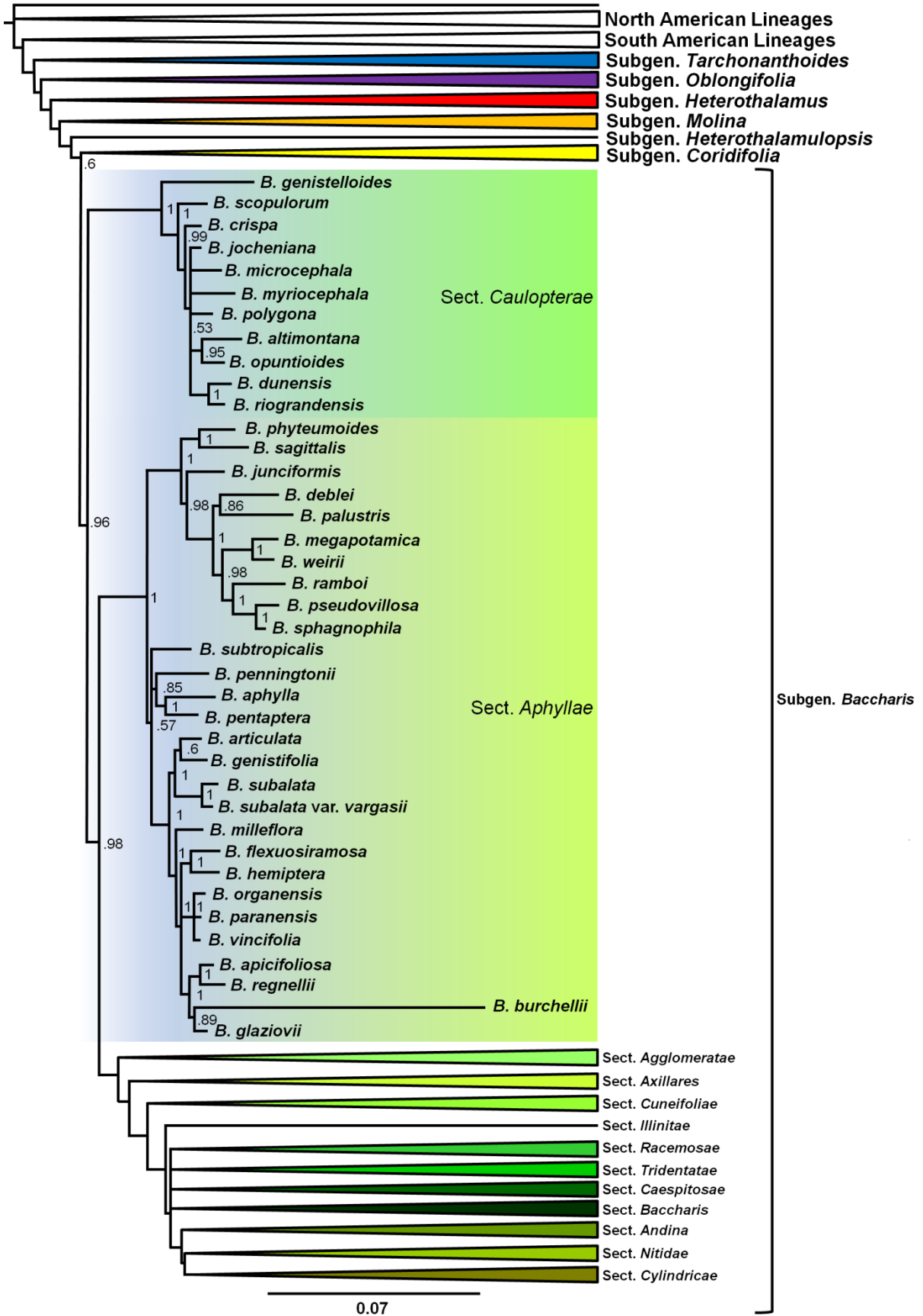


**Figure 5.** Schematic tree to the sections of *Baccharis* subgen. *Baccharis* based on the Bayesian inference phylogeny on the partitioned analyses of all molecular data (nuclear ETS+ITS and plastidial *trnH-psbA+trnL-F*). Bayesian posterior probabilities are shown in the nodes. Collapsed branches within *Baccharis* subgen. *Baccharis* represent the relative sampling size and branches length are not to scale.

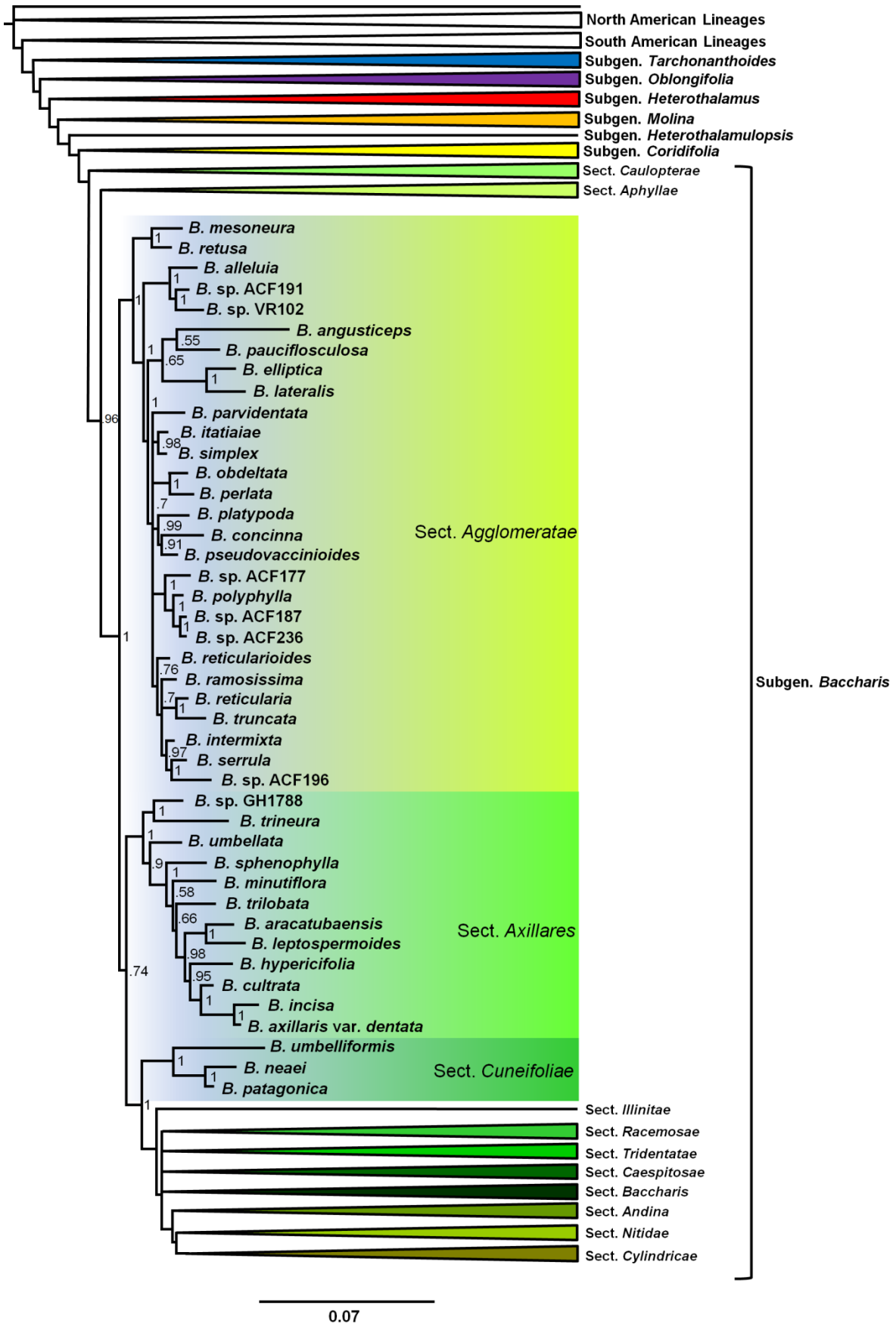




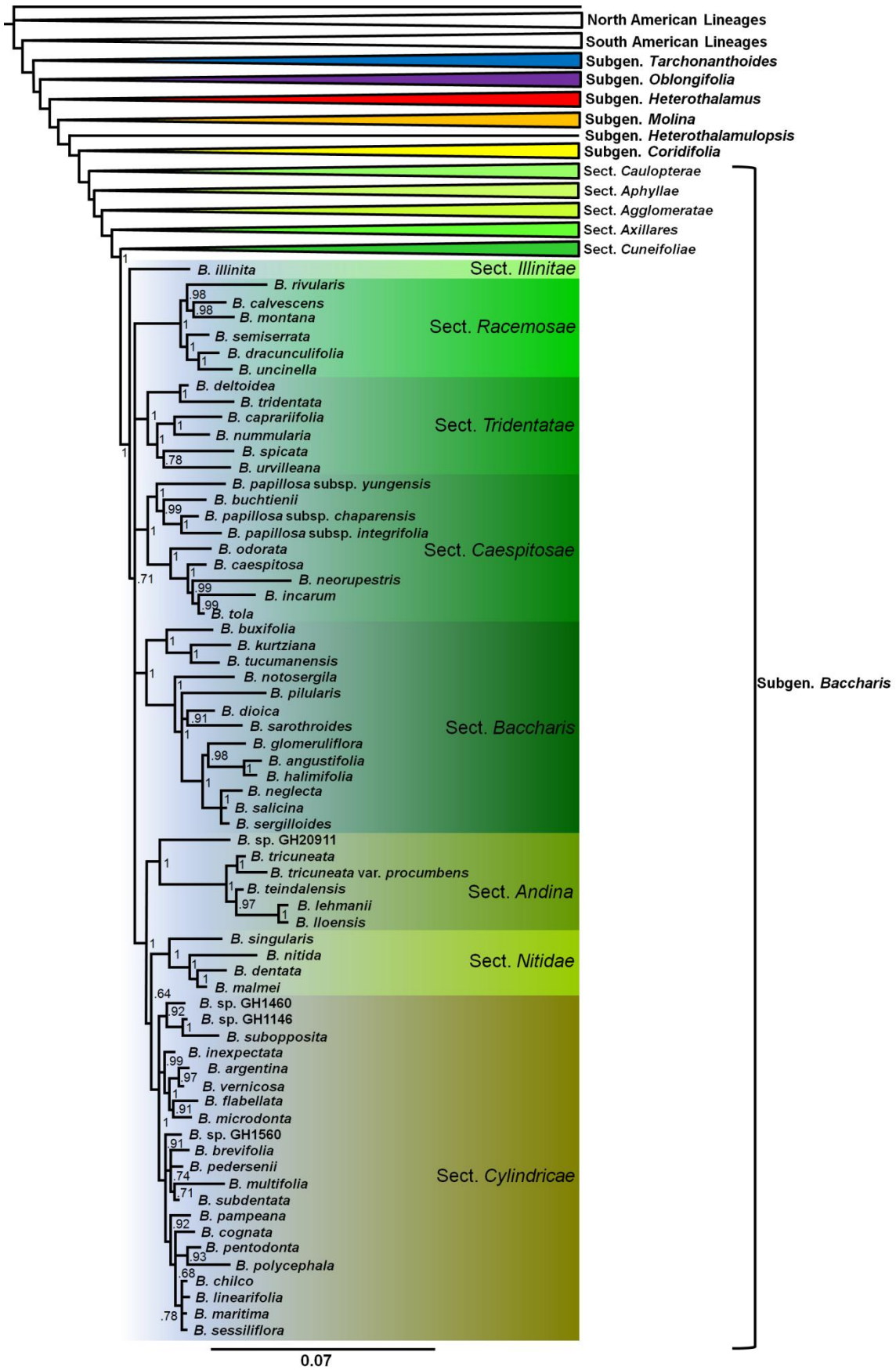
**Figure 6.** Early divergent lineages of *Baccharis* subgen. *Baccharis*. Bayesian inference phylogram based on the partitioned analyses of all molecular data (nuclear ETS+ITS and plastidial *trnH-psbA+trnL-F*). Bayesian posterior probabilities are shown in the nodes. Collapsed branches are not to scale.



**Figure 7.** Core *Baccharis* subgen. *Baccharis* I. Bayesian inference phylogram based on the partitioned analyses of all molecular data (nuclear ETS+ITS and plastidial *trnH-psbA+trnL-F*). Bayesian posterior probabilities are shown in the nodes. Collapsed branches are not to scale.



**Figure 8.** Core *Baccharis* subgen. *Baccharis* II. Bayesian inference phylogram based on the partitioned analyses of all molecular data (nuclear ETS+ITS and plastidial *trnH-psbA+trnL-F*). Bayesian posterior probabilities are shown in the nodes. Collapsed branches are not to scale.



## APPENDIX.



**Appendix 1.** Species included in the molecular analysis, voucher information and GenBank accession numbers (ETS, ITS, *trnH-psbA*, *trnL-F*).

*Apopyros warmingii* (Baker) G.L. Nesom. Brazil, Goiás, Alto Paraíso, 2.XI.2012, *B. Loeuille 744* (SPF): XX0000, XX0000, XX0000, XX0000. *Asteropsis megapotamica* Marchesi, Bonifacino & Sancho. Brazil, Rio Grande do Sul, Manoel Viana, 1.III.2010, *G. Heiden 1317* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis acaulis* (Wedd. ex R.E.Fries) Cabrera. Bolivia, Potosí, Antonio Quijarro, 17.XI.2012, *G. Heiden 2027* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis albilanosa* A. S. Oliveira & Deble. Brazil, Rio Grande do Sul, Manoel Viana, 1.III.2010, *G. Heiden 1313* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis aliena* (Spreng.) Joch. Müll. Brazil, Santa Catarina, Bom Jardim da Serra, 13.I.2011, *G. Heiden 1508* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis alleluia* A.S. Oliveira & Deble. Brazil, Bahia, Guiné, 10.X.2010, *A.C. Fernandes 178* (BHCB): XX0000, XX0000, XX0000, XX0000. *Baccharis altimontana* G. Heiden, Baumgratz & Esteves. Brazil, Rio de Janeiro, Itatiaia, 9.XI.2012, *C.T. Oliveira 732* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis angusticeps* Heering ex Malme. Brazil, Paraná, Guaratuba, 17.XII.2010, *G. Heiden 1445* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis angustifolia* Michx. United States of America, Florida, Miami-Dade, 20.VII.2012, *G. Heiden 1918* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis anomala* DC. Brazil, São Paulo, São Paulo, 10.IX.2011, *G. Heiden 1694* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis antioquiensis* Killip & Cuatrec. Colombia, Antioquia, Belmira, 27.IV.2013, *G. Heiden 2075* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis aphylla* (Vell.) DC. Brazil, São Paulo, Franco da Rocha, 17.IX.2011, *G. Heiden 1712* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis apicifolia* A.A.Schneid & Boldrini. Brazil, Santa Catarina, Urubici, 2.IV.2010, *G. Heiden 1327* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis aracatubaensis* Malag. Brazil, Paraná, Guaratuba, 17.XII.2010, *G. Heiden 1448* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis arenaria* Baker. Brazil, Rio Grande do Sul, Rio Grande, 29.I.2010, *G. Heiden 1191* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis argentina* Heering. Argentina, Catamarca, Paclín, 28.II.2012, *G. Heiden 1855* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis arguta* Gillies ex Hook. & Arn. Bolivia, La Paz, Larecaja, 21.XI.2012, *G. Heiden 2039* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis artemisioides* Hook. & Arn. Argentina, Catamarca, Ambato, 27.II.2012, *G. Heiden 1848* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis articulata* (Lam.) Pers. Brazil, Santa Catarina, Campos Novos, 21.X.2009, *G. Heiden 1117* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis bicolor* (Joch.Müll.) G. Heiden. Bolivia, La Paz, Inquisivi, 24.XI.2012, *G. Heiden 2061* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis bifrons* Baker. Brazil, Rio de Janeiro, Arraial do Cabo, 28.XI.2007, *G. Heiden 917* (RB): XX0000, XX0000, XX0000, XX0000. *Baccharis bogotensis* Kunth. Colombia, Cundinamarca, Guasca, 15.VIII.2013, *G. Heiden 2135* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis boliviensis* (Wedd.) Cabrera. Bolivia, Potosí, Antonio Quijarro, 17.XI.2012, *G. Heiden 2029* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis brevifolia* DC. Brazil, São Paulo, Franco da Rocha, 17.IX.2011, *G. Heiden 1711* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis breviseta* DC. Colombia, Cundinamarca, Guasca, 15.VIII.2013, *G. Heiden 2131* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis buchtienii* H.Rob. Bolivia, La Paz, Nor Yungas, 23.XI.2012, *G. Heiden 2056* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis burchellii* Baker. Brazil, Rio de Janeiro, Resende, 12.IX.2007, *G. Heiden 816* (RB): XX0000, XX0000, XX0000, XX0000. *Baccharis buxifolia* (Lam.)

DC. Peru, Cusco, Viscochone, 13.IX.2013, *C.M. Siniscalchi 397* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis caespitosa* (Ruiz & Pav.) Pers. Bolivia, La Paz, Nor Yungas, 23.XI.2012, *G. Heiden 2050* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis caldasiana* Cuatrec. Colombia, Antioquia, Belmira, 27.IV.2013, *G. Heiden 2084* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis calliprinos* Griseb. Argentina, Tucumán, Tafí del Valle, 29.II.2012, *G. Heiden 1858* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis calvescens* DC. Brazil, Minas Gerais, Santana do Riacho, 14.VI.2010, *G. Heiden 1356* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis caprariifolia* DC. Brazil, Paraná, Balsa Nova, 15.XII.2010, *G. Heiden 1416* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis chilco* Kunth. Colombia, Tolima, Melgar, 11.VIII.2013, *G. Heiden 2118* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis chionolaenoides* D. Falkenberg & Deble. Brazil, Santa Catarina, Urubici, 13.XI.2011, *G. Heiden 1800* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis ciliata* Gardner. Brazil, Rio de Janeiro, Teresópolis, 29.IV.2008, *G. Heiden 1000* (RB): XX0000, XX0000, XX0000, XX0000. *Baccharis cinerea* DC. Brazil, Espírito Santo, Pinheiros, 19.I.2008, *G. Heiden 952* (RB): XX0000, XX0000, XX0000, XX0000. *Baccharis cognata* DC. Brazil, Rio Grande do Sul, Pedras Altas, 26.II.2010, *G. Heiden 1263* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis concinna* G.M.Barroso. Brazil, Minas Gerais, Santana do Riacho, 14.VI.2010, *G. Heiden 1350* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis conyzoides* (Less.) DC. Brazil, São Paulo, São Paulo, 12.XI.2010, *G. Heiden 1410* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis coridifolia* DC. Brazil, Rio Grande do Sul, Hulha Negra, 26.II.2010, *G. Heiden 1268* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis coronata* Giuliano. Brazil, Santa Catarina, Urubici, 13.XI.2011, *G. Heiden 1791* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis crispa* Spreng. Uruguay, Lavalleja, Minas, 4.I.2011, *G. Heiden 1465* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis cultrata* Baker. Brazil, Rio Grande do Sul, Santana do Livramento, 27.II.2010, *G. Heiden 1278* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis curitybensis* Heering ex Malme. Brazil, São Paulo, Campos do Jordão, 18.XI.2011, *G. Heiden 1817* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis darwinii* Hook. & Arn. Argentina, Tucumán, Tafí del Valle, 16.III.2011, *G. Heiden 1659* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis debilis* Rusby. Bolivia, Santa Cruz, Florida, 14.XI.2012, *G. Heiden 2017* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis deblei* A. S. Oliveira & Marchiori. Brazil, Santa Catarina, Urubici, 2.IV.2010, *G. Heiden 1331* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis decussata* Klatt. Colombia, Quindío, Salento, 10.VIII.2013, *G. Heiden 2115* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis deltoidea* Baker. Brazil, Rio Grande do Sul, Alegrete, 25.X.2012, *G. Heiden 2007* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis densa* (N.E. Br.) V.M. Badillo. Brazil, Roraima, Uiramutã, no date, *P.T. Sano s.n.* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis densiflora* Wedd. Bolivia, La Paz, Omasuyos, 20.XI.2012, *G. Heiden 2036* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis dentata* (Vell.) G.M.Barroso. Brazil, Santa Catarina, Urubici, 13.XI.2011, *G. Heiden 1802* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis dioica* Vahl. United States of America, Florida, Miami-Dade, 21.VII.2012, *G. Heiden 1920* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis dracunculifolia* DC. Argentina, Catamarca, Paclín, 28.II.2012, *G. Heiden 1851* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis dubia* Deble & A. S. Oliveira. Brazil, Minas Gerais, Alto Caparaó, 1.X.2012, *G. Heiden 1953* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis dunensis* A.A.Schneid. & G. Heiden. Brazil, Rio Grande do Sul, Rio Grande, 25.V.2009, *G. Heiden 1054* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis effusa* Griseb. Argentina, Salta, Cafayate, 29.II.2012, *G.*

*Heiden 1860* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis elliptica* Gardner. Brazil, Minas Gerais, Diamantina, 9.XII.2010, A.C. Fernandes 398 (BHCB): XX0000, XX0000, XX0000, XX0000. *Baccharis erigeroides* DC. Brazil, Santa Catarina, Bom Jardim da Serra, 13.I.2011, G. Heiden 1512 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis famatinensis* Ariza. Argentina, La Rioja, Famatina, 5.III.2012, G. Heiden 1886 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis flabellata* Hook. & Arn. Argentina, Córdoba, Cosquín, 25.III.2011, G. Heiden 1665 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis flexuosiramosa* A.A.Schneid. & Boldrini. Brazil, Santa Catarina, Grão Pará, 12.XI.2011, G. Heiden 1783 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis genistelloides* (Lam.) Pers. Bolivia, La Paz, Nor Yungas, 23.XI.2012, G. Heiden 2051 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis genistifolia* DC. Uruguay, Maldonado, Punta del Este, 4.I.2011, G. Heiden 1467 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis gibertii* Baker. Uruguay, Canelones, Ciudad de la Costa, 1.XI.2011, G. Heiden 1760 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis gilliesii* A. Gray. Argentina, Santa Cruz, Deseado, 9.XII.2009, G. Sancho 139 (US): XX0000, XX0000, XX0000, XX0000. *Baccharis glaziovii* Baker. Brazil, Rio de Janeiro, Resende, 12.IX.2007, G. Heiden 814 (RB): XX0000, XX0000, XX0000, XX0000. *Baccharis glomeruliflora* Pers. United States of America, Florida, Miami-Dade, 20.VII.2012, G. Heiden 1919 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis glutinosa* Pers. Argentina, Mendoza, Las Heras, 25.II.2012, G. Heiden 1828 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis gnaphalioides* Spreng. Brazil, Rio Grande do Sul, Rio Grande, 25.V.2009, G. Heiden 1051 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis gracilis* DC. Brazil, Paraná, Porto Amazonas, 15.XII.2010, G. Heiden 1422 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis grandimucronata* I.L. Teodoro & J. Vidal. Brazil, Rio de Janeiro, Teresópolis, 27.VI.2007, G. Heiden 793 (RB): XX0000, XX0000, XX0000, XX0000. *Baccharis grisebachii* Hieron. Argentina, Mendoza, Las Heras, 25.II.2012, G. Heiden 1839 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis halimifolia* L. United States of America, Florida, Monroe, 20.VII.2012, G. Heiden 1916 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis helichrysoides* DC. Brazil, São Paulo, São Paulo, 10.IX.2011, G. Heiden 1691 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis hemiptera* G. Heiden & A.A. Schneid. Brazil, Minas Gerais, Alto Caparaó, 30.IX.2012, G. Heiden 1950 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis hyemalis* Deble. Brazil, Rio Grande do Sul, Canguçu, 27.X.2011, G. Heiden 1725 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis hypericifolia* Baker. Brazil, Rio Grande do Sul, São Francisco de Paula, 22.XII.2012, G. Heiden 2069 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis illinita* DC. Brazil, Paraná, Palmas, 8.II.2011, G. Heiden 1586 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis imbricata* I.L. Teodoro & J. Vidal. Brazil, Minas Gerais, Alto Caparaó, 30.IX.2012, G. Heiden 1945 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis incarum* (Wedd.) Perkins. Bolivia, Potosí, Tomás Frías, 16.XI.2012, G. Heiden 2023 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis incisa* Hook. & Arn. Brazil, Santa Catarina, Campos Novos, 21.X.2009, G. Heiden 1115 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis incisa var. dentata* DC. Brazil, Rio Grande do Sul, Canguçu, 27.X.2011, G. Heiden 1734 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis inexpectata* Deble & A.S. Oliveira. Brazil, Rio Grande do Sul, Rosário do Sul, 25.X.2012, G. Heiden 2010 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis intermixta* Gardner. Brazil, Minas Gerais, Jaboticatubas, 15.VI.2010, G. Heiden 1370 (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis itatiaiae* Wawra. Brazil, Minas Gerais, Bocaina de Minas, 13.IX.2007, G. Heiden 839 (RB): XX0000, XX0000, XX0000, XX0000. *Baccharis jelskii* Hieron. Bolivia, Cochabamba, Chapare, 25.XI.2012,

*G. Heiden 2067* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis jocheniana*** G. Heiden & Macias. Uruguay, Lavalleja, Minas, 4.I.2011, *G. Heiden 1464* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis juncea*** (Cass.) Desf. Argentina, Tucumán, Tafí del Valle, 20.III.2011, *G. Heiden 1661* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis junciformis*** DC. Brazil, Rio Grande do Sul, Pinheiro Machado, 5.VI.2012, *G. Heiden 1907* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis kurtziana*** Ariza. Argentina, La Rioja, Famatina, 5.III.2012, *G. Heiden 1881* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis lateralis*** Baker. Brazil, Rio Grande do Sul, São José dos Ausentes, 16.I.2011, *G. Heiden 1536* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis latifolia*** (Ruiz & Pav.) Pers. Bolivia, La Paz, Larecaja, 21.XI.2012, *G. Heiden 2042* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis lehmannii*** Klatt. Colombia, Antioquia, Belmira, 27.IV.2013, *G. Heiden 2080* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis leptospermoides*** DC. Brazil, Rio Grande do Sul, Cambará do Sul, 16.VII.2010, *G. Heiden 1397* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis leucocephala*** Dusén. Brazil, Santa Catarina, Urubici, 13.XI.2011, *G. Heiden 1787* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis leucopappa*** DC. Brazil, Rio Grande do Sul, São Francisco de Paula, 20.X.2012, *G. Heiden 1975* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis ligustrina*** DC. Brazil, Minas Gerais, Santana do Riacho, 2.IX.2011, *B. Loewille 548* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis lilloi*** Heering. Argentina, Tucumán, Tafí del Valle, 16.III.2011, *G. Heiden 1654* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis linearifolia*** (Lam.) Pers. Argentina, Córdoba, Cosquín, 25.III.2011, *G. Heiden 1663* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis lloensis*** Hieron. Colombia, Cundinamarca, La Calera, 15.VIII.2013, *G. Heiden 2140* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis lychnophora*** Gardner. Brazil, Minas Gerais, Serra da Piedade, 21.VIII.2011, *A.C. Fernandes 922* (BHCB): XX0000, XX0000, XX0000, XX0000. ***Baccharis macrophylla*** Dusén. Brazil, Rio de Janeiro, Resende, 12.IX.2007, *G. Heiden 827* (RB): XX0000, XX0000, XX0000, XX0000. ***Baccharis magnifica*** G. Heiden, Leoni & J.N.Nakaj. Brazil, Espírito Santo, Ibitirama, 1.X.2012, *G. Heiden 1955* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis malmei*** Joch. Müll. Brazil, São Paulo, São Paulo, 10.IX.2011, *G. Heiden 1703* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis maritima*** Baker. Uruguay, Rocha, Punta del Diablo, 30.I.2010, *G. Heiden 1214* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis maxima*** Baker. Brazil, Rio de Janeiro, Itatiaia, 13.IV.2008, *G. Heiden 980* (RB): XX0000, XX0000, XX0000, XX0000. ***Baccharis megapotamica*** Spreng. Brazil, Rio Grande do Sul, Canguçu, 26.I.2010, *G. Heiden 1184* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis mesoneura*** DC. Brazil, São Paulo, São Paulo, 10.IX.2011, *G. Heiden 1700* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis microcephala*** (Less.) DC. Brazil, Rio Grande do Sul, Cambará do Sul, 17.VIII.2010, *G. Heiden 1399* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis microdonta*** DC. Brazil, Paraná, Palmeira, 9.II.2011, *G. Heiden 1599* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis milleflora*** (Less.) DC. Brazil, Paraná, Balsa Nova, 15.XII.2010, *G. Heiden 1414* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis minutiflora*** Mart. ex Baker. Brazil, Minas Gerais, Santana do Riacho, 14.VI.2010, *G. Heiden 1364* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis montana*** DC. Brazil, São Paulo, Franco da Rocha, 17.IX.2011, *G. Heiden 1718* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis multifolia*** A.S. Oliveira, Deble & Marchiori. Brazil, Rio Grande do Sul, São Francisco de Assis, 24.X.2012, *G. Heiden 2002* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis myricifolia*** DC. Brazil, Minas Gerais, Santana do Riacho, 17.II.2011, *G. Heiden 1615* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis myriocephala*** DC. Brazil, Rio de

Janeiro, Miguel Pereira, 18.IV.2007, *G. Heiden* 727 (RB): XX0000, XX0000, XX0000, XX0000. ***Baccharis napaea*** G. Heiden. Brazil, Paraná, Palmas, 8.II.2011, *G. Heiden* 1581 (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis neaei*** DC. Argentina, Chubut, Languiñeo, 11.XII.2009, *G. Sancho* 157 (US): XX0000, XX0000, XX0000, XX0000. ***Baccharis nebularis*** G. Heiden. Brazil, Paraná, Guaratuba, 17.XII.2010, *G. Heiden* 1450 (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis neglecta*** Britton. United States of America, Texas, Eastland, 26.VII.2012, *G. Heiden* 1937 (SPF): X0000, XX0000, XX0000, XX0000. ***Baccharis neorupestris*** Deble & A. S. Oliveira. Argentina, Jujuy, Tumbaya, 3.III.2012, *G. Heiden* 1871 (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis niederleinii* var. *potrerillana*** Ariza. Argentina, La Rioja, Famatina, 5.III.2012, *G. Heiden* 1884 (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis nitida*** (Ruiz & Pav.) Pers. Bolivia, La Paz, Nor Yungas, 23.XI.2012, *G. Heiden* 2059 (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis nivalis*** (Wedd.) Sch. Bip. ex Phil. Argentina, Santa Cruz, Lago Argentino, 16.XII.2009, *M. Bonifacino* 4024 (US): XX0000, XX0000, XX0000, XX0000. ***Baccharis notoserquilla*** Griseb. Brazil, Rio Grande do Sul, Barra do Quaraí, 28.II.2010, *G. Heiden* 1297 (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis nummularia*** Heering ex Malme. Brazil, Paraná, Balsa Nova, 15.XII.2010, *G. Heiden* 1417 (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis obdeltata*** G. Heiden. Brazil, Minas Gerais, Santana do Riacho, 16.VI.2010, *G. Heiden* 1385 (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis oblongifolia*** (Ruiz & Pav.) Pers. Colombia, Antioquia, Jardín, 29.IV.2013, *G. Heiden* 2090 (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis ochracea*** Spreng. Uruguay, Rocha, Castillos, 30.I.2010, *G. Heiden* 1209 (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis odorata*** Kunth. Peru, Cusco, Viscochone, 13.IX.2013, *C.M. Siniscalchi* 395 (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis opuntioides*** Mart. ex Baker. Brazil, Minas Gerais, Alto Caparaó, 30.IX.2012, *G. Heiden* 1949 (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis orbignyana*** Klatt. Brazil, Distrito Federal, Brasília, 30.XI.2013, *C.T. Oliveira* 926 (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis organensis*** Baker. Brazil, Rio de Janeiro, Teresópolis, 27.VI.2007, *G. Heiden* 795 (RB): XX0000, XX0000, XX0000, XX0000. ***Baccharis oxyodonta*** DC. Brazil, Minas Gerais, Itamonte, 12.IX.2007, *G. Heiden* 810 (RB): XX0000, XX0000, XX0000, XX0000. ***Baccharis palustris*** Heering. Uruguay, Canelones, Ciudad de la Costa, 1.XI.2011, *G. Heiden* 1756 (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis pampeana*** A.S. Oliveira, Deble & Marchiori. Brazil, Rio Grande do Sul, Quaraí, 27.II.2010, *G. Heiden* 1287 (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis paniculata*** DC. Chile, Región Metropolitana de Santiago, La Reina, 23.II.2012, *G. Heiden* 1826 (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis papillosa* subsp. *chaparensis*** Joch. Müll. Bolivia, Cochabamba, Chapare, 25.XI.2012, *G. Heiden* 2066 (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis papillosa* subsp. *integrifolia*** Joch. Müll. Bolivia, La Paz, Inquisivi, 24.XI.2012, *G. Heiden* 2060 (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis papillosa* subsp. *yungensis*** Joch. Müll. Bolivia, La Paz, Nor Yungas, 23.XI.2012, *G. Heiden* 2057 (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis paranensis*** Heering & Dusén. Brazil, Santa Catarina, Grão Pará, 12.XI.2011, *G. Heiden* 1782 (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis parvidentata*** Malag. Brazil, Rio de Janeiro, Teresópolis, 27.VI.2007, *G. Heiden* 789 (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis patagonica*** Hook. & Arn. Argentina, Santa Cruz, Lago Argentino, 16.XII.2009, *M. Bonifacino* 4026 (US): XX0000, XX0000, XX0000, XX0000. ***Baccharis patens*** Baker. Brazil, Rio Grande do Sul, Canguçu, 27.X.2011, *G. Heiden* 1732 (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis pauciflosculosa*** DC. Brazil, Paraná, Balsa Nova, 7.II.2011, *G. Heiden* 1558 (SPF): XX0000, XX0000, XX0000,

XX0000. *Baccharis pedersenii* Cabrera. Brazil, Rio Grande do Sul, Quaraí, 27.II.2010, *G. Heiden 1291* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis pedunculata* (Mill.) Cabrera. Colombia, Antioquia, Jardín, 30.IV.2013, *G. Heiden 2094* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis penningtonii* Heering. Uruguay, Lavalleja, La Mariscal, 6.I.2011, *G. Heiden 1472* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis pentaptera* (Less.) DC. Brazil, Santa Catarina, Capão Alto, 10.I.2011, *G. Heiden 1477* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis pentlandii* DC. Bolivia, La Paz, Nor Yungas, 23.XI.2012, *G. Heiden 2053* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis pentodonta* Malme. Brazil, Santa Catarina, Capão Alto, 1.VI.2012, *G. Heiden 1894* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis perlata* DC. Brazil, Minas Gerais, Diamantina, 20.II.2011, *G. Heiden 1637* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis perulata* Kuntze. Argentina, Tucumán, Tafí del Valle, 16.III.2011, *G. Heiden 1650* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis phyllicifolia* DC. Brazil, Rio Grande do Sul, São José dos Ausentes, 16.I.2011, *G. Heiden 1528* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis phyteumoides* (Less.) DC. Uruguay, Lavalleja, La Mariscal, 6.I.2011, *G. Heiden 1471* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis pilularis* DC. United States of America, California, Los Angeles, 22.VII.2012, *G. Heiden 1922* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis pingraea* DC. Brazil, Rio Grande do Sul, Barra do Quaraí, 28.II.2010, *G. Heiden 1302* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis platypoda* DC. Brazil, Minas Gerais, Santana do Riacho, 14.VI.2010, *G. Heiden 1347* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis plummerae* A. Gray. United States of America, California, Los Angeles, 22.VII.2012, *G. Heiden 1925* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis pluricapitulata* (Deble) G. Heiden. Brazil, Rio Grande do Sul, Pinheiro Machado, 5.VI.2012, *G. Heiden 1906* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis polifolia* Griseb. Argentina, Tucumán, Tafí del Valle, 16.III.2011, *G. Heiden 1657* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis polycephala* Wedd. Bolivia, La Paz, Omasuyos, 20.XI.2012, *G. Heiden 2033* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis polygona* Baker. Brazil, Minas Gerais, Santana do Riacho, 14.VI.2010, *G. Heiden 1361* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis polyphylla* Gardner. Brazil, Bahia, Rio de Contas, 12.X.2010, *A.C. Fernandes 190* (BHCB): XX0000, XX0000, XX0000, XX0000. *Baccharis prunifolia* Kunth. Colombia, Cundinamarca, San Antonio del Tequendama, 9.VIII.2013, *G. Heiden 2113* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis pseudovaccinioides* Gardner. Brazil, Rio de Janeiro, Teresópolis, 27.VI.2007, *G. Heiden 781* (RB): XX0000, XX0000, XX0000, XX0000. *Baccharis pseudovillosa* Malag. & J. Vidal. Brazil, Santa Catarina, Urubici, 2.IV.2010, *G. Heiden 1330* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis psiadioides* (Less.) Joch. Müll. Brazil, Rio Grande do Sul, Canguçu, 27.X.2011, *G. Heiden 1733* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis punctulata* DC. Brazil, São Paulo, São Paulo, 2.IV.2012, *G. Heiden 1892* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis quitensis* Kunth. Bolivia, Santa Cruz, Florida, 14.XI.2012, *G. Heiden 2018* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis racemosa* (Ruiz & Pav.) DC. Chile, Región 8, Ñuble, 29.II.2012, *M. Muñoz-Schick 5336* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis ramboi* G. Heiden & Macias. Brazil, Rio Grande do Sul, São José dos Ausentes, 16.I.2011, *G. Heiden 1527* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis ramosissima* Gardner. Brazil, Minas Gerais, Santana do Riacho, 14.VI.2010, *G. Heiden 1354* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis regnellii* Sch.Bip. ex Baker. Brazil, São Paulo, Campos do Jordão, 18.XI.2011, *G. Heiden 1815* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis retamoides* Phil. Argentina, Mendoza, Las Heras, 25.II.2012, *G.*

*Heiden 1831* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis reticularia*** DC. Brazil, Minas Gerais, Gouveia, 19.II.2011, *G. Heiden 1630* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis reticularioides*** Deble & A. S. Oliveira. Brazil, Paraná, Palmeira, 15.XII.2010, *G. Heiden 1426* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis retusa*** DC. Brazil, Rio Grande do Sul, Cambará do Sul, 22.X.2012, *G. Heiden 1991* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis revoluta*** Kunth. Colombia, Bogotá, Sumapaz, 12.VIII.2013, *G. Heiden 2122* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis riograndensis*** Teodoro & J. Vidal. Brazil, Rio Grande do Sul, Cerrito, 26.II.2010, *G. Heiden 1243* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis rivularis*** Gardner. Brazil, Distrito Federal, Brasília, 20.IV.2011, *G. Heiden 1689* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis rufidula*** (Spreng.) Joch. Müll. Brazil, Minas Gerais, Santana do Riacho, 14.VI.2010, *G. Heiden 1362* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis rupicola*** Kunth. Colômbia, Bogotá, Usme, 12.VIII.2013, *G. Heiden 2127* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis sagittalis*** (Less.) DC. Brazil, Santa Catarina, Urubici, 2.IV.2010, *G. Heiden 1329* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis salicifolia*** (Ruiz & Pav.) Pers United States of America, California, Los Angeles, 22.VII.2012, *G. Heiden 1923* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis salicifolia*** subsp. ***multibracteata*** Joch. Müll. Peru, Cusco, Viscochone, 13.IX.2013, *C.M. Siniscalchi 393* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis salicina*** Torr. & A.Gray. United States of America, New Mexico, Socorro, 25.VII.2012, *G. Heiden 1933* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis saliens*** Rusby. Bolivia, La Paz, Nor Yungas, 23.XI.2012, *G. Heiden 2058* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis sarothroides*** A.Gray. United States of America, Arizona, Mohave, 23.VII.2012, *G. Heiden 1929* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis scabrifolia*** G. Heiden. Brazil, Santa Catarina, Capão Alto, 10.I.2011, *G. Heiden 1475* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis scopulorum*** A.A.Schneid. & G. Heiden. Brazil, Santa Catarina, Grão Pará, 12.XI.2011, *G. Heiden 1779* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis sculpta*** Griseb. Argentina, Tucumán, Tafí del Valle, 16.III.2011, *G. Heiden 1645* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis semiserrata*** DC. Brasil, Paraná, Curitiba, 16.XII.2010, *G. Heiden 1441* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis sergiloides*** A.Gray. United States of America, New Mexico, Roswell, 25.VII.2012, *G. Heiden 1935* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis serrula*** Sch. Bip. ex Baker. Brazil, Minas Gerais, Catas Altas, 26.III.2011, *A.C. Fernandes 763* (BHCB): XX0000, XX0000, XX0000, XX0000. ***Baccharis serrulata*** (Lam.) Pers. Brazil, Minas Gerais, Jaboticatubas, 18.II.2011, *G. Heiden 1618* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis sessiliflora*** Vahl. Brazil, Paraná, Palmeira, 21.III.2013, *C.T. Oliveira 793* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis simplex*** G. Heiden. Brazil, Minas Gerais, Jaboticatubas, 17.II.2011, *G. Heiden 1610* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis singularis*** (Vell.) G. M. Barroso. Brazil, Rio de Janeiro, Santa Maria Madalena, 25.IX.2012, *C.T. Oliveira 678* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis solomonii*** H. Rob. Peru, Cusco, Paucartambo, 13.IX.2014, *C.M. Siniscalchi 400* (SPF): XX0000, XX0000, XX0000, XX0000. ***Baccharis*** sp. **ACF177**. Brazil, Bahia, Guiné, 10.X.2010, *A.C. Fernandes 177* (BHCB): XX0000, XX0000, XX0000, XX0000. ***Baccharis*** sp. **ACF187**. Brazil, Bahia, Mucugê, 11.X.2010, *A.C. Fernandes 187* (BHCB): XX0000, XX0000, XX0000, XX0000. ***Baccharis*** sp. **ACF191**. Brazil, Bahia, Rio de Contas, 12.X.2010, *A.C. Fernandes 191* (BHCB): XX0000, XX0000, XX0000, XX0000. ***Baccharis*** sp. **ACF196**. Brazil, Bahia, Rio de Contas, 12.X.2010, *A.C. Fernandes 196* (BHCB): XX0000, XX0000, XX0000, XX0000. ***Baccharis*** sp. **ACF236**. Brazil, Bahia, Rio de Contas, 13.X.2010, *A.C. Fernandes 236* (BHCB):

XX0000, XX0000, XX0000, XX0000. *Baccharis sp.* **GH1146**. Brazil, Rio Grande do Sul, São Lourenço do Sul, 21.XI.2009, *G. Heiden 1146* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis sp.* **GH1460**. Uruguay, Treinta y Tres, Treinta y Tres, 3.I.2011, *G. Heiden 1460* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis sp.* **GH1560**. Brazil, Paraná, Palmeira, 7.II.2011, *G. Heiden 1560* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis sp.* **GH1788**. Brazil, Santa Catarina, Urubici, 13.XI.2011, *G. Heiden 1788* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis sp.* **GH1873** Kunth. Argentina, Jujuy, Tumbaya, 3.III.2012, *G. Heiden 1873* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis sp.* **GH2091**. Colombia, Antioquia, Jardín, 29.IV.2013, *G. Heiden 2091* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis sp.* **VR102**. Brazil, Bahia, Palmeiras, 6.I.2012, *V. Rivera 102* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis spartioides* (Hook. & Arn. ex DC.) Remy. Argentina, Mendoza, Luján de Cuyo, 26.II.2012, *G. Heiden 1840* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis sphagnophila* A.A.Schneid. & G. Heiden. Brazil, Santa Catarina, Urubici, 12.I.2011, *G. Heiden 1497* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis sphenophylla* Dusén ex Malme. Brazil, Paraná, Jaguariaíva, 16.XII.2010, *G. Heiden 1438* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis spicata* (Lam.) Baill. Uruguay, Rocha, Castillos, 30.I.2010, *G. Heiden 1205* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis stenophylla* Ariza. Argentina, Tucumán, Tafí del Valle, 16.III.2011, *G. Heiden 1652* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis stylosa* Gardner. Brazil, Rio de Janeiro, Teresópolis, 24.IX.2007, *G. Heiden 860* (RB): XX0000, XX0000, XX0000, XX0000. *Baccharis subalata* Wedd. Bolivia, Cochabamba, Chapare, 25.XI.2012, *G. Heiden 2064* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis subalata var. vargasii* Joch. Müll. Bolivia, Santa Cruz, Manuel María Caballero, 15.XI.2012, *G. Heiden 2021* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis subdentata* DC. Brazil, São Paulo, Franco da Rocha, 17.IX.2011, *G. Heiden 1717* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis subopposita* DC. Brazil, Rio Grande do Sul, Caçapava do Sul, 26.X.2012, *G. Heiden 2012* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis subtropicalis* G. Heiden. Brazil, Santa Catarina, Bom Jardim da Serra, 13.I.2011, *G. Heiden 1509* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis tarchonanthoides* DC. Brazil, São Paulo, Franco da Rocha, 17.IX.2011, *G. Heiden 1708* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis teindalensis* Kunth. Colombia, Cundinamarca, La Calera, 15.VIII.2013, *G. Heiden 2139* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis thymifolia* Hook. & Arn. Argentina, Mendoza, Las Heras, 25.II.2012, *G. Heiden 1836* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis tola* Phil. Bolivia, Potosí, Antonio Quijarro, 17.XI.2012, *G. Heiden 2026* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis tricuneata* (L.f.) Pers. Colombia, Bogotá, Sumapaz, 12.VIII.2013, *G. Heiden 2128* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis tricuneata var. procumbens* Cuatrec. Colombia, Bogotá, Usme, 12.VIII.2013, *G. Heiden 2123* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis tridentata* Vahl. Brazil, Rio Grande do Sul, São José dos Ausentes, 23.I.2011, *A.C. Fernandes 493* (BHCB): XX0000, XX0000, XX0000, XX0000. *Baccharis trilobata* A. S. Oliveira & Marchiori. Brazil, Paraná, Palmeira, 9.II.2011, *G. Heiden 1602* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis trinervis* (Lam.) Pers. Brazil, Minas Gerais, Alto Caparaó, 30.IX.2012, *G. Heiden 1939* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis trineura* Soria & Zardini. Brazil, São Paulo, São Paulo, 2.IV.2012, *G. Heiden 1889* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis truncata* Gardner. Brazil, Minas Gerais, Diamantina, 20.II.2011, *G. Heiden 1635* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis tucumanensis* Hook. & Arn. Argentina, Tucumán, Tafí del Valle, 16.III.2011, *G. Heiden 1642* (SPF): XX0000, XX0000, XX0000,



XX0000. *Baccharis uleana* Malag. Brazil, Santa Catarina, Palhoça, 15.XI.2011, *G. Heiden 1812* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis ulicina* Hook. & Arn. Argentina, Catamarca, Ambato, 27.II.2012, *G. Heiden 1846* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis umbellata* G. Heiden & O.S. Ribas. Brazil, Paraná, Campina Grande do Sul, 5.XI.2011, *G. Felitto 200* (MBM): XX0000, XX0000, XX0000, XX0000. *Baccharis umbelliformis* DC. Argentina, Chubut, Futaleufe, 11.XII.2009, *G. Sancho 154* (US): XX0000, XX0000, XX0000, XX0000. *Baccharis uncinella* DC. Brazil, Paraná, Balsa Nova, 15.XII.2010, *G. Heiden 1418* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis urvilleana* Brongn. Brazil, Rio Grande do Sul, Torres, 22.X.2012, *G. Heiden 1993* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis vernicosa* Hook. & Arn. Brazil, Rio Grande do Sul, Santana do Livramento, 27.II.2010, *G. Heiden 1279* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis vincifolia* Baker. Uruguay, Treinta y Tres, Treinta y Tres, 3.I.2011, *G. Heiden 1461* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis vismioides* DC. Brazil, São Paulo, São Paulo, 10.IX.2011, *G. Heiden 1702* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis vulneraria* Baker. Brazil, Paraná, Piraquara, 17.XII.2010, *G. Heiden 1451* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis wagenitzii* (F. H. Hellw.) Joch. Müll. Brazil, Santa Catarina, Grão Pará, 12.XI.2011, *G. Heiden 1776* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis weirii* Baker. Brazil, Santa Catarina, Capão Alto, 10.I.2011, *G. Heiden 1476* (SPF): XX0000, XX0000, XX0000, XX0000. *Baccharis wrightii* A.Gray. United States of America, New Mexico, Valencia, 25.VII.2012, *G. Heiden 1934* (SPF): XX0000, XX0000, XX0000, XX0000. *Bellis perennis* L. Sweden, Västra Götaland, Göteborg, 1.VII.2013, *G. Heiden 2110* (SPF): XX0000, XX0000, XX0000, XX0000. *Conyza chilensis* Spreng. Brazil, Paraná, Curitiba, 14.XII.2010, *G. Heiden 1413* (SPF): XX0000, XX0000, XX0000, XX0000. *Diplostephium alveolatum* Cuatrec. Colombia, Bogotá, Sumapaz, 12.VIII.2013, *G. Heiden 2124* (SPF): XX0000, XX0000, XX0000, XX0000. *Diplostephium rosmarinifolium* (Benth.) Wedd. Colombia, Antioquia, Belmira, 27.IV.2013, *G. Heiden 2079* (SPF): XX0000, XX0000, XX0000, XX0000. *Erigeron uniflorus* L. Iceland, Austurland, Hornafjörður, 25.VI.2013, *G. Heiden 2109* (SPF): XX0000, XX0000, XX0000, XX0000. *Exostigma notobellidiastrum* (Griseb.) G. Sancho. Brazil, São Paulo, São Paulo, 2.IV.2012, *G. Heiden 1893* (SPF): XX0000, XX0000, XX0000, XX0000. *Exostigma rivulare* (Gardner) G. Sancho. Brazil, Minas Gerais, Alto Caparaó, 30.IX.2012, *G. Heiden 1938* (SPF): XX0000, XX0000, XX0000, XX0000. *Haplopappus velutinus* Remy. Chile, Região Metropolitana de Santiago, San José de Maipo, 23.II.2012, *G. Heiden 1827* (SPF): XX0000, XX0000, XX0000, XX0000. *Hysterionica nidorelloides* (DC.) Baker. Brazil, Rio Grande do Sul, Santana do Livramento, 27.II.2010, *G. Heiden 1271* (SPF): XX0000, XX0000, XX0000, XX0000. *Inulopsis scaposa* (DC.) O.Hoffm. Brazil, Paraná, Porto Amazonas, 15.XII.2010, *G. Heiden 1420* (SPF): XX0000, XX0000, XX0000, XX0000. *Leptostelma catharinense* (Cabrera) A.M.Teles & Sobral. Brazil, Santa Catarina, Urubici, 12.I.2011, *G. Heiden 1492* (SPF): XX0000, XX0000, XX0000, XX0000. *Neja filiformis* (Spreng.) Nees. Brazil, Rio Grande do Sul, Pedras Altas, 26.II.2010, *G. Heiden 1259* (SPF): XX0000, XX0000, XX0000, XX0000. *Noticastrum calvatum* (Baker) Cuatrec. Brazil, São Paulo, São Paulo, 2.IV.2012, *G. Heiden 1890* (SPF): XX0000, XX0000, XX0000, XX0000. *Noticastrum marginatum* (Kunth) Cuatrec. Bolivia, Cochabamba, Chapare, 25.XI.2012, *G. Heiden 2063* (SPF): XX0000, XX0000, XX0000, XX0000. *Parastrephia lucida* (Meyen) Cabrera. Bolivia, Potosí, Antonio Quijarro, 17.XI.2012, *G. Heiden 2024* (SPF): XX0000, XX0000, XX0000, XX0000. *Podocoma bellidifolia* Baker. Brazil, São Paulo, Franco da Rocha, 17.IX.2011, *G. Heiden 1714* (SPF): XX0000, XX0000, XX0000, XX0000. *Podocoma hirsuta* (Hook. & Arn.)

Baker. Brazil, Santa Catarina, Bom Jardim da Serra, 13.I.2011, *G. Heiden 1507* (SPF): XX0000, XX0000, XX0000, XX0000. *Solidago chilensis* Meyen. Brazil, Rio Grande do Sul, São Lourenço do Sul, 2.I.2013, *G. Heiden 2071* (SPF): XX0000, XX0000, XX0000, XX0000. *Sommerfeltia spinulosa* (Spreng.) Less. Brazil, Rio Grande do Sul, Santana do Livramento, 27.II.2010, *G. Heiden 1275* (SPF): XX0000, XX0000, XX0000, XX0000. *Symphotrichum graminifolium* (Spreng.) G.L.Nesom. Brazil, Santa Catarina, Bom Jardim da Serra, 13.I.2011, *G. Heiden 1510* (SPF): XX0000, XX0000, XX0000, XX0000.

## SUPPLEMENTARY TABLES.



**Table S1.** List of genera segregate from *Baccharis*, date of publication, associate information of type species and sampling of type species.

Genus	Publication	Type species	Accepted name of the type species	Sampling
<i>Arrhenachne</i> Cass.	1828	<i>Arrhenachne juncea</i> Cass.	<i>Baccharis juncea</i> (Cass.) Desf.	1
<i>Baccharidastrum</i> Cabrera	1937	<i>Baccharidastrum triplinerveum</i> (Less.) Cabrera	<i>Baccharis vulneraria</i> Baker <i>Baccharis pohlii</i> (Baker) Deble & A.S.Oliveira	1
<i>Baccharidiopsis</i> G.M.Barroso	1975	<i>Baccharidiopsis pohlii</i> (Baker) G.M.Barroso	A.S.Oliveira	0*
<i>Baccharis</i> L.	1753	<i>Baccharis halimifolia</i> L.	<i>Baccharis halimifolia</i> L.	1
<i>Heterothalamulopsis</i> Deble, A.S.Oliveira & Marchiori	2004	<i>Heterothalamulopsis wagenitzii</i> (F.H.Hellwig.) Deble, A.S.Oliveira & Marchiori <i>Marshallia aliena</i> Spreng. = <i>Heterothalamus alienus</i> (Spreng.) Less.	<i>Baccharis wagenitzii</i> (F.H.Hellw.) Joch.Müll.	1
<i>Heterothalamus</i> Less.	1830	(Spreng.) Less.	<i>Baccharis aliena</i> (Spreng.) Joch.Müll.	1
<i>Icma</i> Phil.	1872	<i>Icma involucrata</i> Phil.	<i>Baccharis gilliesii</i> A.Gray	1
<i>Lanugothamnus</i> Deble	2012	<i>Lanugothamnus helichrysoides</i> (DC.) Deble	<i>Baccharis helichrysoides</i> DC.	1
<i>Molina</i> Ruiz & Pav.	1833	<i>Molina latifolia</i> Ruiz & Pav.	<i>Baccharis latifolia</i> (Ruiz & Pav.) Pers.	1
<i>Neomolina</i> F.H.Hellw.	1993	<i>Neomolina racemosa</i> (Ruiz & Pav.) F.H.Hellw.	<i>Baccharis racemosa</i> (Ruiz & Pav.) Pers. <i>Baccharis nivalis</i> (Wedd.) Sch.Bip. ex Phil.	1
<i>Palenia</i> Phil.	1895	<i>Palenia delfini</i> Phil.	Phil.	1
<i>Pingraea</i> Cass.	1826	<i>Pingraea angustifolia</i> Cass. <i>Vernonia triplinervia</i> Spreng. = <i>Polypappus triplinervis</i> (Spreng.) Less.	<i>Baccharis glutinosa</i> Pers.	1
<i>Polypappus</i> Less.	1831	(Spreng.) Less.	<i>Baccharis trineura</i> Soria & Zardini	1
<i>Pseudobaccharis</i> Cabrera	1944	<i>Pseudobaccharis spartioides</i> (Hook. & Arn. ex DC.) Cabrera	<i>Baccharis spartioides</i> (Hook. & Arn. ex DC.) Remy <i>Baccharis acaulis</i> (Wedd. ex R.E.Fries) Cabrera	1
<i>Psila</i> Phil.	1891	<i>Psila cespitosa</i> Phil.	Cabrera	1
<i>Sergilus</i> Gaertn.	1791	<i>Sergilus scoparius</i> (L.) Gartner	<i>Baccharis scoparia</i> (L.) Swartz	0*
<i>Stephananthus</i> Lehm.	1826	<i>Stephananthus junceus</i> Lehm.	<i>Baccharis juncea</i> (Cass.) Desf. <i>Baccharis humifusa</i> Kunth, <i>Baccharis sinuata</i> Kunth	1
<i>Tursenia</i> Cass.	1825	<i>Baccharis humifusa</i> Kunth, <i>Baccharis sinuata</i> Kunth	<i>sinuata</i> Kunth	0*

**15 (18)**

\*The type species of *Baccharidiopsis* is currently assigned to *B.* subgen. *Molina*; the type species of *Sergilus* and the syntype species of *Tursenia* are assigned to *B.* subgen. *Baccharis*.

**Table S2.** List of subgenera described to *Baccharis* or its segregates, date of publication, associate information of type species and sampling of type species.

Subgenus	Publication	Type species	Accepted name of the type species	Sampling
<i>Baccharis</i>	-	<i>Baccharis halimifolia</i> L.	<i>Baccharis halimifolia</i> L.	1
<i>Coridifolia</i> (DC.) G. Heiden	inedited	<i>Baccharis coridifolia</i> DC.	<i>Baccharis coridifolia</i> DC.	1
<i>Curitybenses</i> (Giuliano) Deble	2012	<i>Lanugothamnus curitybensis</i> (Heering ex Malme) Deble	<i>Baccharis curitybensis</i> Heering ex Malme	1
<i>Heterothalamulopsis</i> (Deble <i>et al.</i> ) G. Heiden	inedited	<i>Baccharis wagenitzii</i> (F. H. Hellw.) Joch.Müll.	<i>Baccharis wagenitzii</i> (F. H. Hellw.) Joch.Müll.	1
<i>Heterothalamus</i> (Less.) G. Heiden	inedited	<i>Baccharis aliena</i> (Spreng.) Joch. Müll.	<i>Baccharis aliena</i> (Spreng.) Joch. Müll.	1
<i>Lanugothamnus</i>	2012	<i>Lanugothamnus helichrysoides</i> (DC.) Deble	<i>Baccharis helichrysoides</i> DC.	1
<i>Molina</i> (Pers.) Heering	1904	<i>Molina latifolia</i> Ruiz & Pav.	<i>Baccharis latifolia</i> (Ruiz & Pav.) Pers.	1
<i>Oblongifolia</i> (DC.) G. Heiden	inedited	<i>Baccharis oblongifolia</i> DC.	<i>Baccharis Oblongifolia</i> DC.	1
<i>Pteronioides</i> Heering	1904	<i>Baccharis pteronioides</i> DC.	<i>Baccharis pteronioides</i> DC.	0
<i>Stephananthus</i> (Lehm.) Heering	1904	<i>Baccharis juncea</i> (Cass.) Desf.	<i>Baccharis juncea</i> (Cass.) Desf.	1
<i>Tarchonanthoides</i> Heering	1904	<i>Baccharis tarchonanthoides</i> DC.	<i>Baccharis tarchonanthoides</i> DC.	1
<i>Tarchonantoides</i> (Heering) Deble	2012	<i>Lanugothamnus tarchonanthoides</i> (DC.) Deble	<i>Baccharis tarchonanthoides</i> DC.	1
<i>Toxicothamnus</i> Deble	2012	<i>Lanugothamnus montevidensis</i> (Spreng.) Deble	<i>Baccharis coridifolia</i> DC.	1
				<b>12 (13)</b>

**Table S3. Part 1.** List of sections described to *Baccharis* or its segregates, date of publication, associate information of type species and sampling of type species.

Section	Publication	Type species	Accepted name of the type species	Sampling
<i>Agglomeratae</i> Giuliano	12.XII.2005	<i>Baccharis platypoda</i> DC.	<i>Baccharis platypoda</i> DC.	1
<i>Albidae</i> Giuliano	23.IX.2011	<i>Baccharis albida</i> Hook. & Arn.	<i>Baccharis albida</i> Hook. & Arn.	0
<i>Andina</i> G. Heiden	inedited	<i>Baccharis teindalensis</i> Kunth	<i>Baccharis teindalensis</i> Kunth	1
<i>Angustifoliae</i> Baker	1882	<i>Baccharis ulicina</i> Hook. & Arn.	<i>Baccharis ulicina</i> Hook. & Arn.	1
<i>Aphyllae</i> Baker	1882	<i>Baccharis aphylla</i> (Vell.) DC.	<i>Baccharis aphylla</i> (Vell.) DC.	1
<i>Arenariae</i> Giuliano	23.IX.2011	<i>Baccharis arenaria</i> Baker	<i>Baccharis arenaria</i> Baker	1
<i>Aristidentes</i> G.L.Nesom	VII.1990	<i>Baccharis multiflora</i> Kunth	<i>Baccharis multiflora</i> Kunth	0
<i>Australes</i> Giuliano	23.IX.2011	<i>Molina racemosa</i> Ruiz & Pav.	<i>Baccharis racemosa</i> (Ruiz & Pav.) Pers.	1
<i>Baccharidastrum</i> (Cabrera) G.L.Nesom	1988	<i>Baccharidastrum triplinervium</i> (Less.) Cabrera	<i>Baccharis vulneraria</i> Baker	1
<i>Baccharis</i>	-	<i>Baccharis halimifolia</i> L.	<i>Baccharis halimifolia</i> L.	1
<i>Bogotenses</i> Cuatrec.	1967	<i>Baccharis bogotensis</i> Kunth	<i>Baccharis bogotensis</i> Kunth	1
<i>Bradeanae</i> G. Heiden	inedited	<i>Baccharis dubia</i> Deble & A. S. Oliveira	<i>Baccharis dubia</i> Deble & A. S. Oliveira	1
<i>Caespitosae</i> Giuliano	23.IX.2011	<i>Molina caespitosa</i> Ruiz & Pav.	<i>Baccharis caespitosa</i> (Ruiz & Pav.) Pers.	1
<i>Canescentes</i> Giuliano	12.XII.2005	<i>Baccharis helichrysoides</i> DC.	<i>Baccharis helichrysoides</i> DC.	1
<i>Caulopterae</i> DC.	1-10.X.1836	<i>Baccharis genistelloides</i> (Lam.) Pers.	<i>Baccharis genistelloides</i> (Lam.) Pers.	1
<i>Coridifoliae</i> Giuliano	23.IX.2011	<i>Baccharis coridifolia</i> DC.	<i>Baccharis coridifolia</i> DC.	1
<i>Corymbosae</i> Heering	1903	<i>Baccharis marginalis</i> DC.	<i>Baccharis salicifolia</i> (Ruiz & Pav.) Pers.	1
<i>Cuneifoliae</i> DC.	1836	<i>Baccharis cuneifolia</i> (Lam.) DC.	<i>Baccharis patagonica</i> Hook. & Arn.	1
<i>Curitybenses</i> Giuliano	12.XII.2005	<i>Baccharis curitybensis</i> Heering ex Malme	<i>Baccharis curitybensis</i> Heering ex Malme	1
<i>Cylindricae</i> Heering	1903	<i>Baccharis santiagensis</i> Heering	<i>Baccharis santiagensis</i> Heering	0
<i>Discolores</i> DC.	1836	<i>Baccharis phyllicoides</i> Kunth	<i>Baccharis phyllicoides</i> Kunth	0
<i>Divaricatae</i> Giuliano	23.IX.2011	<i>Baccharis divaricata</i> Hauman	<i>Baccharis divaricata</i> Hauman	0
<i>Effusae</i> Giuliano	23.IX.2012	<i>Baccharis effusa</i> Griseb.	<i>Baccharis effusa</i> Griseb.	1

**Table S3. Part 2.** List of sections described to *Baccharis* or its segregates, date of publication, associate information of type species and sampling of type species.

Section	Publication	Type species	Accepted name of the type species	Sampling
<i>Frenguellianae</i> Giuliano	23.IX.2011	<i>Baccharis frenguellii</i> Cabrera	<i>Baccharis frenguellii</i> Cabrera	0
<i>Gladiatae</i> Cuatrec.	1967	<i>Baccharis marcetiifolia</i> Benth.	<i>Baccharis marcetiifolia</i> Benth.	0
<i>Glandulicarpae</i> G.L.Nesom	VII.1990	<i>Baccharis wrightii</i> A.Gray	<i>Baccharis wrightii</i> A.Gray	1
<i>Glomeruliflorae</i> Heering	1904	<i>Baccharis glomeruliflora</i> Pers.	<i>Baccharis glomeruliflora</i> Pers.	1
<i>Heterothalamus</i> (Less.) Giuliano	23.IX.2011	<i>Baccharis aliena</i> (Spreng.) Joch.Müll.	<i>Baccharis aliena</i> (Spreng.) Joch.Müll.	1
<i>Icma</i> (Phil.) Giuliano	23.IX.2011	<i>Icma involucrata</i> Phil.	<i>Baccharis gilliesii</i> A.Gray	1
<i>Illinitae</i> G. Heiden	inedited	<i>Baccharis illinita</i> DC.	<i>Baccharis illinita</i> DC.	1
<i>Involucratae</i> Heering	1904	<i>Baccharis conferta</i> Kunth	<i>Baccharis conferta</i> Kunth	0
<i>Lanugothamnus</i>	2012	<i>Lanugothamnus helichrysoides</i> (DC.) Deble	<i>Baccharis helichrysoides</i> DC.	1
<i>Lilloanae</i> Giuliano	23.IX.2011	<i>Baccharis lilloi</i> Heering	<i>Baccharis lilloi</i> Heering	1
<i>Macrophyllae</i> Heering	1904	<i>Baccharis elaeoides</i> Remy	<i>Baccharis elaeoides</i> Remy	0
<i>Megapotamicae</i> Giuliano	23.IX.2012	<i>Baccharis megapotamica</i> Spreng.	<i>Baccharis megapotamica</i> Spreng.	1
<i>Microphyllae</i> Heering	1904	<i>Baccharis patagonica</i> Hook. & Arn.	<i>Baccharis patagonica</i> Hook. & Arn.	1
<i>Molinae</i> (Pers.) Cuatrec.	1967	<i>Molina latifolia</i> Ruiz & Pav.	<i>Baccharis latifolia</i> (Ruiz & Pav.) Pers.	1
<i>Nitidae</i> Cuatrec.	1967	<i>Baccharis nitida</i> (Ruiz & Pav.) Pers.	<i>Baccharis nitida</i> (Ruiz & Pav.) Pers.	1
<i>Oblongifoliae</i> DC.	1836	<i>Baccharis oblongifolia</i> (Ruiz & Pav.) Pers.	<i>Baccharis oblongifolia</i> (Ruiz & Pav.) Pers.	1
<i>Paleatae</i> Giuliano	12.XII.2005	<i>Baccharis retamoides</i> Phil.	<i>Baccharis retamoides</i> Phil.	1
<i>Palenia</i> Giuliano	23.IX.2011	<i>Palenia delfinii</i> Phil.	<i>Baccharis nivalis</i> (Wedd.) Sch.Bip. ex Phil.	1
<i>Paniculatae</i> Heering	1906	<i>Baccharis paniculata</i> DC.	<i>Baccharis paniculata</i> DC.	1
<i>Pedicellatae</i> Heering	1904	<i>Baccharis lycioides</i> Remy	<i>Baccharis lycioides</i> Remy	0
<i>Pinnatae</i> Cuatrec.	1967	<i>Baccharis buddlejoides</i> Kunth	<i>Baccharis buddlejoides</i> Kunth	0
<i>Polifoliae</i> G. Heiden	inedited	<i>Baccharis polifolia</i> Griseb.	<i>Baccharis polifolia</i> Griseb.	1
<i>Pluricephala</i> Deble	2012	<i>Lanugothamnus scabrifolius</i> (G. Heiden) Deble	<i>Baccharis scabrifolia</i> G. Heiden	1
<i>Pluricephalae</i> (Deble) G. Heiden	inedited	<i>Baccharis scabrifolia</i> G. Heiden	<i>Baccharis scabrifolia</i> G. Heiden	1



**Table S3. Part 3.** List of sections described to *Baccharis* or its segregates, date of publication, associate information of type species and sampling of type species.

Section	Publication	Type species	Accepted name of the type species	Sampling
			<i>Baccharis spartioides</i> (Hook. & Arn. ex DC.)	
<i>Pseudobaccharis</i> (Cabrera) Cuatrec.	1982	<i>Heterothalamus spartioides</i> Hook. & Arn. ex DC.	Remy	1
<i>Psila</i> (Phil.) Cuatrec.	1982	<i>Psila caespitosa</i> Phil.	<i>Baccharis acaulis</i> (Wedd. ex R. E. Fr.) Cabrera,	1
<i>Punctatae</i> Giuliano & G.L.Nesom	22.XII.2003	<i>Baccharis bigelovii</i> A. Gray	<i>Baccharis bigelovii</i> A. Gray	0
<i>Racemosae</i> Ariza	1973	<i>Baccharis dracunculifolia</i> DC.	<i>Baccharis dracunculifolia</i> DC.	1
<i>Revolutae</i> Cuatrec.	1967	<i>Baccharis revoluta</i> Kunth	<i>Baccharis revoluta</i> Kunth	1
<i>Rodrigueziana</i> Giuliano	23.IX.2011	<i>Baccharis rodriguezii</i> Ariza	<i>Baccharis rodriguezii</i> Ariza	0
<i>Scandentes</i> Cuatrec.	1967	<i>Baccharis decussata</i> Klatt	<i>Baccharis decussata</i> Klatt	1
<i>Sergilae</i> DC.	1836	<i>Baccharis scoparia</i> (L.) Pers.	<i>Baccharis scoparia</i> (L.) Pers.	0
<i>Sericicarpus</i> Deble [as "Sericicarpa"]	2012	<i>Lanugothamnus leucocephalus</i> (Dusén) Deble	<i>Baccharis leucocephala</i> Dusén	1
<i>Serrulatae</i> Cuatrec.	1967	<i>Baccharis caldasiana</i> Cuatrec.	<i>Baccharis caldasiana</i> Cuatrec.	1
<i>Spicatae</i> Giuliano	23.IX.2011	<i>Baccharis spicata</i> (Lam.) Baill.	<i>Baccharis spicata</i> (Lam.) Baill.	1
<i>Stephananthus</i> (Lehm.) Cuatrec.	1967	<i>Stephananthus junceus</i> Lehm.	<i>Baccharis juncea</i> (Cass.) Desf.	1
<i>Subliguliflorae</i> Giuliano	2001	<i>Baccharis niederleinii</i> Heering	<i>Baccharis niederleinii</i> Heering	0
<i>Tarchonanthoides</i> (Heering) Cuatrecasas	1967	<i>Baccharis tarchonanthoides</i> DC.	<i>Baccharis tarchonanthoides</i> DC.	1
<i>Tenellae</i> Giuliano	23.IX.2011	<i>Baccharis tenella</i> Hook. & Arn.	<i>Baccharis tenella</i> Hook. & Arn.	0
<i>Thymifoliae</i> Giuliano	23.IX.2011	<i>Baccharis thymifolia</i> Hook. & Arn.	<i>Baccharis thymifolia</i> Hook. & Arn.	1
<i>Toxicothamnus</i> Deble	2012	<i>Lanugothamnus montevidensis</i> (Spreng.) Deble	<i>Baccharis coridifolia</i> DC.	1
<i>Tridentatae</i> Giuliano	12.XII.2005	<i>Baccharis tridentata</i> Vahl	<i>Baccharis tridentata</i> Vahl	1
<i>Trinervatae</i> DC.	1836	<i>Baccharis trinervis</i> Pers.	<i>Baccharis trinervis</i> Pers.	1
<i>Tubulatae</i> Cuatrec.	1967	<i>Baccharis grandiflora</i> Kunth	<i>Baccharis grandiflora</i> Kunth	0
<i>Tucumanenses</i> Giuliano	23.IX.2011	<i>Baccharis tucumanensis</i> Hook. & Arn.	<i>Baccharis tucumanensis</i> Hook. & Arn.	1

50 (68)

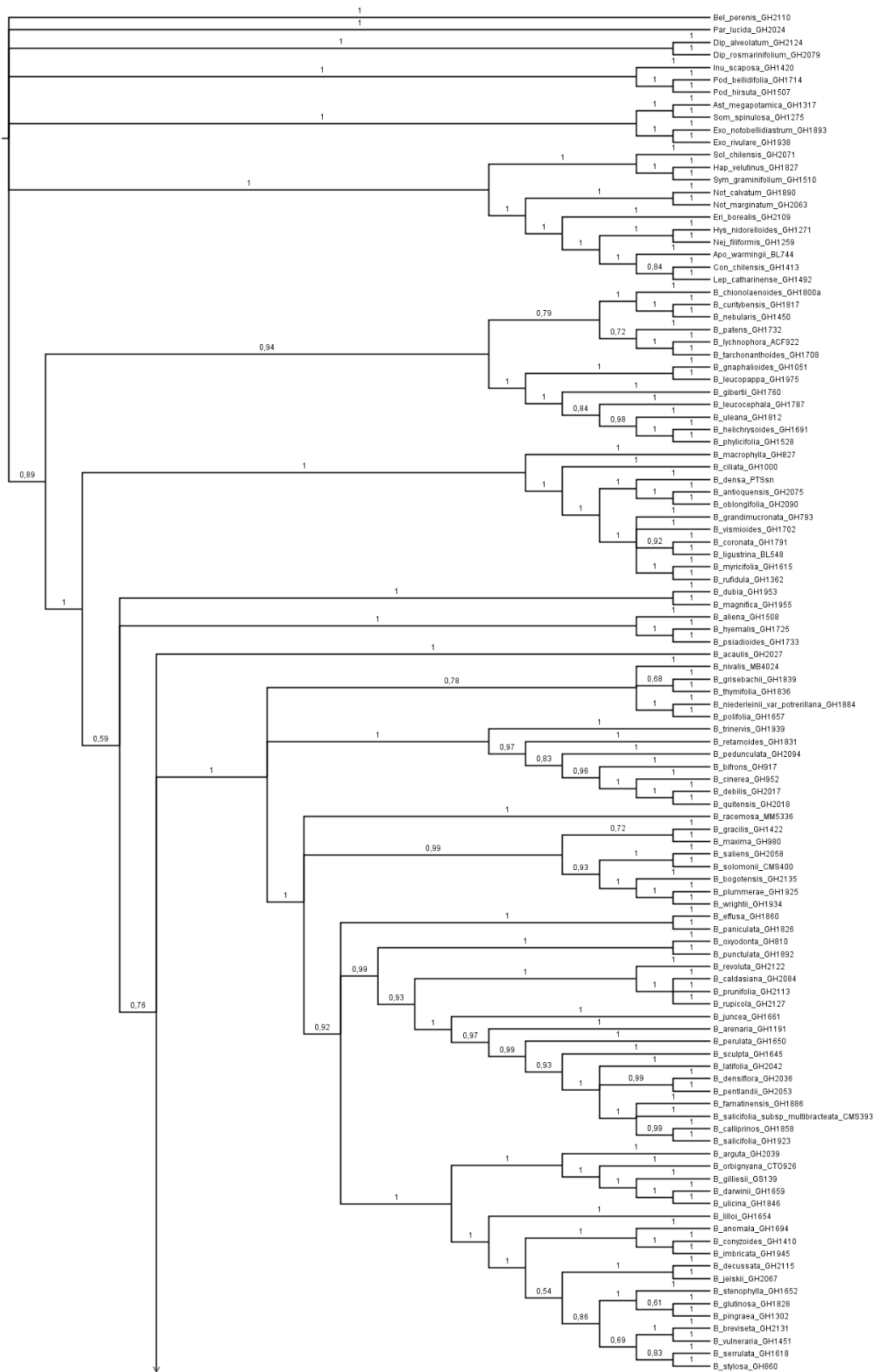
**Table S4.** List of series described to *Baccharis*, date of publication, associate information of type species and sampling of type species.

<b>Series</b>	<b>Publication</b>	<b>Type species</b>	<b>Accepted name of the type species</b>	<b>Sampling</b>
<i>Angustifoliae</i> (Baker) Giuliano	12.XII.2005	<i>Baccharis ulicina</i> Hook. & Arn.	<i>Baccharis ulicina</i> Hook. & Arn.	1
<i>Axillaris</i> Giuliano	12.XII.2005	<i>Baccharis axillaris</i> DC.	<i>Baccharis axillaris</i> DC.	0
<i>Baccharis</i>	-	<i>Baccharis halimifolia</i> L.	<i>Baccharis halimifolia</i> L.	1
<i>Canescentes</i>	-	<i>Baccharis helichrysoides</i> DC.	<i>Baccharis helichrysoides</i> DC.	1
<i>Colliculatae</i> G. Heiden	inedited	<i>Baccharis patens</i> DC.	<i>Baccharis patens</i> DC.	1
<i>Curitybenses</i> (Giuliano) G. Heiden	inedited	<i>Baccharis curitybensis</i> Heering ex Malme	<i>Baccharis curitybensis</i> Heering ex Malme	1
<i>Cylindricae</i> (Heering) Giuliano	12.XII.2005	<i>Baccharis santiagensis</i> Heering	<i>Baccharis santiagensis</i> Heering	1
<i>Hirsutae</i> Giuliano	12.XII.2005	<i>Baccharis muelleri</i> Baker	<i>Baccharis urvilleana</i> Brongn.	1
<i>Gnaphalioides</i> G. Heiden	inedited	<i>Baccharis gnaphalioides</i> Spreng.	<i>Baccharis gnaphalioides</i> Spreng.	1
<i>Lanuginosae</i> Giuliano	12.XII.2005	<i>Baccharis calvescens</i> DC.	<i>Baccharis calvescens</i> DC.	1
<i>Nitidae</i> (Cuatrec.) Giuliano	12.XII.2005	<i>Baccharis nitida</i> (Ruiz & Pav.) Pers.	<i>Baccharis nitida</i> (Ruiz & Pav.) Pers.	1
<i>Tarchonanthoides</i>	-	<i>Baccharis tarchonanthoides</i> DC.	<i>Baccharis tarchonanthoides</i> DC.	1
<i>Uniflorae</i> Giuliano	12.XII.2005	<i>Baccharis uniflora</i> (Ruiz & Pav.) Pers.	<i>Baccharis uniflora</i> (Ruiz & Pav.) Pers.	0
<b>Total</b>				<b>11 (13)</b>

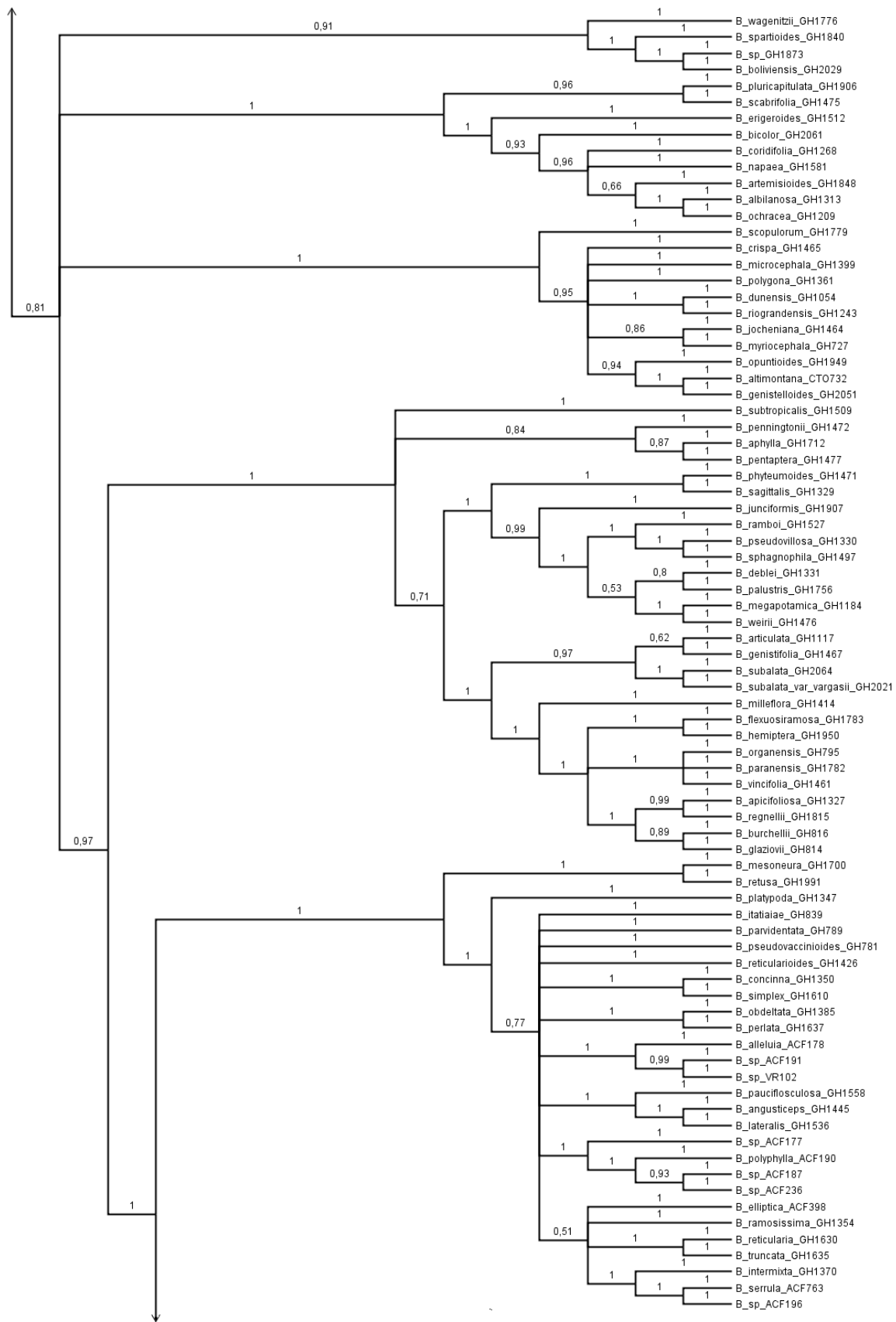
**Table S5.** Summary of sampling of type species of generic segregates and infrageneric taxa and species of *Baccharis*.

<b>Taxonomic level</b>	<b>Total</b>	<b>Sampling</b>	<b>Percentage</b>
<b>Segregated genera</b>	18	15	83.3%
<b>Subgenera</b>	13	12	92.3%
<b>Sections</b>	68	50	73.5%
<b>Series</b>	13	11	84.6%
<b>Species</b>	433	248	57.3%

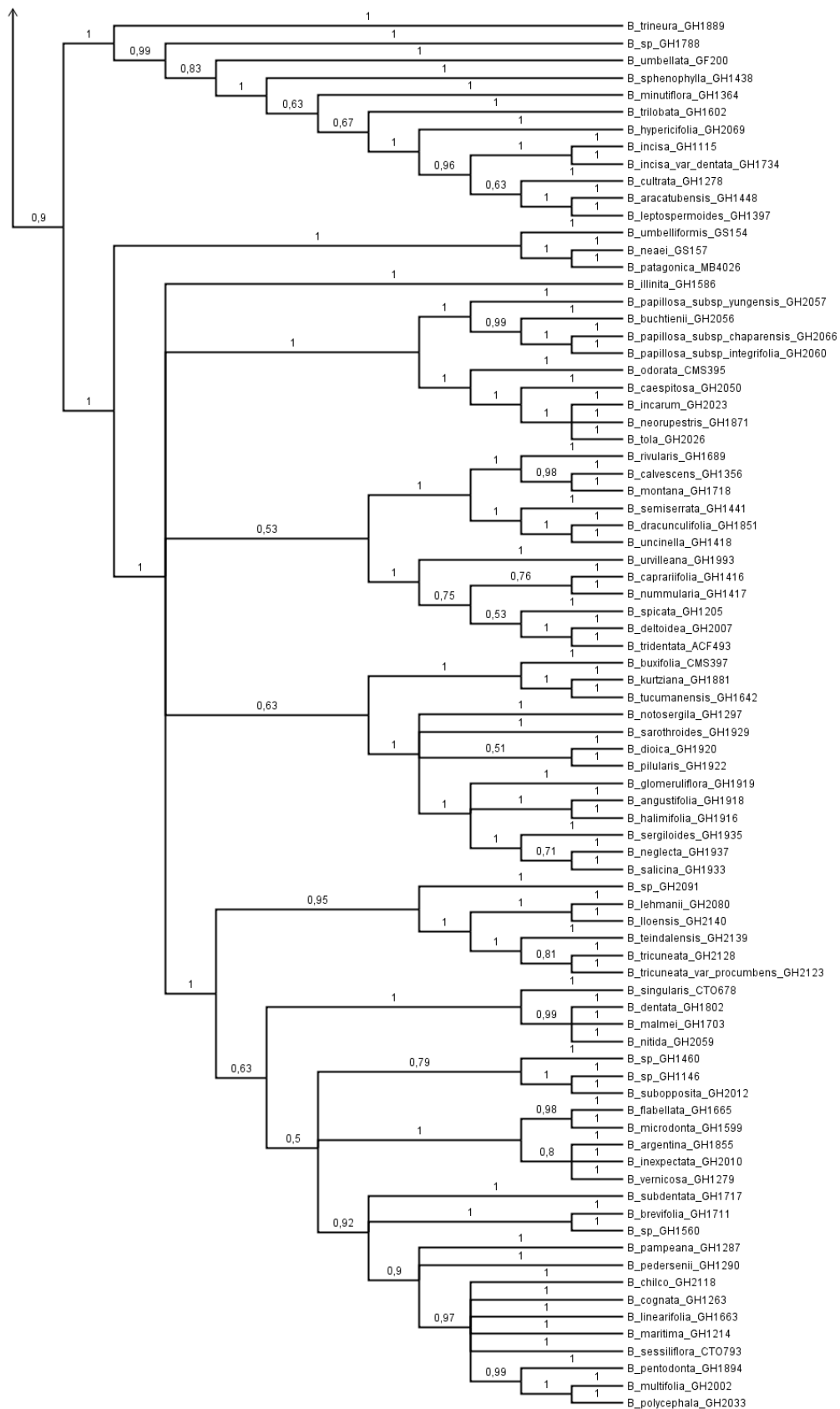
## SUPPLEMENTARY FIGURES.



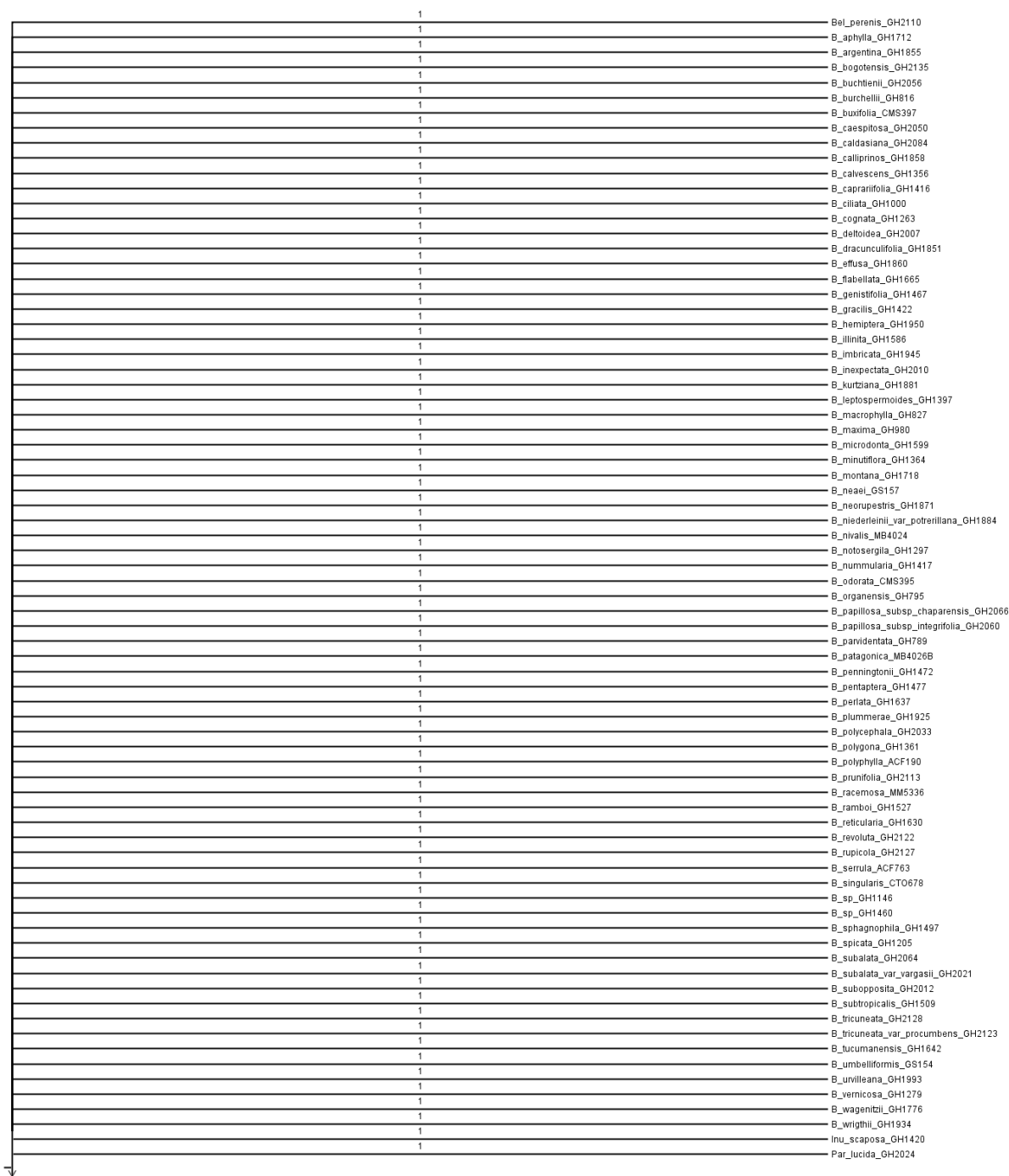
**Figure S1. Part 1.** Bayesian inference tree based on the nuclear subset analyses (ETS+ITS). Bayesian posterior probabilities are shown above the branches.



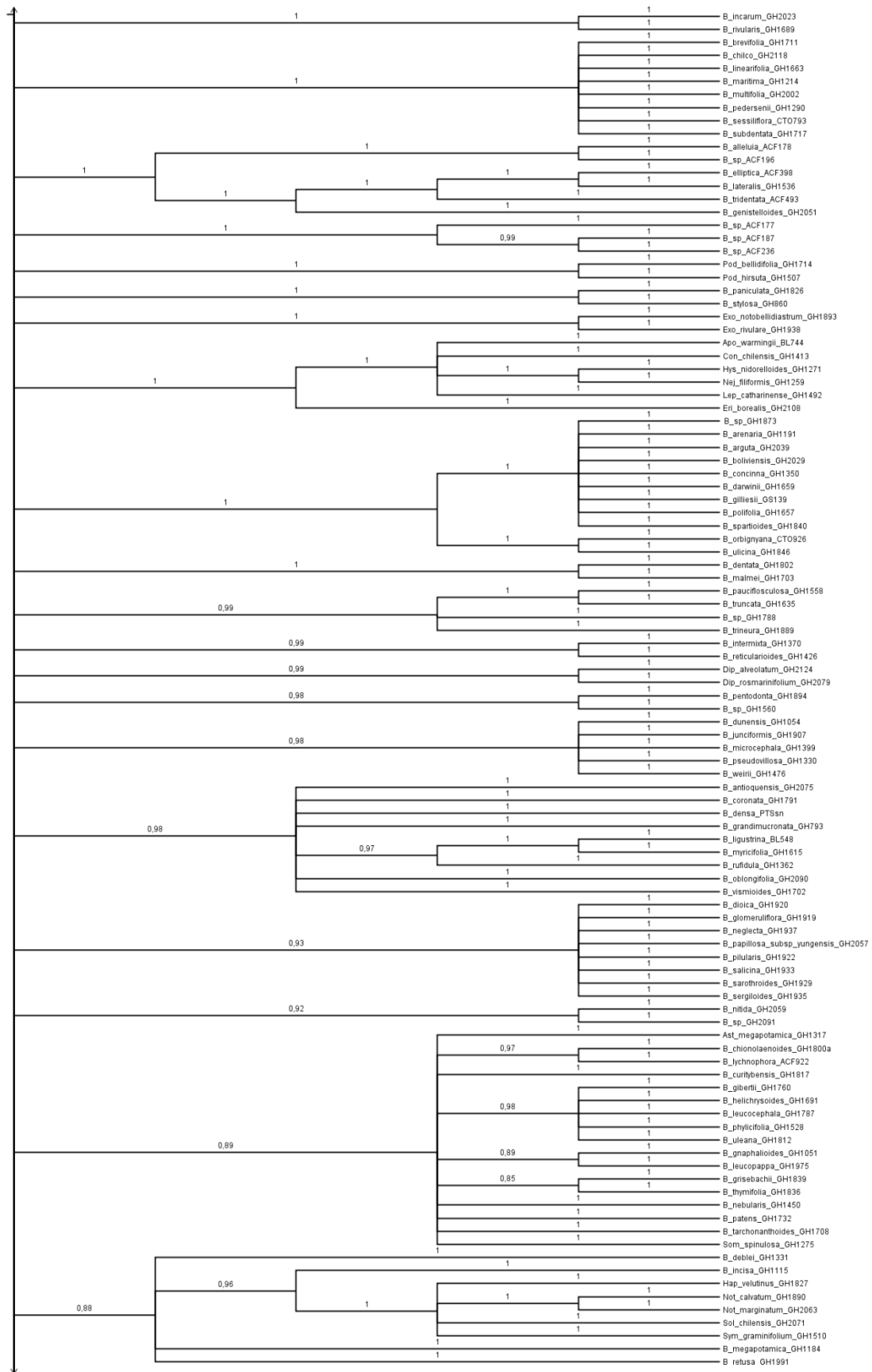
**Figure S1. Part 2.** Bayesian inference tree based on the nuclear subset analyses (ETS+ITS). Bayesian posterior probabilities are shown above the branches.



**Figure S1. Part 3.** Bayesian inference tree based on the nuclear subset analyses (ETS+ITS). Bayesian posterior probabilities are shown above the branches.

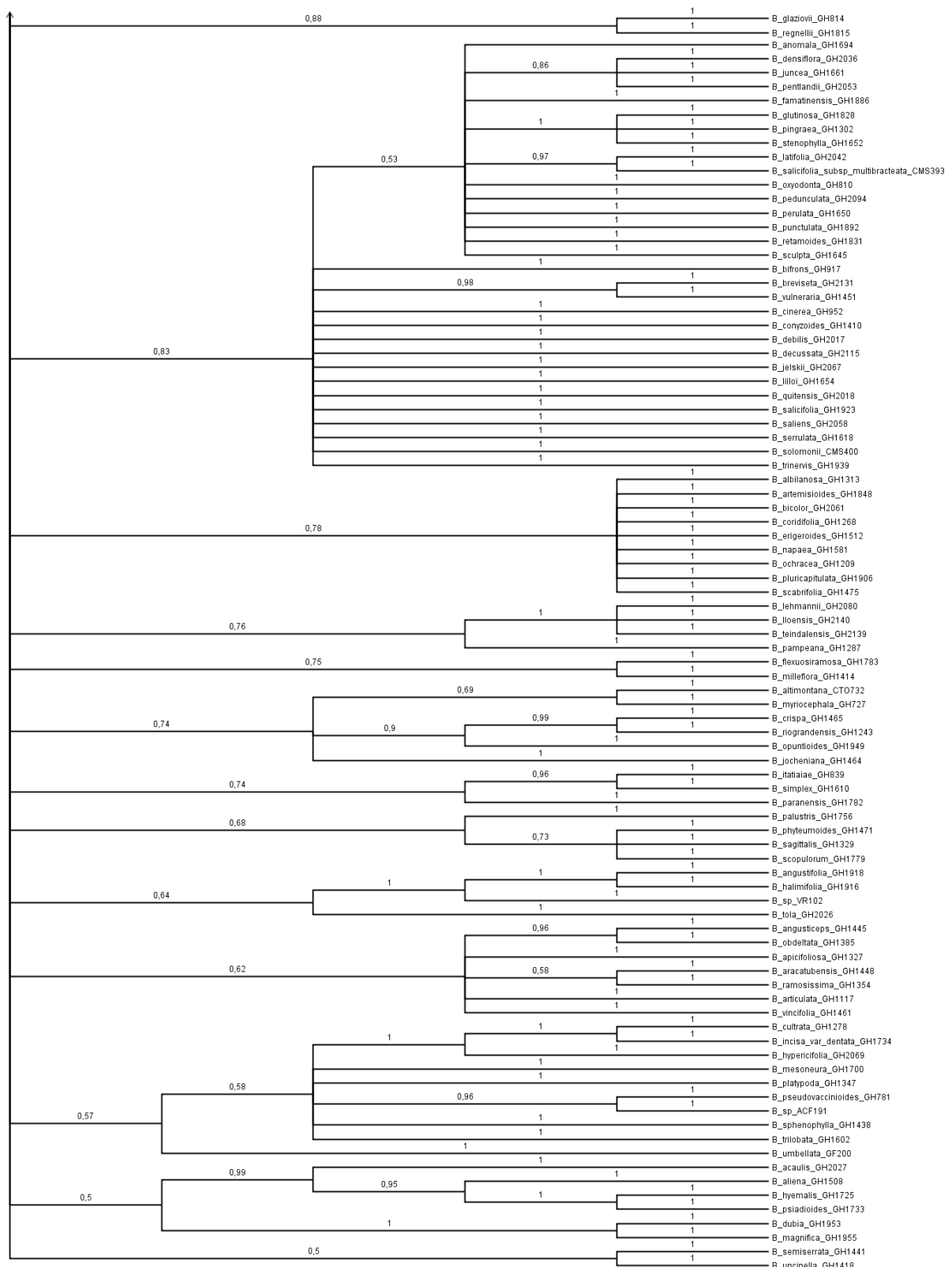


**Figure S2. Part 1.** Bayesian inference tree based on the plastidial subset analyses (*trnH-psbA*+*trnL-F*). Bayesian posterior probabilities are shown above the branches.

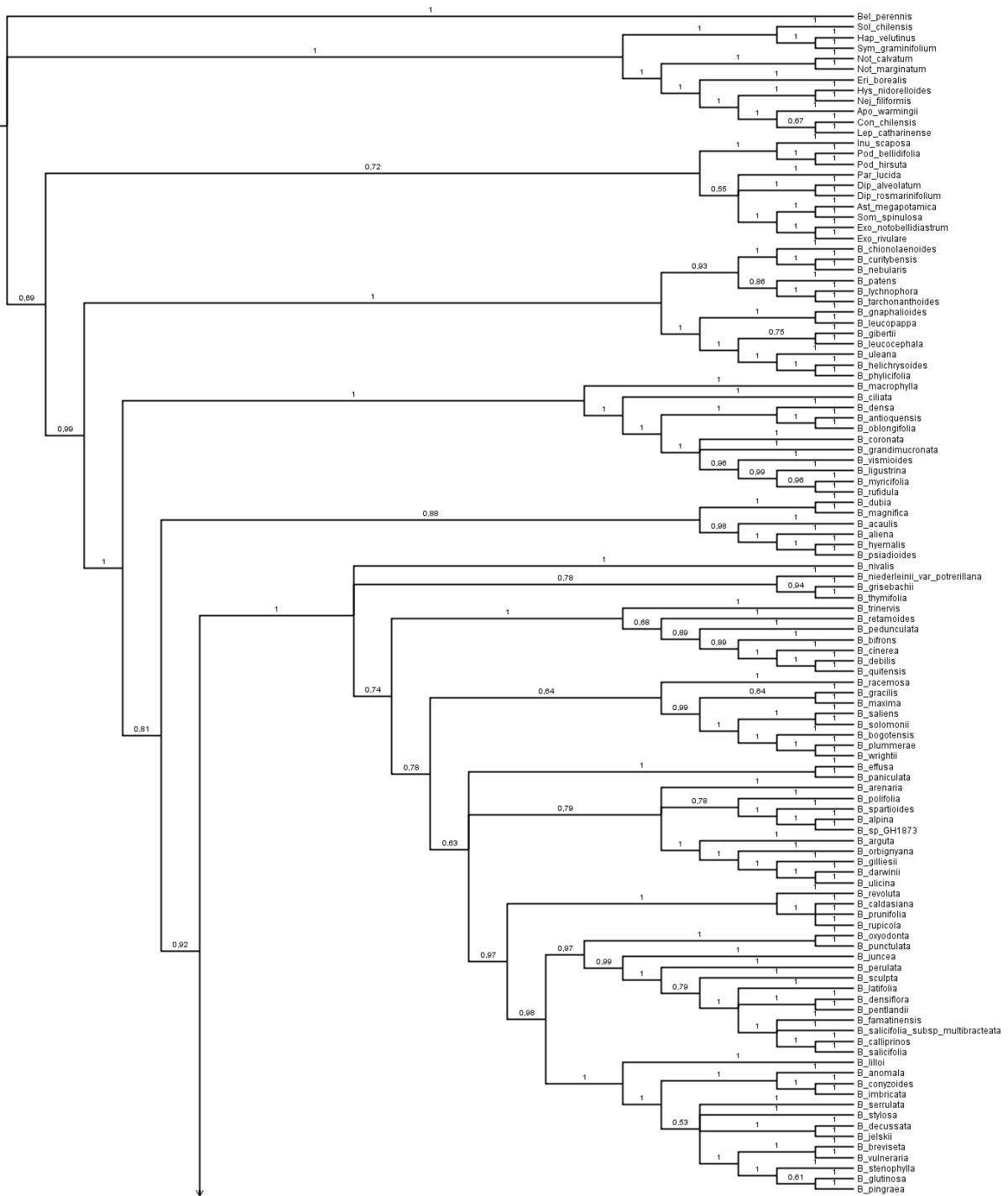


**Figure S2. Part 2.** Bayesian inference tree based on the plastidial subset analyses (*trnH-psbA+trnL-F*). Bayesian posterior probabilities are shown above the branches.

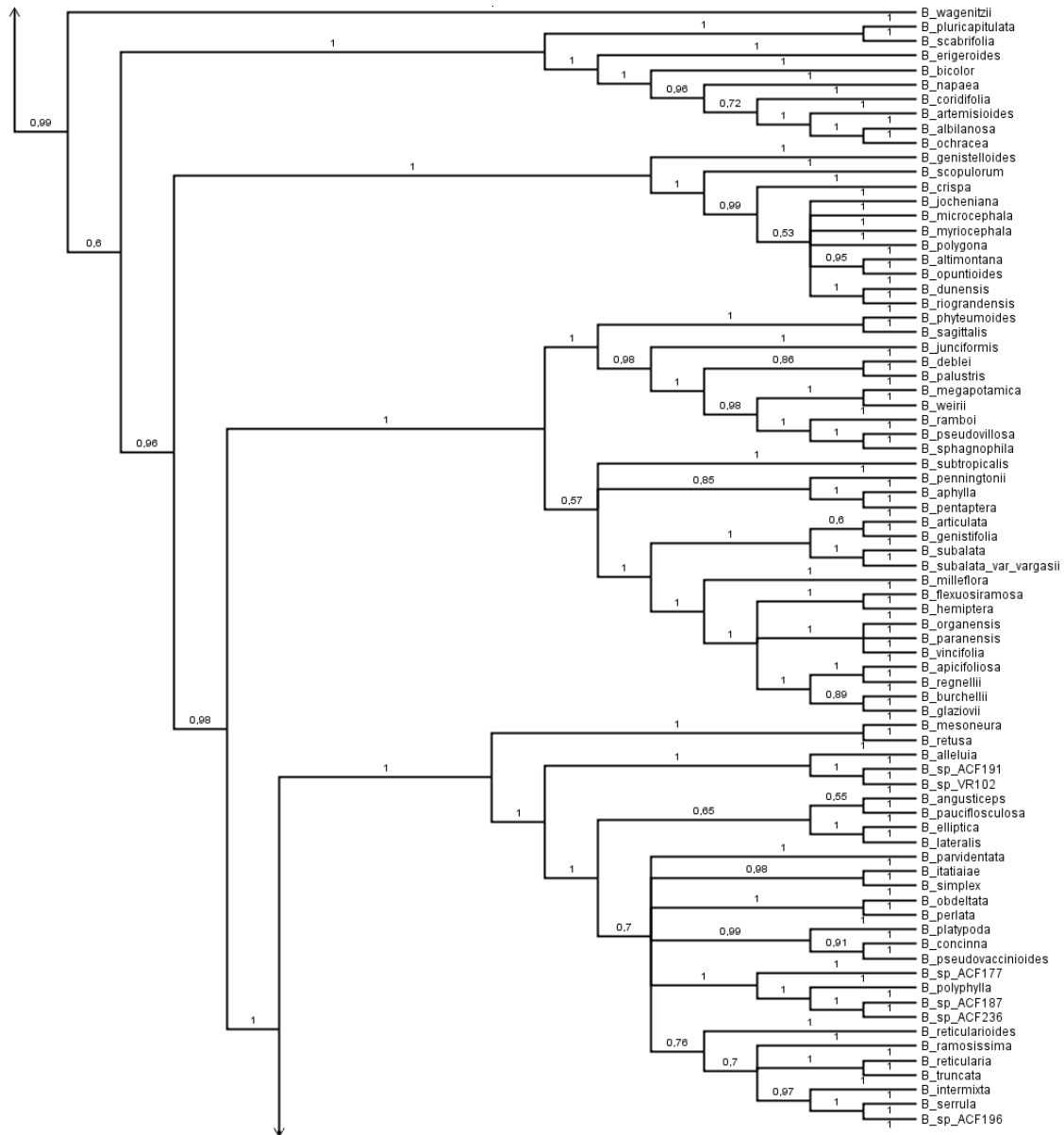




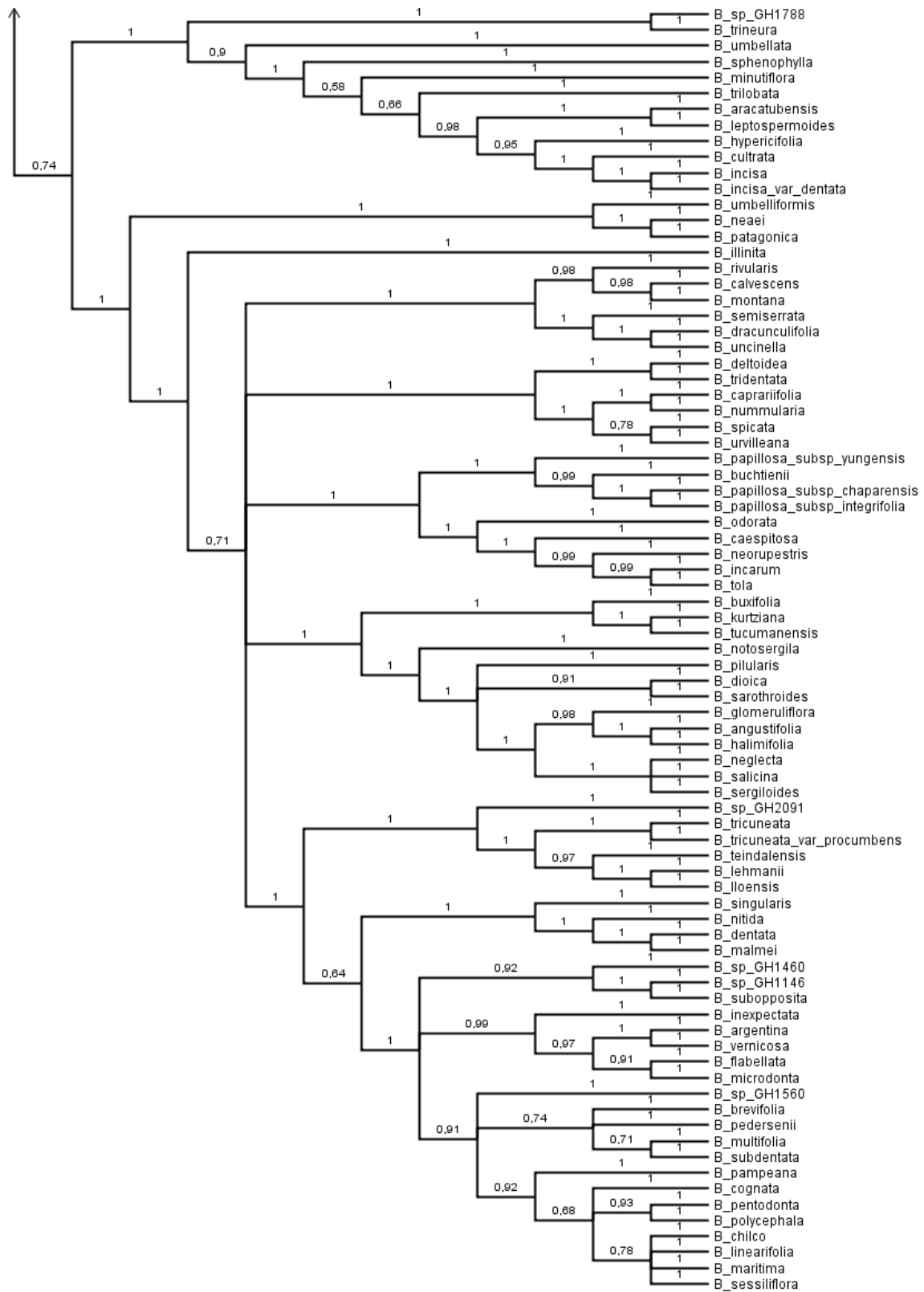
**Figure S2. Part 3.** Bayesian inference tree based on the plastidial subset analyses (*trnH-psbA+trnL-F*). Bayesian posterior probabilities are shown above the branches.



**Figure S3. Part 1.** Bayesian inference tree based on the partitioned analyses of all molecular data (nuclear ETS+ITS and plastidial *trnH-psbA+trnL-F*). Bayesian posterior probabilities are shown above the branches.



**Figure S3. Part 2.** Bayesian inference tree based on the partitioned analyses of all molecular data (nuclear ETS+ITS and plastidial *trnH-psbA+trnL-F*). Bayesian posterior probabilities are shown above the branches.



**Figure S3. Part 3.** Bayesian inference tree based on the partitioned analyses of all molecular data (nuclear ETS+ITS and plastidial *trnH-psbA+trnL-F*). Bayesian posterior probabilities are shown above the branches.

## CHAPTER 2

**Studies in *Baccharis* subgen. *Tarchonanthoides* (Asteraceae,  
Astereae)**



## PART 2.1

**A synopsis and notes for *Baccharis* subgen. *Tarchonanthoides*  
(Asteraceae: Astereae)**





**A synopsis and notes for *Baccharis* subgen. *Tarchonanthoides* (Asteraceae: Astereae)**

Gustavo Heiden<sup>1,2</sup> & José Rubens Pirani<sup>1</sup>

<sup>1</sup>*Departamento de Botânica, Instituto de Biociências, Universidade de São Paulo, Rua do Matão, Travessa 14, 321, São Paulo, SP 05508-090, Brazil.*

<sup>2</sup>*gustavo.heiden@gmail.com*

Phytotaxa 60: 41-49, 2012.



## Abstract

Nomenclatural and taxonomic notes are provided as the result of a taxonomic revision of *Baccharis* subgen. *Tarchonanthoides*, currently underway. A list of accepted species within the subgenus, their synonyms, and a revised sectional classification are presented. Protologues and types of previously published names have been reviewed. Currently 21 species and 10 synonyms are recognized within the subgenus. Morphologically, the species of the subgenus are classified into four sections: *Canescentes* (9 spp.), *Coridifoliae* (8 spp.), *Curitybensis* (2 spp.), and *Tarchonanthoides* (2 spp.). A new combination and status is proposed to *B. coridifolia* subsp. *bicolor*, *B. uleana* is assigned to subgen. *Tarchonanthoides*, and lectotypes are designated for *B. artemisioides*, *B. curitybensis*, *B. erigeroides* var. *dusenii*, *B. gibertii*, *B. patens*, *B. psammophila* and *B. squarrosa*, most of them providing 'second-step' lectotypes.

**Key words:** Baccharidinae, Compositae, lectotypifications, nomenclature



## Introduction

*Baccharis* Linnaeus (1753: 860; Asteraceae: Astereae) is a New World genus comprising between 338–400 species (Bremer 1994, Müller 2010). The genus is broadly characterized by the usually tufted indumentum of the leaves and stems, with fused trichomes that have only one adjoining basal cell, and the common occurrence of dioecy (Müller 2006). Heering (1904) published the first subgeneric classification of *Baccharis* including the subgenera *Baccharis*, *Molina* (Persoon 1807: 424) Heering (1904: 40), *Pteronioides* Heering (1904: 15), *Stephananthus* (Lehm.) Heering (1904: 39) and *Tarchonanthoides* Heering (1904: 26). The most recent proposal of a subgeneric classification of *Baccharis* was published by Müller (2006), who accepted four of the five subgenera proposed by Heering (1904), but recognized the subgenus *Stephananthus* as simply *incertae sedis*.

Müller (2006) considered *Baccharis* subgen. *Tarchonanthoides* as the most consistently circumscribed subgenus of *Baccharis*, being characterized by the corollas of the female florets with five papillose teeth, and by male florets with a style apex nearly fully cleft into lanceolate or ovate branches. Species of this subgenus occur from southeastern Brazil to western Bolivia and south to central and eastern Argentina, with the greatest diversity found in southeastern Brazil and Uruguay. A taxonomic revision and phylogenetic analysis of *Baccharis* subgen. *Tarchonanthoides* are currently being carried out by the authors. A study of protologues, along with other relevant bibliography, and a revision of herbarium material, including an examination of types, has allowed us to prepare a first checklist of the subgenus accompanied by notes clarifying its nomenclature and taxonomy.

## Nomenclatural and taxonomic notes

A list of currently accepted species and their synonymy is presented below, under a sectional classification system, and seven lectotypifications are proposed. As a result of the revision of all the names previously published at specific or infraspecific ranks within *Baccharis* subgen. *Tarchonanthoides*, 21 species are here accepted, along with the proposition of a new combination and status and the recognition of 10 synonyms. Morphologically, the species of the subgenus are classified into four sections: *Canescentes* Giuliano (2005: 535) and *Coridifoliae* Giuliano (Giuliano & Freire 2011: 339) with nine and eight species each respectively, and *Curitybensis* Giuliano (2005: 536) and

*Tarchonanthoides* (Heering) Cuatrecasas (1967: 89), comprising two species each. However, changes in the circumscription and composition of the sections may take place when the forthcoming systematic and molecular phylogenetic studies are completed.

Barroso (1976: 7) in the introduction to her study of the subtribe Baccharidinae in Brazil stated that one of the goals of her work was to typify the species studied. Throughout the work, she indicated lectotypes in different ways, sometimes calling them “holotype”, sometimes “type” and sometimes even without mentioning these words. In addition, the herbaria hosting the chosen specimens were only rarely clearly indicated. This made Barroso’s lectotypifications sometimes valid and sometimes invalid, and often difficult to interpret. More than once her choices proved necessary to be narrowed further to a single specimen. Following Art. 9.15 of the ICBN (McNeil et al. 2006), ‘second-step’ lectotypification is required to clarify and establish most of the Barroso’s lectotype choices for *Baccharis* subgen. *Tarchonanthoides*.

***Baccharis* subgen. *Tarchonanthoides*** Heering (1904: 26) [as “Tarchonantoides”]. —Type: *Baccharis tarchonanthoides* DC.

**I. *Baccharis* sect. *Canescentes*** Giuliano (2005: 535). —Type: *Baccharis helichrysoides* DC.

**1. *Baccharis gibertii*** Baker (1882: 52). —Type: “ad Maldonado et Montevideo, ad ripas fluminis S. Lucia: Capt. King! Gibert n. 813! 814! Arechavaleta n. 4104! Cunningham!”. URUGUAY. Montevideo: Santa Lucia, 1867, ♀, *M. E. Gibert 814* (lectotype K, first-step lectotype designated by Barroso 1976: 63, second-step lectotype **designated here** (000222026, right hand branch in the top) photo!; isolectotype K (000222026, left hand branch at the bottom) photo!). —Remaining syntypes: URUGUAY. Maldonado: s.d., ♂, *P. P. King 63* (K (000222025) photo!). Montevideo: Santa Lucia, 1867, ♂, *M. E. Gibert 813* (K (000222027) photo!); Bañado de la Barra de Santa Lucia, November 1814, ♂ & ♀, *J. Arechavaleta 4104* (LP (006775)!, MVM!). *Cunningham* (not found).

For *Baccharis gibertii*, Barroso (1976) indicated the specimen *Gibert 814* as “holotype”. Here we propose the right hand branch at the top of the sheet (K000222026) as lectotype and consider the second branch at the base, under the same name and barcode number, as an isolectotype. The choice of one of these two branches is justified because the both branches of *Gibert 814* are mounted separately on the same sheet and are mixed with the specimens of *Gibert 813* and *King 63*. The branch chosen here as lectotype is clearly identified by the original label with the type locality, date and collecting number attached to it, and has more capitulescences and capitula than the other regarded as an isolectotype.

**2. *Baccharis gnaphalioides*** Sprengel (1826: 461). —Type: "Ad fl. magnum Amer. austr. Sello". URUGUAY. s.d., ♂, *F. Sellow d585* (holotype P; isotypes GH (00247130; 00247131) photos!, K (00022190; 000221905) photos!).

*Baccharis radicans* de Candolle (1836: 416). —Type: “in Brasiliae prov. Rio-Grande. ... (v. s. in h. Mus. reg. Par. à Mus. imp. Bras. sub n. 906 miss.)”. BRAZIL. Rio Grande do Sul: s. d., ♂, *F. Sellow s.n. = M. I. B. 906* (holotype P (00755689) photo!; isotypes B† photo in F! (0BN037718), G-DC (00200458) photo!).

**3. *Baccharis helichrysoides*** de Candolle (1836: 415). —Type: "in Brasiliae prov. Rio-Grande et Sancti-Pauli. ... (v. s. ... in h. Mus. reg. Par. à Mus. imp. Bras. sub n. 811 et 492 miss.)". BRAZIL. Rio Grande do Sul: [between Piratini and Pelotas fide Malagarriga (1957)], 1824, ♀ & ♂, *F. Sellow d2013 = M. I. B. 811* (lectotype P (00468143) photo !, designated by Malagarriga 1958: 284; isolectotypes: G-DC (00200392) photo!, K). —Remaining syntypes: BRAZIL. São Paulo, s. d., ♀, *F. Sellow s.n. = M. I. B. 492* (syntype P (00468144) photo!). BRAZIL. S.l., s. d., ♂ & ♀, *F. Sellow s.n.* (probable syntypes, fide Müller (2010), G (00222633; 00222634) photos!, GH (00247134) photo!, W).

*Baccharis lanuginosa* Gardner (1848: 82). —Type: “Dry bushy places between Villa do Principe and Coacas”. BRAZIL. Minas Gerais: [between Serro and Arraial dos Cocais, between 18<sup>th</sup> and 26<sup>th</sup> August 1840, fide Hind, pers. comm.], Sept. 1840, ♀, *G. Gardner 4900/1* (holotype BM [000756675] photo!).

Barroso (1976) only indicated *Sellow d2013* as “holotype” of *B. helichrysoides*, without citing any herbarium acronym. Although effectively a lectotypification, her choice was superseded owing to a previous lectotypification by Malagarriga (1957) based on the same material in P. The holotype of *B. lanuginosa* is stated as being from September 1840 on the type specimen sheet. However, Gardner (1848) wrote ‘Aug. 1840’ in the protologue and cited the collection as ‘4900,1’. In the ‘Catalogue’ of his collections, the entry of *B. lanuginosa* was clearly added relatively late when Gardner realized he had a ‘new species’, especially since the locality is not otherwise found within this number sequence (Hind, pers. comm.).

**4. *Baccharis leucocephala*** Dusén (1910: 24). —Type: "Wächst in Gebüsch; bei Roça nova, den 24. Nov. 1903, (Nr. 2208), und bei Itapirusú, den 17. Nov. 1908". BRAZIL. Paraná: Piraquara, Roça Nova, 24 November 1903, ♀, *P. K. H. Dusén 2208* (lectotype S (10-22317) photo!, designated by Barroso 1976: 62; isolectotypes HBG, R! (37746, ♂)). —Remaining syntypes: BRAZIL. Paraná: Itaperuçu, 17 November 1908, ♂ & ♀, *P. K. H. Dusén 7169* (syntypes NY! (00162259), S (10-22319; 10-22321; 10-22323) photos!).

Barroso (1976) chose *Dusén 2208* at S as the “holotype” of *B. leucocephala*. This is the only case within *Baccharis* subgen. *Tarchonanthoides* where a second-step lectotypification is not required, since Barroso’s choice is in total accordance with the ICBN rules (McNeil *et al.* 2006).

**5. *Baccharis leucopappa*** de Candolle (1836: 415). *Baccharis helichrysoides* var. *leucopappa* (DC.) Baker (1882: 51). —Type: "in prov. Rio-Grande Brasiliae. (h. Mus. imp. Bras. n. 330)". BRAZIL. Rio Grande do Sul: [between Encruzilhada do Sul and Caçapava do Sul fide Malagarriga (1957)], ♀, *F. Sellow 3111 = M. I. B. 830* (holotype P (00755454) photo!; isotypes B (100093163) photo!, G-DC (00200391) photo!, P (00755455) photo!).



6. *Baccharis patens* Baker (1882: 52). —Type: "Habitat prope Montevideo: Sello n. 463! 729!"!). URUGUAY. Montevideo: s. d., ♀, *F. Sellow d463* (lectotype K (000221906) photo! **designated here**; isolectotypes GH (00003969) photo!, NY! (0016229)). —Remaining syntypes: URUGUAY. Montevideo: s.d., ♀, *F. Sellow s.n.* (syntypes K (000222052) photo!), B† photo in F! (0BN015027)).

*Baccharis squarrosa* Baker (1882: 50), non Kunth (1818). —Type: "Habitat in Uruguay, in campis et rupestribus ad Maldonado: Capt. King!; prope Montevideo: Sello n. 2808! 2924!; prope Las Minas in fissuris rupium: Gibert n. 881!" URUGUAY. Lavalleja: Minas, April 1869, ♂, *M. E. Gibert 881* (lectotype K, first-step lectotype designated by Barroso 1976: 57, second-step lectotype **designated here** (K000222090, uppermost branch) photo!; isolectotype K (000222090, branches of the same collection at the bottom of the sheet) photo!). —Remaining syntypes: URUGUAY. Maldonado: 1826, ♀, *P. P. King 28* (K (000222088; 000222091) photos!). BRAZIL. Rio Grande do Sul: Porto Alegre, Morro da Polícia [fide Malagarriga (1957)], June 1825, ♀, *F. Sellow 2808* (syntype GH (00004002) photo!). *F. Sellow 2924* (not found).

*Baccharis bakeri* Heering (1904: 39). —Type: "Reineck & Czermak n. 106. Rio Grande do Sul. Belém Velho an bebuschten Hängen". BRAZIL. Rio Grande do Sul: Porto Alegre, Belém Velho, 12 September 1894, ♂ & ♀, *E. M. Reineck & J. Czermak n. 106* (holotype HBG 2 sheets; isotypes P (00509635) photo!, S (10-22206) photo!).

Barroso (1976) did not lectotypify *Baccharis patens*. We have designated *Sellow d463* in K (000221906) as the lectotype on the basis of its agreement with the protologue, because it bears more branches and capitula than the remaining isolectotypes, and because of more complete label data, showing clearly the collector and collecting number, when compared to the remaining syntypes. The locality on the label is "Brasilia", however the collection was made in what is now Uruguay, which was annexed by the former Brazilian Empire as the Cisplatina Province during the time when Friedrich Sellow travelled in the region (1822-1823). Barroso (1976) assigned the specimen *Gibert 881* in K as type material of *B. squarrosa*, however, without either using the words "type" or "holotype", and did not cite the remaining syntypes. We interpret this as a first-step inferential lectotypification and the uppermost branch of the same collection [K000222090] mentioned by

Barroso (1976) is designated here as the second-step lectotype. The remaining branches under the same label and barcoding number are interpreted here as isolectotypes. Choosing just one of the branches is justified because the detached branches of *Gibert 881* are mounted on the same sheet with the syntype specimens of *King 28*, which are stored under two barcoding numbers (K000222088; K000222091), and three branches of the collection *Tweedie 1023* (K000222089), which are not types of *B. squarrosa*.

**7. *Baccharis phylicifolia*** de Candolle (1836: 415) [as “phylicaefolia”]. —Type: “in Brasiliae prov. Sancti-Pauli. ... (v. s. in h. Mus. reg. Par. à Mus. imp. Bras. sub n. 491 miss.)”. BRAZIL. São Paulo: s.d., ♂, *F. Sellow s.n.* = *M. I. B. 491* (holotype P (00755658) photo!; isotype G-DC (00200390) photo!).

**8. *Baccharis psammophila*** Malme (1933: 70). —Type: “Santa Catharina: Laguna 24/6 09 (n. 8425). Hab. in arena mobili”. BRAZIL. Santa Catarina: Laguna, 24 June 1909, *P. K. H. Dusén 8425* (lectotype S (S-R-597, ♂) photo!, **designated here**). —Remaining syntype: BRAZIL. Santa Catarina: Laguna, 24 June 1909, *P. K. H. Dusén 8425* (S (0-22439, ♀) photo!).

Malme (1933) based his description of *B. psammophila* on the *Dusén 8425* collection in S. An examination of this collection demonstrated that effectively there are two syntypes under the same number housed in S, as they are not clearly labelled as two parts on different sheets for the same specimen. The single preparation comprising the staminate specimens of *Dusén 8425* (S-R-597) is here designated as lectotype as it is in agreement with the original description and bears the original collection label written in pencil. The female duplicates of *Dusén 8425* (S10-22439), which lack the original annotations other than the herbarium label and are mounted on another single sheet, is considered here as an isolectotype.

**9. *Baccharis uleana*** Malagarriga (1977: 139). —Type: “Strauch in den Sümpfen der Estive dos Pregos bei Tubarão”. BRAZIL: Santa Catarina, Capivari de Baixo, Banhado da Estiva dos Pregos, November 1889, *E. Ule 1510* (holotype P (♀); isotype F! (1520199, ♂)).

Heering (1904) cited the collection *Ule 1510* as a voucher of *B. gibertii* in Santa Catarina State, southern Brazil. However, *B. gibertii* is restricted to Rio Grande do Sul State, southernmost Brazil, and Uruguay. Later, Malagarriga (1977) described *B. uleana* based on the same collection and indicating one specimen in P as holotype. Müller (2010) assigned *B. uleana* to *Baccharis* subgen. *Baccharis*, however he did not cite the voucher specimens seen. Malagarriga’s holotype in P has not been found, however examination of a male isotype found at F, completely in agreement with the type locality and the protologue diagnosis, enables the recognition of this taxon as a distinct species belonging to subgenus *Tarchonanthoides*.

**II. *Baccharis* sect. *Coridifoliae*** Giuliano (2011: 339). —Type: *Baccharis coridifolia* DC.

**10. *Baccharis albilanosa*** Oliveira & Deble (2006: 4) [as "albolanosa"]. —Type: BRAZIL. Rio Grande do Sul: São Francisco de Assis, RS 241, estrada de chão entre São Francisco de Assis e Manoel Viana, em solo arenoso, 27 February 2006, *L. P. Deble & A. S. de Oliveira 5109* (holotype MBM; isotypes CTES! (0013895, ♂ & ♀), HDCF, PACA, SI! (000815, ♂; 000816, ♀)).

**11. *Baccharis artemisioides*** Hooker & Arnott (1841: 41). —Type: "Between Rio de los Ehovillos and el Rio Quinto, province of San Luis. Dr Gillies (n. 185.) Salt Plains of Bahia Blanca, lat. 40°. in N. Patagonia, and in high and dry places of Cordova. Tweedie (n. 1126.)". ARGENTINA. San Luis: between Río Chorillos and Río Quinto, ♀, *J. Gillies 185* (lectotype K (000222002) photo!, **designated here**; isolectotype E! (00322911)). —Syntypes: ARGENTINA. Buenos Aires: Bahia Blanca, 40° S, s. d., ♀, *J. Tweedie s.n.* (syntypes E! (00322910), K (000222003) photo!). Córdoba: s. d., ♂, *J. Tweedie 1126* (syntype K (000222004) photo!).

Hooker & Arnott (1841) described *B. artemisioides* based on three collections cited in the protologue. All of them are located in K, agree with the protologue and are in good condition. We designate *Gillies 185* at K (000222002) as lectotype because it possesses more branches and capitula. An isolectotype, in good condition, is available in E (00322911).

**12. *Baccharis bicolor* (Joch. Müll.) G. Heiden, *comb. et stat. nov.***

Basionym: *Baccharis coridifolia* subsp. *bicolor* Müller (2006: 276). —Type: BOLIVIA. Cochabamba: Prov. Ayopaya, Independencia 22 km hacia Kami, em dirección S, 3670 m, 29 November 1981, ♂ & ♀, *S. Beck 7467* (holotype JE (00005245) photo!; isotypes G, LPB, SI! (004229), US! (00901686), USZ).

Müller (2006) applied the infraspecific rank of subspecies to “taxa that are morphologically (nearly) always well separated and have distinct or scarcely overlapping distributions” and used varieties for “taxa in which the character states show frequent overlap and which are sympatric”. In the current checklist, any taxon that can be distinguished from the others by morphological characters is considered a species and therefore a new combination and status is proposed. As pointed out by Müller (2006), *B. bicolor* can be distinguished from *B. coridifolia* by, amongst others, leaves and shoots with a persistent indumentum of filiform hairs and a pappus of female florets with less than 60 bristles. In contrast, *B. coridifolia* has longer and wider leaves and shoots without filiform hairs or with these only present on very young structures and then caduceous. *Baccharis coridifolia* has female florets with a pappus of more than 80 bristles. Both species do not overlap in geographic distribution, since *B. bicolor* is restricted to the Yungas of northeastern Bolivia (elevations between 2500-3500 m in the Departments of Cochabamba and La Paz) while *B. coridifolia* is widespread in southern South America, occurring from southwestern Bolivia (elevations between 1200-2700 m in the Departments of Chuquisaca, Tarija and Santa Cruz) to southeastern Brazil, south to central and eastern Argentina.

**13. *Baccharis coridifolia*** de Candolle (1836: 422). —Type: “in Brasiliae prov. Rio-Grande et fortè Sancti-Pauli. ... (v. s. in h. Mus. reg. Par. à Mus. imp. Bras. sub n. 810, 826, 837, 855 et fortè 510 miss.)”. BRAZIL. Rio Grande do Sul: [between Herval and Piratini fide Malagarriga (1957)], February–March 1824, ♀, *F. Sellow d1893* = *M. I. B.* 826 (lectotype P (00755558) photo!, first-step lectotype designated by Barroso 1976: 56, second-step lectotype designated by Müller 2006: 273; isoelectotypes G-DC, R!). —Remaining syntypes: BRAZIL. Rio Grande do Sul: s.d., ♀, *F. Sellow d616* = *M. I. B.* 810 (P (00755555) photo!); s. d., ♂, *F. Sellow s.n.* = *M. I. B.* 837 (P (00755557) photo!); s. d., ♀, *F. Sellow d2067* = *M. I. B.* 855 (P (00755556) photo!). São Paulo: s.d., ♂ & ♀, *F. Sellow s.n.* = *M. I. B.* 510 (P (00755554) photo!).

*Eupatorium montevidense* Sprengel (1826: 417). —Type: URUGUAY. "Monte Video. Sello"; s.d., ♀, *F. Sellow s.n.* (holotype P (00755549) photo!).

Müller (2006) chose *Sellow d1893* (P00755558) as lectotype of *B. coridifolia*. However, Barroso (1976) previously designated the same collection as “holotype”, although without indicating the herbarium where this lectotype is housed. Yet, she stated that the duplicate at R is an isotype. The choice by Barroso is here considered as the first-step lectotypification, whereas Müller’s (2006) designation is a second-step lectotypification to accomplish the ICBN requirements (McNeil *et al.* 2006).

**14. *Baccharis erigeroides*** de Candolle (1836: 418). —Type: “in campis editis prov. Sancti-Pauli”. BRAZIL. São Paulo: Mogi das Cruzes, November 1833, ♀, *P. W. Lund 845* (holotype G-DC (00136722) 2 sheets photo!).

*Baccharis puberula* de Candolle (1836: 401). —Type: “in Brasiliae prov. Sancti-Pauli ... (v.s. ♀ in h. Mus. reg. Par. à Mus. imp. Bras. sub n. 515 miss.)”. BRAZIL. São Paulo: s.d., ♀, *F. Sellow s.n.* = *M. I. B.* 515 (holotype P (00755577) photo!; isotype G-DC microfiche!).

*Baccharis erigeroides* var. *dusenii* Heering ex Dusén (1910: 23). —Type: "Gesammelt auf den Campos bei Capão grande am 18. Dez. 1903 (Nr. 2766), und bei Capivari am 21. Okt. 1908". BRAZIL. Paraná: Ponta Grossa, Capão Grande, 18 December 1903, ♂, *P. K. H. Dusén 2766*

(lectotype R!, first-step lectotype designated by Barroso 1976: 55, second-step lectotype **designated here**; isoelectotype R!, S). —Syntypes: BRAZIL. Paraná: Jaguariaíva, Capivari, 21 October 1908, ♂, P. K. H. Dusén s.n. (syntypes A (00003941) photo!, E! (00346655), M (0031202) photo!, NY! (00162243)).

De Candolle (1836) described *B. erigeroides* based on *Lund s.n.* The specimen *Lund 845*, the only collection of this species at G-DC herbarium, agrees with the original data and description in the protologue and is composed of two sheets labelled as part 1 and 2 of the same specimen. These are stored under the same barcoding number (G00136722). So a lectotypification is not required in this situation. Concerning *Baccharis erigeroides* var. *dusenii*, Barroso (1976) cited the specimen *Dusén 2766* as a type with duplicates housed in R and S, without specifying which one is the lectotype. There are two duplicates of *Dusén 2766* stored in the same folder in R, but not labelled as the same specimen. Barroso's (1976) indication of *Dusén 2766* is a first-step lectotypification. The designation here, of the preparation consisting of a branch with a fertile and a vegetative shoot along with another detached fertile shoot and the original label with Dusén's handwriting, is the second-step lectotypification. The remaining duplicate at R, composed of three detached fertile branches, is considered an isoelectotype; the duplicate in S could not be located. *Baccharis erigeroides* var. *dusenii* Heering ex Dusén is commonly cited as originally described by Heering, however, this taxon was recognized by Heering *in schedula* and was later validated by Dusén (1910).

**15. *Baccharis ochracea*** Sprengel (1826: 460). —Type: “Monte Video. Sello”. URUGUAY. S.d., ♂, F. Sellow d477 (holotype P (00755681) photo!; isotypes GH (00247151) photo!, K (000221891) photo!, P (00755680) photo!).

*Baccharis velutina* de Candolle (1836: 415). —Types: “in Brasiliae prov. Rio-Grande. ... (v. s. in h. Mus. reg. Par. à Mus. imp. Bras. ♂ sub n. 995, ♀ sub 819 miss.)”. BRAZIL. Rio Grande do Sul: [between Herval and Piratini fide Malagarriga (1957)], February–March 1824, ♂, F. Sellow d1978 = M. I. B. 995 (lectotype P (00755682) photo!, designated by Malagarriga 1958: 288; isoelectotypes G-

DC, K (222047) photo!, NY! (00162282), P (00755680) photo!). —Remaining syntypes: s.d., ♀, *Sellow s.n.* = *M. I. B. 819* (syntypes G-DC; P (00755679; 00755683) photos!).

**16. *Baccharis scabrifolia*** Heiden (2008: 6) [16 June 2008]. —Type: “Taimbesinho p. São Francisco de Paula”. BRAZIL. Rio Grande do Sul: Cambará do Sul, Itaimbezinho, 7 February 1941, ♂, *B. Rambo 4392* (holotype PACA!).

*Baccharis multipaniculata* Oliveira-Deble & Deble (2008: 18) [August 2008]. —Type: BRAZIL. Santa Catarina: Curitibanos, no campo, 900 m. s. m., 22 February 1962, ♀, *R. Reitz & R. M. Klein 12222* (holotype HBR!).

**17. *Baccharis suberectifolia*** Oliveira-Deble & Deble (2008: 18). —Type: BRAZIL. Paraná: Palmeira, Rod. BR-277, rio Papagaios, campo limpo, ereta, capítulos alvescentes, 11 February 1988, ♀, *G. Hatschbach & S. Ginzburg 51875* (holotype MBM!; isotype US! (3112550)).

**III. *Baccharis* sect. *Curitybenses*** Giuliano (2005: 536). —Type: *Baccharis curitybensis* Heering ex Malme.

**18. *Baccharis chionolaenoides*** Falkenberg & Deble (2010: 64). —Type: BRAZIL. Santa Catarina: Urubici, extremo sul do topo do Morro da Igreja, pouco além da área cercada pelo CINDACTA, 6 December 1996, ♀, *D. B. Falkenberg 8961* (holotype FLOR!; isotypes CTES, MBM, SI, UEC!).

**19. *Baccharis curitybensis*** Heering ex Malme (1933: 69). —Types: “Curityba 20/10 08 (n. 6906), Serrinha 14/10 09 (n. 8539). Hab. in campo. Ad eandem speciem pertinet Glaziou n. 7715 (in Serra da Bocaina civit. Sao Paulo lecta)”. BRAZIL. Paraná: Curitiba, 20 October 1908, ♂, *P. K. H. Dusén 6906* (lectotype S (10-22254), first-step lectotype designated by Barroso 1976: 97, second-step lectotype **designated here** photo!; isolectotypes: F! (0049682F), G (00222589) photo!, GH (00003932) photo!, K (000221944) photo!, LD (1222629) photo!, MO! (797734), NY! (00162224), US! (00129284)). —Remaining syntypes: BRAZIL. Paraná: Balsa Nova; São Luiz do Purunã, Serrinha, 14 October 1909,

♂, P. K. H. Dusén 8539 (syntype S (10-22255) photo!). São Paulo: Serra da Bocaina, ♂, A. F. M. Glaziou 7715 (syntype S (S10-22253) photo!).

Barroso (1976) referred to the specimen *Dusén 6906* as “holotype” of *B. curitybensis*, without indicating which duplicate she was referring to and in which herbarium it is located. Barroso’s choice was the first-step for lectotypification and the specimen *Dusén 6906* at S (S10-22254) is here designated as lectotype in the second-step to accomplish the ICBN requirements (McNeil *et al.* 2006). This designation restricts and specifies Barroso’s (1976) choice and results in several isolectotypes for this name. The remaining syntypes don’t have known duplicates.

**IV. *Baccharis* sect. *Tarchonanthoides*** (Heering) Cuatrecasas (1967: 89). *Baccharis* subgen. *Tarchonanthoides* Heering (1904: 26) [as “Tarchonantoides”]. —Type: *Baccharis tarchonanthoides* DC.

**20. *Baccharis lychnophora*** Gardner (1848: 85). —Type: “Moist rocky places on the high mountains of the Diamond District”. BRAZIL. Minas Gerais: July 1840, ♂, G. Gardner 4898 (holotype BM (000554168) photo!; isotypes B† photo in F! (0BN015009, Macbride negative number 15009), BHCb! (000042), G (00222623) photo!, GH (00003953) photo!, K, NY! (00162263), P (00755476) photo!, W, US! (00129312)).

*Baccharis tarchonanthoides* var. *integrifolia* Baker (1882: 50). —Syntypes: “in prov. S. Paulo: Sello n. 175; in Minas Geraës ad Itambé: Martius” (syntypes not looked for). (synonym fide Barroso (1976)).

Two collections were cited by Baker (1882) in the description of *Baccharis tarchonanthoides* var. *integrifolia*. Since none has been found so far, a lectotype cannot be designated here. The description provided in the protologue agrees with *B. lychnophora* and Barroso (1976) recognized this name as a synonym of this species.



21. *Baccharis tarchonanthoides* de Candolle (1836: 414). —Type: “in Brasiliae prov. Minarum General.”. BRAZIL. Minas Gerais: Mariana, 1833, ♂, A.C. *Vauthier* 275 (holotype G-DC (00200472) photo!; isotypes G (00169376) photo!, GH (00004012) photo!, K (000221895) photo!, P (00755763; 00755764), photos!, W)

*Baccharis ibitensis* Toledo ex Handro (1953: 67). —Type: BRAZIL. São Paulo: Amparo, Monte Alegre, encosta do Pico da Serra Negra, 1200 m, 30 August 1943, ♀, M. *Kuhlmann* 1032 (holotype SP! (50262); isotype RB! (114847)).

### Acknowledgements

The authors acknowledge FAPESP (processes 2010/00519-8 and 2011/18385-0), IAPT Research Grants in Plant Systematics 2010, and the Smithsonian Institution’s 2011 Cuatrecasas Fellowship Award for financial support. We are also grateful to Nicholas Hind and two anonymous referees for valuable comments on drafts of this manuscript, and to the staff of the herbaria consulted for offering support during herbarium revision and loaning material for study.

### References

- Baker, J.G. (1882) Compositae. III. Asteroideae, Inuloideae. In: Martius, C.F.P.† & Eichler, A.G. (eds). *Flora brasiliensis enumeratio plantarum in Brasilia hactenus detectarum quas suis aliorumque botanicorum studiis descriptas et methodo naturali digestas partim icone illustratas* 6: 1-134. Monachii, Lipsiae: Fleischer.
- Barroso, G.M. (1976) Subtribo Baccharidinae Hoffman. Estudo das espécies ocorrentes no Brasil. *Rodriguésia* 28: 1–281.
- Bremer, K. (1994) *Asteraceae: Cladistics & Classification*. Portland: Timber Press. 752 pp.
- Candolle, A.P. de. (1836) *Prodromus systematis naturalis regni vegetabilis sive enumeratio contracta ordinum, generum specierumque plantarum huc usque cognitarum, juxta methodi naturalis normas digesta*, vol. 5. Paris: Treuttel & Würtz.
- Cuatrecasas, J. (1967) Revisión de las especies colombianas del género *Baccharis*. *Revista de la Academia Colombiana de Ciencias Exactas, Físicas y Naturales* 13: 5-102.

- Dusén, P.K.H. (1910) Neue Gefäßpflanzen aus Paraná (Südbrasilien). *Arkiv för Botanik* 9: 1-37.
- Falkenberg, D.B. & Deble, L.P. (2010) *Baccharis chionolaenoides* (Asteraceae), a new species of subgenus *Tarchonantoides* from Santa Catarina state (Brazil). *Darwiniana* 48: 64-67.
- Gardner, G. (1848) Contributions towards a Flora of Brazil, being the distinctive characters of some new species of Compositae, belonging to the tribe Asteroideae. *The London journal of botany: containing figures and descriptions of such plants as recommend themselves by their novelty, rarity, history, or uses: together with botanical notices and information and occasional portraits and memoirs of eminent botanists* 7: 78-90.
- Giuliano, D.A. (2005) New infragenera in *Baccharis* (Asteraceae, Astereae). *Novon* 15: 534-541.
- Giuliano, D.A. & Freire, S. E. (2011) Nuevas secciones en *Baccharis* (Asteraceae, Astereae) de América Del Sur. *Annals of the Missouri Botanical Garden* 98: 331–347.
- Handro, O. (1953) Novidades taxonômicas de J.F. Toledo. *Arquivos de Botânica do Estado de São Paulo* 3: 67-97.
- Heering, W. (1904) Die *Baccharis*-Arten des Hamburger Herbars. *Jahrbuch der Hamburgischen Wissenschaftlichen Anstalten* 21: 1–46.
- Heiden, G. (2008) A New Species of *Baccharis* subgen. *Tarchonanthoides* Heering (Asteraceae-Astereae) from Rio Grande do Sul, Brasil. *Bradea* 13: 5–9.
- Hooker, W. J. & Arnott, G.A.W. (1841) Contributions towards a Flora of South America and the islands of the Pacific. I. Extra-tropical South America. Subtribe II. Baccharideae Less. *Journal of Botany* (Hooker) 3: 19-47.
- Kunth, C.S. (1818) Nova genera et species plantarum quas in peregrinatione ad plagam aequinoctialem orbis novi collegerunt, descripserunt, partim adumbraverunt Amat. Bonpland et Alex. de Humboldt. Vol. 4. Ed. folio. Paris: N. Maze.
- Linnaeus, C. (1753) *Species plantarum*. Vol. 2. Stockholm: L. Salvius.
- McNeill, J., Barrie, F. R., Burdet, H. M., Demoulin, V., Hawksworth, D. L., Marhold, K., Nicolson, D. H., Prado, J., Silva, P. C., Skog, J. E., Wiersema, J. H. & Turland, N. J. (eds) (2006) International Code of Botanical Nomenclature (Vienna Code) adopted by the Seventeenth International Botanical Congress Vienna, Austria, July 2005. Gantner, Ruggell. (Regnum Vegetabile, 146). i–xviii, 568 pp.

- Malagarriga Heras, R.P. [as Irmão Teodoro Luis] (1957) Para o estudo da Flora Sul-Riograndense qual o valor da “Flora Brasiliensis” de Martius? *Contribuições do Instituto Geobiológico La Salle* 8: 1-61.
- Malagarriga Heras, R.P. [as Irmão Teodoro Luis] (1958) Notes critiques a propos des Baccharidinae de l'herbier du laboratoire de phanérogamie du museum d'histoire naturelle de Paris. *Bulletin du Muséum national d'Histoire naturelle* 2: 275-298.
- Malagarriga Heras, R.P. (1977) [1976]. Nomenclator baccharidarum omnium. *Memoria de la Sociedad de Ciencias Naturales La Salle* 37: 129-224.
- Malme, G.O.A. (1933) Compositae paranenses dusenianae. *Kongliga Svenska Vetenskaps-Akademiens Handlingar* 12: 1-122.
- Müller, J. (2006) Systematics of *Baccharis* (Compositae–Astereae) in Bolivia, including an overview of the genus. *Systematic Botany Monographs* 76: 1–341.
- Müller, J. (2010) *World checklist of Baccharis L. (Compositae–Astereae)*. Available from: <http://www2.uni-jena.de/biologie/spezbot/herbar/Baccharis.htm>. (22 March 2012).
- Oliveira, A.S. & Deble, L.P. (2006) Duas novas espécies sul-brasileiras de *Baccharis* L. (Asteraceae–Astereae). *Balduinia* 9: 4-9.
- Oliveira-Deble, A.S. & Deble, L.P. (2008) New species of *Baccharis* (Asteraceae, Astereae) from Brazil. *Bonplandia* 17: 13-24.
- Persoon, C.H. (1807). *Synopsis plantarum, seu enchiridium botanicum ...* vol. 2. Paris: Craemer; Tübingen: Cotta.
- Ruiz, H. & Pavón, J.A. 1798. *Systema vegetabilium florum peruvianae et chilensis, ...* vol. 1. [Madrid:] Sancha.
- Sprengel, K. (1826) *Systema vegetabilium*, ed.16, vol. 3. Gottingensis: Dieterich.



## PART 2.2

### **Two new combinations in *Baccharis* (Asteraceae: Astereae)**



**TWO NEW COMBINATIONS IN *BACCHARIS* (ASTERACEAE: ASTEREA)**

**GUSTAVO HEIDEN**

Departamento de Botânica, Instituto de Biociências

Universidade de São Paulo

Rua do Matão, Travessa 14, 321

São Paulo, SP 05508-090, Brazil

[gustavo.heidem@gmail.com](mailto:gustavo.heidem@gmail.com)





## ABSTRACT

The newly proposed genus *Lanugothamnus* Deble is considered a synonym of *Baccharis*, since phylogenetic data strongly support the monophyly of *Baccharis* sensu lato and reject the current circumscription of *Baccharis* subg. *Tarchonanthoides*, on which the circumscription of the new genus is based. Two new combinations are proposed: ***Baccharis anabelae*** (Deble) G. Heiden and ***Baccharis pluricapitulata*** (Deble) G. Heiden, based on taxa originally described in *Lanugothamnus*.

**KEY WORDS:** Baccharidinae, Compositae, new combinations, nomenclature



*Baccharis* L. comprises between 338 and 400 species occurring from the USA to southern Argentina and Chile (Bremer 1994; Müller 2013) and is characterized by the usually tufted indumentum of the leaves and stems and the common occurrence of dioecy (Müller 2006). Heering (1904) published the first subgeneric classification of *Baccharis* and included the subgenera *Baccharis*, *Molina* (Pers.) Heering, *Pteronioides* Heering, *Stephananthus* Heering, and *Tarchonanthoides* Heering.

The genus has been target of recent alterations in its circumscription. Hellwig (1993) proposed segregate *Neomolina* F.H. Hellw. and *Pingraea* Cass. from *Baccharis* and suggested that the species he included in the informal group “Lanugobaccharis” should be considered equivalent to a genus as well. On the other hand, broader circumscriptions of *Baccharis* were proposed by Nesom (1988) and Müller (2006) with the merging of monoecious (*Baccharidastrum* Cabrera), gynodioecious (*Heterothalamus* Less.), and polygamous taxa (*Baccharidiopsis* G.M. Barroso).

The most recent proposal for subgeneric classification of *Baccharis* was published by Müller (2006), who assumed as starting point the infrageneric taxa of Nesom (1990) and the genera segregated by Hellwig (1993), accepting four out of five subgenera established by Heering (1904). In his scheme, Müller (2006) accepted the subgenera *Baccharis*, *Molina*, *Pteronioides*, and *Tarchonanthoides*.

Müller (2006) considered *Baccharis* subgen. *Tarchonanthoides* as the most consistently circumscribed subgenus of *Baccharis* and Heiden and Pirani (2012a, b) published a new species and taxonomic synopsis for the subgenus. Deble (2012) segregated *Baccharis* subgen. *Tarchonanthoides* sensu Müller (2006) into the new genus *Lanugothamnus* Deble, proposing 19 new combinations and describing two new species.

A phylogenetic analysis of *Baccharis* focusing on the subgenus *Tarchonanthoides* (Heiden et al., ined.), sampling 22 of the 23 species accepted in this taxon as circumscribed morphologically by Müller (2006), strongly supports the monophyly of *Baccharis* sensu lato, i.e. including *Baccharidastrum*, *Baccharidiopsis*, *Heterothalamus*, *Neomolina*, *Pingraea* and *Lanugothamnus*. However, *Baccharis* subgen. *Tarchonanthoides* as proposed by Müller (2006), and consequently *Lanugothamnus* as published by Deble (2012) is polyphyletic, since the characters used to circumscribe the new genus, such as the absence of the tufted indumentum common to most of the *Baccharis* species and other uncorrelated characters, as the pistilodium sweeping hairs of equal length and pubescent cypselae, are not correlated and evolved more than once in *Baccharis*. Thus *Lanugothamnus* is regarded as a synonym of *Baccharis* and two new combinations for species published in *Lanugothamnus* with no name available in *Baccharis* are provided as follows.

**BACCHARIS ANABELAE** (Deble) G. Heiden, **comb. nov.** Basyonym: *Lanugothamnus anabelae* Deble (2012, p. 20). **TYPE. Brazil. Rio Grande do Sul:** São José dos Ausentes, Canion Monte Negro, 1000 m, 7 Nov 2005, ♀, *Deble & Oliveira 4128* (holotype MBM; isotype SI).

**BACCHARIS PLURICAPITULATA** (Deble) G. Heiden, **comb. nov.** Basyonym: *Lanugothamnus pluricapitulatus* Deble (2012, p. 16). **TYPE. Brazil. Rio Grande do Sul:** Pinheiro Machado, Serra das Asprezas, 5 Mar 2008, *Deble & Oliveira 8421* (holotype MBM; isotype: CTES)

#### ACKNOWLEDGEMENTS

The authors acknowledge FAPESP (processes 2010/00519-8, 2011/18385-0 and 2012/17911-3), IAPT Research Grants in Plant Systematics 2010, the Smithsonian Institution's 2011 Cuatrecasas Fellowship Award for financial support, and Guy Nesom for the review of the manuscript.

#### LITERATURE CITED

- Bremer, K. 1994. *Asteraceae: Cladistics & Classification*. Timber Press, Portland.
- Deble, L.P. 2012. Studies in Baccharidinae (Asteraceae: Astereae). I: *Lanugothamnus* a new genus from South America. *Balduinia* 37: 2–25.
- Heering, W. 1904. Die *Baccharis*-Arten des Hamburger Herbars. *Jahrb. Hamburg. Wissensch. Anst.* 21: 1–46.
- Heiden, G. and J.R. Pirani. 2012a. A synopsis and notes for *Baccharis* subgen. *Tarchonanthoides* (Asteraceae: Astereae). *Phytotaxa* 60: 41–49.
- Heiden, G. and J.R. Pirani. 2012b. *Baccharis napaea* (Asteraceae, Astereae): a new species of subgen. *Tarchonanthoides* sect. *Coridifoliae* from the subtropical highlands of southern Brazil. *Phytotaxa* 66: 49–54.
- Hellwig, F. 1993. The genera *Pingraea* Cassini and *Neomolina* Hellwig (Compositae-Astereae). *Candollea* 48: 203–219.
- Müller, J. 2006. Systematics of *Baccharis* (Compositae–Astereae) in Bolivia, including an overview of the genus. *Syst. Bot. Monogr.* 76: 1–341.
- Nesom, G.L. 1988. *Baccharis* sect. *Baccharidastrum* (Compositae: Astereae), including two monoecious and one dioecious species. *Phytologia* 65: 169–173.
- Nesom, G.L. 1990. Infrageneric taxonomy of North and Central American *Baccharis* (Asteraceae: Astereae). *Phytologia* 68: 40–46.

## PART 2.3

**Taxonomy of *Baccharis* subgen. *Tarchonanthoides* (Asteraceae:  
Astereae), a group from the southeastern South American  
open vegetations**



**Taxonomy of *Baccharis* subgen. *Tarchonanthoides* (Asteraceae: Astereae), a group from the southeastern South American open vegetations**

GUSTAVO HEIDEN<sup>1,2</sup> & JOSÉ RUBENS PIRANI<sup>1</sup>

<sup>1</sup>*Departamento de Botânica, Instituto de Biociências, Universidade de São Paulo, Rua do Matão, Travessa 14, 321, São Paulo, SP 05508-090, Brazil.*

<sup>2</sup>*gustavo.heidem@gmail.com.*

*Manuscript planned to be submitted as a Monograph to Phytotaxa.*





**Abstract.** This is the first attempt to provide a taxonomic revision of a subgenus of *Baccharis* according to a phylogenetic framework, and under no geographic constraint. The recircumscription of *Baccharis* subgen. *Tarchonanthoides* involves the synonymization of *Lanugothamnus*, and the exclusion of *Baccharis* sect. *Coridifoliae* in order to keep the subgenus monophyletic. Other taxonomic changes are: *Baccharis psammophila* is confirmed as a synonym of *B. gnaphalioides*, *B. anabelae* is a synonym of *B. phyllicifolia* and the application of this name along with *B. leucopappa* and *B. uleana* is clarified. A lectotype is designated to *B. uleana*. Two recircumscribed sections, five new series and 13 species are accepted within the subgenus which diversified mainly in open vegetations from southeastern South America in Brazil, Paraguay, Uruguay, and Argentina. General morphological descriptions of the infrageneric taxa are provided, as well as a taxonomic key, descriptions, data on etymology, distribution and habitats, phenology, conservation status, ethnobotany and vernacular names, and a list of specimens examined, line drawings, pictures and maps of distribution for all accepted species.

**Key Words.** Araucaria forest, Atlantic forest, Baccharidinae, Campos de altitude, Campos rupestres, Cerrado, Compositae, Pampa.



## Introduction

*Baccharis* Linnaeus (1753: 860) comprises between 338 and 400 species occurring from the USA to southern Argentina and Chile (Bremer 1994; Müller 2013) and is characterized by the usually tufted indumentum of the leaves and stems and the common occurrence of dioecy (Müller 2006).

The genus has been target of recent alterations in its circumscription. Hellwig (1993) proposed segregation of *Neomolina* F.H. Hellw. and *Pingraea* Cass. from *Baccharis*, and suggested that the species he included in the informal group “Lanugobaccharis” should be considered equivalent to a genus as well. On the other hand, broader circumscriptions of *Baccharis* were proposed by Nesom (1988) and Müller (2006), with the merging of monoecious (*Baccharidastrum* Cabrera), gynodioecious (*Heterothalamus* Less.), and polygamous taxa (*Baccharidiopsis* G.M. Barroso).

The most recent proposal for a subgeneric classification of *Baccharis* was published by Müller (2006), who assumed as starting point the infrageneric taxa of Nesom (1990) and the genera segregated by Hellwig (1993), accepting four out of five subgenera established by Heering (1904). Müller (2006) considered *B.* subgen. *Tarchonanthoides* as the most consistently circumscribed subgenus of *Baccharis*, and Heiden & Pirani (2012a, b) published two new species and a taxonomic synopsis for the subgenus. Deble (2012) segregated *B.* subgen. *Tarchonanthoides* sensu Müller (2006) into the new genus *Lanugothamnus* Deble, proposing 19 new combinations and describing two new species.

A phylogenetic analysis of the genus (Heiden et al., in preparation), sampling 22 of the 23 species accepted in this subgenus as circumscribed morphologically by Müller (2006), plus 51 of the 69 type species of generic and infrageneric segregates of *Baccharis*, strongly supports the monophyly of *Baccharis* sensu lato, i.e. including *Baccharidastrum*, *Baccharidiopsis*, *Heterothalamus*, *Neomolina*, *Pingraea* and *Lanugothamnus*. However, *B.* subgen. *Tarchonanthoides* as proposed by Müller (2006), and consequently *Lanugothamnus* as published by Deble (2012), emerged as a polyphyletic assemblage; hence some of the characters generally used to circumscribe that subgenus are not correlated and evolved more than once in *Baccharis*. Thus, based on phylogenetic grounds, Heiden (2013) regarded *Lanugothamnus* as a synonym of *Baccharis*, and provided two new combinations for species originally published in *Lanugothamnus* with no name available in *Baccharis*.

The recircumscription of *Baccharis* subgen. *Tarchonanthoides* accompanied by a phylogenetic tree is presented by Heiden et al. (in preparation). The current article is a classical taxonomic revision of the 13 species that remained in the recircumscribed subgenus, presenting general morphological descriptions for the infrageneric taxa, a taxonomic key, descriptions, data on etymology, distribution and habitat, phenology, conservation status, ethnobotany and vernacular names, and list of specimens examined, as well as line drawings, pictures and maps of distribution for each accepted species.

## Material & Methods

Fieldwork focusing on *Baccharis* subgen. *Tarchonanthoides* was conducted in Argentina, Brazil, and Uruguay between 2007 and 2013. The specimens collected between 2007 and 2009 were deposited primarily in RB, and between 2010 and 2013 primarily in SPF. When available, duplicates were sent mainly to K, LP, MBM, MVFA, and US. Herbarium collections from B, BAA, BAB, BHCB, C, CEN, CEPEC, CESJ, COL, CORD, CTES, E, ESA, F, FLOR, G, GB, GUA, HAS, HB, HBG, HBR, HECT, HEPH, HRJ, HUEFS, HURG, IAC, IBGE, ICN, INPA, IPA, JPB, K, LIL, LP, MBM, MBML, MEDEL, MG, MO, MT, MVFA, MVFQ, MVJM, MVM, NY, O, OUPR, P, PACA, PAMG, PEL, R, RB, RBR, RFFP, RUSU, S, SI, SP, SPF, SPSF, UB, UEC, UFP, UFRN, UPCB, US, and USZ were examined.

The key was built to reflect phylogenetic relationships among clades, infrageneric taxa and species based on Heiden et al. (in preparation). The subgenus is defined by a combination of characters and the descriptions for section and series are diagnostic. The infrageneric taxa and species are presented following the order they appear in the key. The species descriptions were based on fertile specimens selected to represent the whole range of geographic distribution and morphological variability observed. Measurements were done with a digital caliper and diminute structures were analyzed and measured in a stereomicroscope. Illustrations of branches were based on living specimens and details of structures were based on stereomicroscope pictures. The species are circumscribed in this revision based on morphological discontinuities within and between populations, and species are considered the smallest units that can be diagnosed by constant morphological character states.

Geographic distribution and habitat, phenology and vernacular names data were gathered from herbarium specimens and fieldwork observations. Uncertain citations of geographic distribution found only in bibliography and vague or conflicting voucher label collecting data (including data referring only to state/province level) were not mapped neither considered as usable records to validate distributional data. Maps were prepared using the software DIVA-GIS 5.4 and the conservation status was assessed on the basis of the guidelines provided by International Union for Conservation of Nature Red List Categories and Criteria (IUCN 2013).

## Taxonomy

***Baccharis* subgen. *Tarchonanthoides*** Heering (1904: 26) [as “*Tarchonantoides*”]. —Type: *Baccharis tarchonanthoides* DC.

*Lanugothamnus* Deble (2012: 11). —Type: *Lanugothamnus helichrysoides* (DC.) Deble (= *Baccharis helichrysoides* DC.). *Syn. nov.*

Dioecious shrubs and subshrubs, rarely treelets. Indumentum of shoots and leaves whitish to ochraceous or canescent, composed mostly of single, rarely paired, filiform, flageliform and biseriate trichomes (tufted indumentum absent). Leaves sessile or petiolate, leaf blade discolourous. Male

capitula hemispherical or cup-shaped, epaleate. Male florets with pistillodium apex nearly fully cleft into linear-lanceolate branches bearing sweeping hairs of equal length. Female capitula epaleate. Female florets with 5-denticulate corollas. Cypselae generally covered by twin trichomes.

*Baccharis* has been broadly defined by the usually tufted indumentum of the leaves and stems, with fused trichomes that have only a single adjoining basal cell, and the functionally unisexual florets, generally in distinct individuals (Müller 2006, Volkens 1890). A phylogenetic analysis based on molecular data shows that *Baccharis* subgen. *Tarchonanthoides* is the earliest diverging lineage of *Baccharis*, thus the sister clade of the remaining species of the genus (Heiden et al. in preparation). This subgenus shares the functionally unisexual florets with its sister clade, but lacks the tufted indumentum common to most species of *Baccharis*. The lack of the tufted indumentum and common occurrence of an indumentum of filiform trichomes is one of the main reasons why *B. sect. Coridifoliae* Giuliano has been traditionally assigned to *B. subgen. Tarchonanthoides*. However, as demonstrated by Heiden et al. (in preparation), *B. sect. Coridifoliae* is not close related to the clade containing the type species of *B. subgen. Tarchonanthoides*, being the sister-group of a newly recircumscribed *B. subgen. Baccharis*.

The absence of the tufted indumentum in *Baccharis* subgen. *Tarchonanthoides* and *B. sect. Coridifoliae* could be explained by two independent events of loss, in the case the tufted indumentum is a simpliomorphy of *Baccharis*, or to the retention of a plesiomorphic character in *B. subgen. Tarchonanthoides* with gain of tufted indumentum in the clade composed by the remaining species of *Baccharis*, with a posterior reversal in *B. sect. Coridifoliae*. In both situations, absence of tufted indumentum is a homoplasy within *Baccharis* and cannot be taken into account alone to circumscribe monophyletic taxa. As *B. sect. Coridifoliae* is closer related to the species of *B. subgen. Baccharis*, Heiden et al. (in preparation) propose the exclusion of *B. sect. Coridifoliae* from *B. subgen. Tarchonanthoides* to keep it monophyletic. The current taxonomic revision is based on this restricted circumscription of *B. subgen. Tarchonanthoides*.

*Baccharis* subgen. *Tarchonanthoides* can be recognized by the combination of the following characters: indumentum of shoots and leaves composed mostly of filiform trichomes, male florets with pistillodium apex nearly fully cleft into linear-lanceolate branches bearing sweeping hairs of equal length, female florets with 5-denticulate corollas and cypselae generally covered by twin trichomes.

*Baccharis* subgen. *Tarchonanthoides* comprises 13 species classified into two sections and five series that are supported phylogenetically (PP $\geq$ 0.9; Heiden et al. in preparation). The group has diversified mainly in open vegetations of Southeastern South America, occurring along the edges of forests, grasslands and savannahs; in tropical, subtropical, and temperate climates; in lowlands and highlands; and in moist or dry environments in Brazil, Paraguay, Uruguay, and Argentina (Fig. 1). The main center of species richness is found in the Southern Brazilian highlands along the states of Paraná, Santa Catarina and Rio Grande do Sul. Nonetheless, endemic taxa also occur in the rocky grasslands

(*campos rupestres*) of Minas Gerais, in Southeastern Brazil, and in the lowland temperate grasslands from the pampas of Argentina, Uruguay and Southern Brazil.

**Key to the species of *Baccharis* subgen. *Tarchonanthoides***

1. Phanerophytes ; pappus of female florets not accrescent ..... A. sect. *Tarchonanthoides* 2
- . Chamaephytes; pappus of female florets accrescent ..... B. sect. *Canescentes* 7
2. Capitulescences corymbose ..... I. ser. *Curitybensis* 3
- . Capitulescences racemose or paniculate ..... 5
3. Pappus bristles of male floret with twisted apex, not broadened apically; cypsela glabrous or puberulous, sparsely covered by twin trichomes ..... 1. *B. chionolaenoides*
- . Pappus bristles of male floret with straight or flexuous apex, broadened apically; cypsela pubescent, densely covered by twin trichomes ..... 4
4. Shoots virgate; leaves evenly distributed along the branches; peduncles with a pilose indumentum; pappus bristles of male florets not twisted; female floret with style 3–3.4 mm long, pappus 3.6–4 mm long ..... 2. *B. curitybensis*
- . Shoots ascending; leaves crowded at the distal part of the branches; peduncles with a tomentose indumentum; pappus bristles of male florets flexuous; female floret with style 3.9–4.2 mm long, pappus 2.9–3.2 mm long ..... 3. *B. nebularis*
5. Shoots patent; leaves sessile; capitulescence racemose; pappus bristles of male florets tortuous apically; female corolla with a subapical wreath of trichomes; cypsela glabrous, pappus multiseriate ..... II. ser. *Colliculatae* 4. *B. patens*
- . Shoots virgate; leaves petiolate, capitulescence paniculate; pappus bristles of male florets not twisted apically; female corolla without a subapical wreath of trichomes; cypsela pilose or glabrescent, pappus uniseriate ..... III. ser. *Tarchonanthoides* 6
6. Shoots, abaxial surface of leaves and peduncles tomentose; male corolla 1.6–2.2 mm long, pappus 1.5–2.1 mm long, bristles straight; cypselae 1.7–2 mm long, glabrescent, sparse biseriate glandular trichomes near the apex ..... 5. *B. lychnophora*
- . Shoots, abaxial surface of leaves and peduncles villose; male corolla 2.8–3.4 mm long, pappus 2.7–3 mm long, bristles basally tortuous; cypselae 1.4–1.6 mm long, puberulous, evenly covered by twin trichomes ..... 6. *B. tarchonanthoides*
7. Male florets with glabrous lobes ..... IV. ser. *Gnaphalioides* 8
- . Male florets with trichomes on the lobes ..... V. ser. *Canescentes* 9

8. Shoots tomentose; abaxial surface of leaves lanose; male corolla 3.2–3.5 mm long, pappus bristles tortuous; female florets with style 5.5–6.1 mm long; cypsela 1.2–1.9 mm long ..... 7. *B. gnaphalioides*
- . Shoots villose; abaxial surface of leaves tomentose; male corolla corolla 2.2–2.7 mm long, pappus bristles flexuous; female florets with style 2.9–3.3 mm long; cypsela 0.9–1.1 mm long ..... 8. *B. leucopappa*
9. Capitulescences racemose ..... 10
- . Capitulescences corymbose or paniculate ..... 11
10. Fertile shoots ascending; leaves cordate, ovate to oblong, 1-nerved (hyphodromous), sericeous abaxially; male capitula 4.7–6 mm long; female capitula 6.2–6.7 mm long; cypselae 1.2–1.4 mm long ..... 9. *B. gibertii*
- . Fertile shoots pendulous; leaves lanceolate, 3-nerved, acrodromous imperfect, tomentose abaxially; male capitula 6.5–8 mm long; female capitula 8–20 mm long; cypselae 2–2.4 mm long ..... 10. *B. leucocephala*
11. Leaves with felted indumentum abaxially; male and female clinanthia globose, puberulous or glabrescent ..... 11. *B. uleana*
- . Leaves with tomentose indumentum abaxially; male and female clinanthia conical, slightly convex or or plane, pubescent ..... 12
12. Shoots tomentose; capitulescence corymbose; male corolla 2.2–2.8 mm long; female corolla 2.2–2.7 mm long; cypselae 0.8–1.1 mm long ..... 12. *B. phyllicifolia*
- . Shoots villose; capitulescence paniculate; male corolla 3.6–4.2 mm long; female corolla 3.6–4 mm long; cypselae 1.2–1.4 mm long ..... 13. *B. helichrysoides*

**A. *Baccharis* sect. *Tarchonanthoides*** (Heering) Cuatrecasas (1967: 89). *Baccharis* subgen.

*Tarchonanthoides* Heering (1904: 26) [“Tarchonantoides”]. *Lanugothamnus* subgen.

*Tarchonanthoides* (Heering) Deble (2012: 16) —Type: *Baccharis tarchonanthoides* DC.

Phanerophytes, shoots whitish to ochreous. Leaves green adaxially, whitish to ochraceous abaxially.

Pappus of female florets uniseriate or multiseriate, not accrescent.

The circumscription of *Baccharis* sect. *Tarchonanthoides* is reassessed to include species presenting a phanerophyte life form and pappus of female florets not accrescent. Consequently, species of *Baccharis* subgen. *Tarchonanthoides* formerly placed in *B.* sect. *Curitybenses* and one species in *B.* sect. *Canescentes* (*B. patens*) by Giuliano (2005) are transferred to *B.* sect. *Tarchonanthoides*. As currently defined, the section comprises three series and six species occurring in savannahs and grasslands from Southeastern Brazil to Southern Uruguay.

**I. *Baccharis* ser. *Curitybenses*** (Giuliano) G. Heiden, *stat. nov.* Basyonim: *Baccharis* sect. *Curitybenses* Giuliano (2005: 536). *Lanugothamnus* subgen. *Curitybenses* (Giuliano) Deble (2012: 15) —Type: *Baccharis curitybensis* Heering ex Malme (1933: 69).

Shoots ascending or virgate. Leaves petiolate, basally 3–5-nerved. Capitulescences corymbose. Pappus bristles of male florets straight, flexuous or tortuous apically. Female corollas without a subapical wreath of trichomes. Cypselae 8–10-ribbed, puberulous, glabrescent or not, pappus deciduous, multiseriate.

A new status is proposed and *Baccharis* ser. *Curitybenses* is subordinated to *B.* sect. *Tarchonanthoides* due its life form and pappus of female florets not accrescent. The series represents a lineage of three close related species diversified in the high altitude tropical and subtropical grasslands of South and Southeastern Brazil. The series was originally described by Giuliano (2005) in the rank of section to accommodate solely *B. curitybensis*. Falkenberg & Deble (2010) and Heiden & Pirani (2014, *in press*) described two additional species.

**1. *Baccharis chionolaenoides*** Falkenberg & Deble (2010: 64). *Lanugothamnus chionolaenoides* (D.B.Falkenb. & Deble) Deble (2012: 16). —Type: BRAZIL. Santa Catarina: Urubici, extremo sul do topo do Morro da Igreja, pouco além da área cercada pelo CINDACTA, 6 December 1996, ♀, *D. B. Falkenberg 8961* (holotype FLOR!; isotypes CTES!, MBM, SI!, UEC!).

Illustration: Falkenberg & Deble (2010: 66). Fig. 2, 3.

*Subshrubs* 0.3–1 m tall, erect; fertile shoots ascending, dichotomously branched. *Stems* light brown, shoots tomentose. *Leaves* 2–4 cm long, 0.7–2.5 cm wide, crowded at the distal part of the branches; petioles 0–1 cm long; leaf blade indurate, elliptic to obovate, apex acute to obtuse, sometimes mucronulate, base long-attenuate, margins entire or with one pair of vestigial teeth, flat; leaves basally 3–5-nerved, acrodromous, with a secondary even reticulum, adaxial surface with a caducous lanose indumentum, abaxial surface with a persistent tomentose indumentum. *Capitulescences* terminal; corymbs 2–4.5 cm long, 2.5–5 cm wide. *Capitula* pedunculate; peduncles 0.4–4 cm long, lanose. *Male capitula* 6.5–8.6 mm long; florets 43–92; involucre 5–6.5 mm long, 8–13 mm wide, cup-shaped; phyllaries 3–4-seriate, ochraceous or stramineous, outer linear-ovate, median and inner linear-lanceolate, margins entire, apex rounded to acute, villose; clinanthium convex, with flagellate trichomes; corolla 4–5.3 mm long, tube 2–2.9 mm long, throat 0.6–0.8 mm, lobes 1.4–1.6 mm long, biseriate hairs on throat; anthers fulvous, 0.9–1.1 mm long; style 4–5.4 mm long; ovary abortive, 0.9–1.1 mm long, 0.1–0.2 mm wide, glabrous; pappus 3.7–5 mm long, bristles 30–52, twisted, not broadened apically. *Female capitula* 6–12 mm long; florets 43–70; involucre 5.5–10 mm long, 7–12 mm wide, cup-shaped to campanulate; phyllaries 4–5-seriate, ochraceous or stramineous, outer and median ones oblanceolate, inner ones linear-lanceolate, margins entire, apex obtuse to acute, villose; clinanthium convex, with scattered biseriate glandular trichomes; corolla 3.1–4 mm long; style 4.1–4.4 mm long, branches 0.7–1 mm long. *Cypselae* 2.4–3.2 mm long, 0.7–1 mm wide, brown, glabrescent,



ribs with scattered twin trichomes, obconical, slightly compressed laterally, 9–10-ribbed; pappus 3.5–5.2 mm long; bristles 40–66. Chromosome number unknown.

**Etymology:**— The specific epithet refers to the superficial resemblance to the Southeastern Brazilian species *Chionolaena latifolia* (Benth.) Baker (Asteraceae: Gnaphalieae).

**Distribution and habitat:**— *Baccharis chionolaenoides* occurs in southern Brazil (Santa Catarina state), being endemic from a single site in the Southern precipice of the Morro da Igreja, at elevations around 1775 m a.s.l. (Fig. 4). It forms dense populations on rock outcrops, growing on steep cliffs at the transition between bare rocks and cloud forests, along the buffer zone between the ombrophilous dense forest and the high altitude subtropical highland grasslands, in the contact of the Atlantic and Paranense provinces.

**Phenology:**— Fertile specimens have been collected from early October to late January.

**Conservation status:**— Critically endangered (B1, B2a). It is known from a single locality with a small extent of occurrence (<100 km<sup>2</sup>) and area of occupancy (<10 km<sup>2</sup>). Although the species occurs at an almost intangible area inside a conservation unit, its population size, number of mature individuals and resilience of the population is unknown. Anthropogenic threats seems to be out of reach, however extinction may take place due to stochastic events.

**Vernacular names:**— unknown.

*Baccharis chionolaenoides* is easily recognized by the habit and entire leaves distally crowded on branches. It has an unusual large sterile ovary compared to the other species of the subgenus. The pappus bristles of male florets not broadened apically is a further character distinguishing this species from the remaining of *B. ser. Curitybensis*.

**Specimens examined:**— BRAZIL. SANTA CATARINA: Urubici, Parque Nacional de São Joaquim, Morro da Igreja, CINDACTA, 16 October 1993, ♀, *D.B. Falkenberg* 6290 (FLOR); 18 June 1996, *D. B. Falkenberg* 7958 (FLOR); 8 October 1996, ♀, *D.B. Falkenberg* 8378 (FLOR); 3 November 1996, ♂, *D.B. Falkenberg* 8724 (FLOR, CTES, SI, MBM, UEC); 6 December 1996, ♂, *D.B. Falkenberg* 8962 (FLOR); 29 January 1997, ♂, *D.B. Falkenberg* 9421 (FLOR); 28°7'53"S, 49°28'38"W, 1775 m, 13 November 2011, ♂, *G. Heiden & C.T. Oliveira* 1799 (SPF); ♀, *G. Heiden & C.T. Oliveira* 1800 (SPF).

**2. *Baccharis curitybensis*** Heering ex Malme (1933: 69). *Lanugothamnus curitybensis* (Heering ex Malme) Deble (2012: 16). —Types: “Curityba 20/10 08 (n. 6906), Serrinha 14/10 09 (n. 8539). Hab. in campo. Ad eandem speciem pertinet Glaziou n. 7715 (in Serra da Bocaina civit. Sao Paulo lecta)”. BRAZIL. Paraná: Curitiba, 20 October 1908, ♂, *P. K. H. Dusén* 6906 (lectotype S! (10-22254), first-step lectotype designated by Barroso 1976: 97, second-step lectotype designated by Heiden & Pirani (2012a: 47); isolectotypes: F! (0049682F), G! (00222589), GH! (00003932), K! (000221944), LD (1222629) photo!, MO! (797734), NY! (00162224), US! (00129284)). —Remaining syntypes: BRAZIL. Paraná: Balsa Nova; São Luiz do Purunã, Serrinha, 14 October 1909, ♂, *P. K. H. Dusén*

8539 (syntype S! (10-22255)). São Paulo: Serra da Bocaina, ♂, A. F. M. Glaziou 7715 (syntype S! (S10-22253) = *B. tarchonanthoides* DC.).

Illustration: Barroso (1976: 221, 224); Malme (1933: Tab. V); Malagarriga (1973: fig. 16a; 1977: dessin 68). Fig. 5, 6.

*Shrubs* 0.5–1.5 m tall, erect; fertile shoots virgate, dichotomously or trichotomously branched. *Stems* brown, shoots pilose. *Leaves* 1–5 cm long, 0.7–1.5 cm wide, evenly distributed along the branches; petioles 2–8 mm long; leaf blade indurate, oblanceolate, elliptic to ovate, apex acute to obtuse, rarely mucronulate, base attenuate to cuneate, margins entire or rarely with 1–5 pairs of teeth, flat; leaves basally 3-nerved, acrodromous imperfect, with a secondary semicraspedodromous, rarely craspedodromous reticulum, adaxial surface with a caducous villose indumentum, abaxial surface with a persistent felted indumentum. *Capitulescences* terminal; corymbs 1.2–10 cm long, 1.4–12 cm wide. *Capitula* sessile to pedunculate; peduncles 0–1.8 cm long, pilose. *Male capitula* 4–5.9 mm long; florets 43–92; involucre 3.8–4.3 mm long, 5.4–8.9 mm wide, cup-shaped to campanulate; phyllaries 3–4-seriate, light green or stramineous, outer and median ovate, inner linear-lanceolate, margins entire, apex acute to rounded, pilose; clinanthium convex, glabrous or with flagellate trichomes; corolla 3–3.4 mm long, tube 1.9–2.5 mm long, throat 0.7–0.8 mm, lobes 0.6–1 mm long, biseriate hairs on throat; anthers fulvous 3–3.2 mm long; style 3–3.5 mm long; ovary abortive, 0.2–0.4 mm long, 0.1–0.2 mm wide, with twin trichomes; pappus 3–3.4 mm long, bristles 28–50, not twisted, apically broadened. *Female capitula* 5.1–7.5 mm long; florets 40–62; involucre 5–6.2 mm long, 5.5–8.2 mm wide, cup-shaped to campanulate; phyllaries 4–5-seriate, light green or stramineous, outer ones ovate, median oblong, inner ones linear-lanceolate, margins entire, apex acute to rounded, pilose; clinanthium concavous, nearly glabrous, with scarce biseriate glandular trichomes; corolla 2.6–3 mm long; style 3–3.4 mm long, branches 0.4–0.5 mm long. *Cypselae* 1.3–1.5 mm long, 0.3–0.5 mm wide, light brown, puberulous, evenly covered by twin trichomes, oblong, 8–10-ribbed; pappus 3.6–4 mm long; bristles 36–40, slightly broadened apically. Chromosome number unknown.

**Etymology:**— The specific epithet refers to the type locality in Curitiba, Paraná, Brazil.

**Distribution and habitat:**— *Baccharis curitybensis* occurs in southeastern (Minas Gerais and São Paulo states) and southern Brazil (Paraná, Santa Catarina and Rio Grande do Sul states), known from several disjunct locations along the highlands of Serra da Mantiqueira, Planalto Paulista, Serra da Bocaina (a portion of Serra do Mar range), Planalto de Curitiba, Planalto de Ponta Grossa, and Serra Geral, at elevations between 900 and 1250 m a.s.l. (Fig. 4). It forms sparse populations in open and generally dry vegetations, growing in patches of high altitude tropical and subtropical highland grasslands occurring in between the Ombrophilous Dense Forest and Ombrophilous Mixed Forest (with *Araucaria*), along the Atlantic and Paranense provinces.

**Phenology:**— Fertile specimens have been collected from early September to early June, with the peak of flowering between November and December.

**Conservation status:**— Near threatened (NT). It is known to occur inside some natural reserves and in few non-protected primary and secondary areas. Some previously recorded populations along the naturally fragmented range of distribution became locally extinct as habitat quality recently decreased and habitat loss increased. Regional state assessments are encouraged with the aim to evaluate the conservation and keep the great variability found in populations preserved.

**Vernacular names:**— Vassourinha-do-campo (*Heiden & Iganci 1970, 1971*).

*Baccharis curitybensis* is seldom misidentified as *B. tarchonanthoides*, and it is not rare to found both species growing sympatrically. Leaf shape and teeth show a great variability in the two species, but the corymbose capitulescences help to differentiate *B. curitybensis* from the paniculate *B. tarchonanthoides* straightforwardly.

Even though the capitulescences of the specimen *Glaziou 7715*, a syntype of *B. Curitybensis*, are immature, they show characters typical of *B. tarchonanthoides*. This specimen has 3-nerved leaves, as commonly found in *B. curitybensis*, however 3-nerved leaves, though rare, can also be found within *B. tarchonanthoides* variability.

**Specimens examined:**— BRAZIL. MINAS GERAIS: Itamonte, Campo Redondo, 1401 m, 8 November 2007, ♀, *P.L. Viana, N.F.O. Mota & L.E. Andrade 3205* (BHCB); Parque Estadual do Papagaio, 2152 m, 7 November 2007, ♀, *N.F.O. Mota, P.L. Viana & L.E. Andrade 998* (BHCB). Passa Quatro, Serra Fina, Campo do Muro, 23 November 2006, ♀, *L.D. Meireles & J.A. Nunes 2620* (BHCB, UEC); ♂, *L.D. Meireles & J.A. Nunes 2621* (BHCB, UEC); ♀, *L.D. Meireles & J.A. Nunes 2629* (BHCB, RB, UEC); ♂, *L.D. Meireles & J.A. Nunes 2634* (RB, UEC). PARANÁ: Almirante Tamandaré, 9 October 1975, ♂, *G. Hatschbach 37325* (C, MBM); 4 October 1914, ♂, *G. Jönsson 1026a* (SI). Balsa Nova, São Luiz do Purunã, 28 October 1996, ♂, *O.S. Ribas & M.F. Luz 1534* (MBM, US); 14 January 1965, ♀, *L.B. Smith, R.M. Klein & G. Hatschbach 14440* (HBR, NY, RB, US); Escarpa Devoniana, 18 September 1989, ♂, *L. Dombrowski 13953* (MBM). Bocaiúva do Sul, Capivari, 16 October 1949, ♂, *G. Hatschbach 1545* (ICN, MBM, PACA, S, US); Salto, 12 November 1959, ♂, *G. Hatschbach 6474* (ICN, LIL, MBM). Campina Grande do Sul, 22 October 1961, ♂, *G. Hatschbach 8501* (MBM, RB); 20 November 1965, ♂ & ♀, *G. Hatschbach 13147* (F, K, MBM, NY, P, UPCB, US). Curitiba, 16 December 1947, ♀, *G. Tessman s.n.* (MBM 264282, RB65128). Jaguaruaiva, Fazenda Samambaia, 14 October 2006, ♀, *E. Barbosa, J.M. Silva & E.M. Cunha 1672* (MBM). Pirai do Sul, Joaquim Murtinho, 17 November 1970, ♂, *G. Hatschbach & O. Guimarães 25423* (CTES, MBM, MO, UPCB). Palmeira, Fazenda Santa Rita, November 1979, ♂, *L. Dombrowski 13500* (MBM); Recanto dos Papagaios, 11 October 1978, ♂, *L. Dombrowski 9812* (MBM). Ponta Grossa, rio Pitanguí, ♂ & ♀, *A. Cervi & G. Hatschbach 3005* (GB, MBM, S, SPSF). 9 October 1989, Passo do Pupo, 12 October 1995, ♂, *C.B. Poliquesi & J. Cordeiro 448* (E, ESA, G, HUEFS, MBM, MO, NY, PEL, UB). São José dos Pinhais, Rio Pequeno, 900 m, 5 November 1969, ♂, *G. Hatschbach 22813* (MBM, NY, UPCB); 2 November 2004, *J.M. Silva 4200* (MBM). RIO GRANDE DO SUL: Cambará do Sul, Cânion Fortaleza, September 2003, ♂, *M. Grings 1280* (ICN); Serra da Pedra,

February 1948, st. *B. Rambo* 36314 (PACA). SANTA CATARINA: Bom Jardim da Serra, Cural Falso, 1500 m, 11 December 1958, ♂, *R. Reitz & R.M. Klein* 7800 (B, G, HBR, NY, RB, US). Campo Alegre, Iquererim, 8 November 1956, ♀, *L.B. Smith & R.M. Klein* 7416 (HBR, RB, US); 9-10 December 1956, ♀, *L.B. Smith & R.M. Klein* 8551 (HBR, RB, US); 18 October 1957, ♂, *R. Reitz & R.M. Klein* 5308 (HBR, NY, P, US). Garuva, Serra do Quriri, 16 October 2004, ♂, *J.M. Silva, O.S. Ribas & M.R. Bornschein* 4115 (CTES, MBM, RB, SP). Rancho Queimado, Serra da Boa Vista, 1014 m, 14 October 2012, ♂, *G. Heiden & J.R.V. Iganci* 1970 (SPF); ♀, *G. Heiden & J.R.V. Iganci* 1971 (SPF). SÃO PAULO: Campos do Jordão, 9 June 1992, ♀, *A. Sciamarelli s.n.* (UEC 26543); 22 October 1938, ♂, *G. Hashimoto* 5 (RB); 17 November 1940, ♂, *G. Hashimoto* 391 (SP); September 1945, *J.E. Leite* 3626 (LIL); 23 October 1974, ♂, *J. Mattos* 15931 (SP); 28 September 1976, ♀, *P. Davis et al.* 2964 (RB); Capivari, 18 November 2011, 1568, ♂, *G. Heiden et al.* 1816 (SPF); ♀, *G. Heiden et al.* 1817 (SPF); Mata do Auditório, 10 June 1992, ♀, *T.C. Sposito s.n.* (UEC 26429); ♂, *T.C. Sposito s.n.* (UEC 26430); Parque Estadual dos Mananciais, 6 September 1994, ♂, *M.J. Robim & R. Evangelista* 504 (MBM, SPSF, UEC); 1 December 2011, ♀, *G. Heiden, G. Sancho & J.M. Bonifacino* 1818 (SPF); Pedra do Elefante, ♂, *M.J. Robim & R. Evangelista* 797 (SPSF); 26 July 1991, ♂, *S. Xavier & E. Caetano* 185 (SPSF); 15 October 1992, ♂, *S. Xavier, A. Rodrigues & A. Costa* 302 (SPSF); São José dos Alpes, 22 September 1975, ♂ & ♀, *H.P. Bautista & G.M. Barroso* 214 (JE, RB, SPF); 1 October 1995, ♂, *J.R. Guillaumon s.n.* (MBM, SPSF); Umuarama, 22 October 1949, ♂, *E. Kühn & M. Kuhlmann* 2059 (R, RB, SP, SPF, US); Vila Matilde, 19 October 1975, ♂, *M. Sakane* 330 (SP). Queluz, Serra Fina, Pedra a Mina, 2550-2660 m, ♂, *G.J. Shepherd et al.* 97-40 (BHCB, UEC). São José do Barreiro, 30 December 1998, ♀, *L. Freitas & I.S.M. Gajardo* 498 (UEC); 23 December 1999, ♂, *L. Freitas* 733 (K, UEC); Serra da Bocaina, 9 December 1952, ♂, *Markgraf & Apparicio* 10301 (G, RB). São Paulo, Vila Emma, December 1932, ♂, *A.C. Brade* 12192 (R).

**3. *Baccharis nebularis*** G. Heiden in Heiden & Pirani (2014: *accepted*). — Type:—BRAZIL. Paraná: Guaratuba, Serra de Araçatuba, Morro dos Perdidos, cume, 25° 53' 21 "S, 48° 57' 28 "W, 1,411 m, 17 December 2010, ♀, *G. Heiden, J.R.V. Iganci, J.M. da Silva & J.M. Vaz* 1449 (holotype SPF!; isotypes FLOR!, K!, MBM!, RB!, US!).

Illustration: Heiden & Pirani (2014: *accepted*). Fig. 7, 8.

*Shrubs* 0.5–2 m tall, erect; fertile shoots ascending, dichotomously branched. *Stems* brown, shoots tomentose. *Leaves* 1.2–5 cm long, 0.7–2 cm wide, leaves crowded at the distal part of the branches; petioles 2–18 mm long; leaf blade indurate, obovate to elliptic, apex acute to obtuse, sometimes mucronulate, base acute, margins entire or with 1–3 pairs of teeth, flat; leaves basally 3-nerved, acrodromous imperfect, with a secondary semicraspedodromous reticulum, adaxial surface with a caducous lanose indumentum, abaxial surface with a persistent felted indumentum. *Capitulescences* terminal; corymbs 3–6.5 cm long, 3.3–6.8 cm wide. *Capitula* pedunculate; peduncles 0.7–2.5 cm long, tomentose. *Male capitula* 4.7–6 mm long; florets 34–45; involucre 4–5 mm long, 7–9.6 mm wide, cup-shaped; phyllaries 3–4-seriate, light green, outer and median ovate, inner linear-lanceolate,

margins entire, apex rounded, pilose, glabrescent; clinanthium plane, nearly glabrous, with scarce biseriate trichomes; corolla 3–3.6 mm long, tube 1.6–1.9 mm long, throat 0.7–0.9 mm, lobes 0.7–0.8 mm long, biseriate hairs on the lobes; anthers fulvous, 2.3–2.7 mm long; style 2.3–2.9 mm long; ovary abortive, 0.3–0.5 mm long, 0.1–0.3 mm wide, covered by biseriate and twin trichomes; pappus 3.3–3.7 mm long, bristles 18–22, flexuous, apically broadened. *Female capitula* 6.7–8.5 mm long; florets 26–44; involucre 4.2–5.5 mm long, 7.3–9.9 mm wide, campanulate; phyllaries 4–5-seriate, light green, outer ones elliptic, median ovate, inner ones oblanceolate, margins entire, apex rounded, pilose, glabrescent; clinanthium plane, nearly glabrous, with scarce flageliform trichomes; corolla 2.8–3 mm long; style 3.9–4.2 mm long, branches 0.3–0.5 mm long. *Cypselae* 1.2–1.4 mm long, 0.4–0.8 mm wide, brown, puberulous, evenly covered by twin trichomes, oblong, 8–10-ribbed; pappus multiseriate, 2.9–3.2 mm long; bristles 32–48, slightly broadened apically. Chromosome number unknown.

**Etymology:**— The specific epithet refers to the habitat in cloud forest thickets amidst high altitude grasslands.

**Distribution and habitat:**— *Baccharis nebularis* occurs in southern Brazil (Paraná and Santa Catarina states) and is restricted to the summits of the peaks of the Southernmost range of Serra do Mar, at elevations between 1400 and 1700 m a.s.l. (Fig. 4). It grows in patches of moist high altitude tropical grasslands mixed with cloud forest thickets, forming sparse populations, in the buffer zone between the ombrophilous dense forest and the high altitude subtropical highland grasslands of the Atlantic province.

**Phenology:**— Fertile specimens have been collected from August to late December, with a flowering peak between October and November.

**Conservation status:**— Near threatened (NT, Heiden & Pirani 2014, *in press*). It is known to occur in a few non-protected primary areas and seems not to persist in secondary and anthropized environments. Some populations along the range of distribution could become locally extinct, while others are recorded to hardly accessible places, out of reach of strong anthropogenic pressure. As habitat quality is decreasing and habitat loss is increasing along its naturally fragmented range, the species should be monitored and the category vulnerable could be applied in the near future.

**Vernacular names:**— unknown.

*Baccharis nebularis* resembles the allopatric *B. chionolaenoides* due to the densely branched habit with leaves crowded in the apex of the branches. However, *B. nebularis* is closer related to the parapatric *B. curitybensis*. The studied specimens of *B. nebularis* were previously determined in herbaria as *B. curitybensis*. The two species have in common similar 3-nerved, entire or dentate leaves, corymbose capitulescences, cup-shaped male and campanulate female capitula, pappi of male florets broadened apically and cypselae covered by twin trichomes, but can be differentiated as demonstrated in the key.

**Specimens examined:**— BRAZIL. PARANÁ: Campina Grande do Sul, Morro Camapuã, 9 September 1999, ♂, *E. Barbosa, J.M. Silva & L.A. Ferreira* 390 (C, CTES, ESA, G, INPA, MBM); Pico Caratuva, 2 August 1967, 1950 m, ♂, *G. Hatschbach* 16829 (MBM); 5 October 1967, *G. Hatschbach* 17322 (CTES, K, MBM, MO, UPCB); ♂, 15 November 1967, *G. Hatschbach* 17845 (HBR, MBM, UPCB); Serra do Capivari, 23 October 1997, ♂, *C.V. Roderjan & A.P. Tramujas* 1510 (MBM, UPCB); Capivari Grande, 23 October 2001, ♂, *E. Barbosa, O.S. Ribas & E.F. Costa* 670 (B, MBM); Serra do Ibitiraquire, 2 November 2001, ♂, *A.Y. Mochinski & M. Scheer* 40 (UPCB); Serra dos Órgãos, Morro Tucum, 19 November 1999, ♂, *J. Cordeiro, J.M. Cruz & L.A. Ferreira* 1643 (B, CESJ, G, MBM, UFP). Guaratuba, Serra de Araçatuba, 9 November 1983, ♂, *R. Kummrow* 2391 (GB, HBG, MBM, NY, UB, UPCB); 23 November 1996, ♂, *E.P. Santos, H.M. Fernandes & C.M.S. Coimbra* 297 (MBM, UPCB); 1 December 1998, ♂, *J.M. Silva, E. Barbosa & J.M. Cruz* 2661 (C, FLOR, G, HBG, HUEFS, K, MBM, NY, SPF); 25 February 2000, ♂, *J.M. Silva, E. Barbosa & J. Cordeiro* 3262 (CESJ, ESA, HUEFS, MBM); 30 October 2003, ♂, *J.M. Silva, E. Lucas, F.F. Mazine & C.M. Sakuragui* 3809 (CORD, MBM, NY, SP); Morro dos Perdidos, cume, 25° 53' 21 "S, 48° 57' 28 "W, 1,411 m, 17 December 2010, ♀, *G. Heiden, J.R.V. Iganci, J.M. da Silva & J.M. Vaz* 1449 (FLOR, K, MBM, RB, SPF, US); ♂, *G. Heiden, J.R.V. Iganci, J.M. da Silva & J.M. Vaz* 1450 (MBM, RB, SPF, US); 9 November 1994, ♀, *C.B. Poliquesi & J.M. Cruz* 208 (BHCB, HAS, MBM, UB); 9 September 2006, bud, *G.O. Romão & A.P.T. Dantas* 1676 (BHCB, ESA, UEC); 29 October 2006, ♂, *G.O. Romão, C.D. Rodrigues & A.P. Dantas* 1496 (BHCB, ESA, SPF, UEC); 23 November 1996, ♂, *E.P. Santos, H.M. Fernandes & C.M.S. Coimbra* 297 (NY, UPCB). Quatro Barras, Morro Mãe Catira, 8 October 1985, ♀, *R. Kummrow & J.M. Silva* 2626 (C, CORD, FLOR, GB, MBM, US); 31 October 1989, ♂, *J.M. Silva & C.B. Poliquesi* 655 (MBM, SP). SANTA CATARINA: Campo Alegre, Serra do Quiriri, 19 November 1992, *J. Cordeiro & C.B. Poliquesi* 953 (C, HUEFS, MBM, MO); 28 December 1999, ♀, *J. Cordeiro, J.M. Silva, E. Barbosa & O.S. Ribas* 1747 (CTES, MBM). Garuva, Monte Crista, 6 October 1960, *R. Reitz & R.M. Klein* 10034 (HBR, RB).

**II. *Baccharis* ser. *Colliculatae*** G.Heiden, *ser. nov.* —Type: *Baccharis patens* Baker (1882: 52).

*Differs from all species of Baccharis subgen. Tarchonanthoides by its glabrous cypselae with colliculate surface.*

Shoots patent. Leaves sessile, 1-nerved. Capitulescences racemose. Pappus bristles of male florets tortuous apically. Female corollas with a subapical wreath of trichomes. Cypselae 5–7-ribbed, glabrous, colliculate, pappus deciduous, multiseriate.

The newly described *Baccharis* ser. *Colliculatae* is assigned to sect. *Tarchonanthoides* due its life form and pappus of female florets not accrescent. The series is characterized by the glabrous cypselae with a colliculate surface, which is unique in the subgenus. The 1-nerved sessile leaves and female corollas with a subapical wreath of trichomes are also unique within *B.* sect. *Tarchonanthoides*. *Baccharis patens*, occurring in subtropical and temperate grasslands from Southern Brazil and

Uruguay, was previously placed in *B. sect. Canescentes* by Giuliano (2005). It is the only known species to be assigned to this series and represents an isolated or relictual lineage.

**4. *Baccharis patens*** Baker (1882: 52). *Lanugothamnus patens* (Baker) Deble (2012: 13). —Type: "Habitat prope Montevideo: Sello n. 463! 729!". URUGUAY. Montevideo: s. d., ♀, *F. Sellow d463* (lectotype K! (000221906), designated by Heiden & Pirani (2012a: 43); isolectotypes GH! (00003969), NY! (0016229)). —Remaining syntypes: URUGUAY. Montevideo: s.d., ♀, *F. Sellow s.n.* (syntypes K! (000222052)), B† photo in F! (0BN015027)).

*Baccharis squarrosa* Baker (1882: 50), non Kunth (1818). —Type: "Habitat in Uruguay, in campis et rupestribus ad Maldonado: Capt. King!; prope Montevideo: Sello n. 2808! 2924!; prope Las Minas in fissuris rupium: Gibert n. 881!". URUGUAY. Lavalleja: Minas, April 1869, ♂, *J.E. Gibert 881* (lectotype K, first-step lectotype designated by Barroso 1976: 57, second-step lectotype designated by Heiden & Pirani (2012a: 43) K! (000222090), uppermost branch); isolectotype K! (000222090, branches of the same collection at the bottom of the sheet); MVM!. —Remaining syntypes: URUGUAY. Maldonado: 1826, ♀, *P.P. King 28* (K! (000222088; 000222091)). BRAZIL. Rio Grande do Sul: Porto Alegre, Morro da Polícia [fide Malagarriga (1957)], June 1825, ♀, *F. Sellow 2808* (syntype GH! (00004002)). *F. Sellow 2924* (not found).

*Baccharis bakeri* Heering (1904: 39). —Type: "Reineck & Czermak n. 106. Rio Grande do Sul. Belém Velho an bebuschten Hängen". BRAZIL. Rio Grande do Sul: Porto Alegre, Belém Velho, 12 September 1894, ♂ & ♀, *E. M. Reineck & J. Czermak 106* (holotype HBG! 4 sheets; isotypes G!, MO! (5753120), MVM!, O!, P! (00509635), S! (10-22206).

Illustration: Barroso (1976: 224); Malagarriga (1973: fig. 8, as *Baccharis bakeri*; 1977: dessin 112). Fig. 9, 10.

*Subshrubs* or shrubs 0.05–1.5 m tall, erect or procumbent; fertile shoots patent, branches axillary. *Stems* light brown to stramineous; shoots tomentose. *Leaves* 0.5–2 cm long, 1.3–3 mm wide, evenly distributed along the branches; petioles absent; leaf blade indurate, linear-obovate, linear-oblong, linear-elliptic to linear, apex rounded to acute, base sessile, attenuate, obtuse or subcordate, margins entire, revolute; leaves 1–nerved, adaxial surface with a caducous pubescent indumentum, abaxial surface with a persistent felted indumentum. *Capitulescences* racemose, rarely capitula solitary, terminal; racemes 1–4 cm long, 1–4 cm wide. *Capitula* pedunculate; peduncles 0.5–2 cm long, tomentose. *Male capitula* 3.6–5.3 mm long; florets 12–36; involucre 3.4–4.7 mm long, 4.9–6.8 mm wide, campanulate; phyllaries 3–4-seriate, light green or vinaceous, outer ones ovate, median oblong, inner ones oblanceolate, margins scarious, dentate, apex acute to rounded, lanose to glabrous; clinanthium conical, with scarce biseriate trichomes; corolla 3–3.6 mm long, tube 1.6–1.8 mm long, throat 1–1.2 mm, lobes 0.4–0.6 mm long, biseriate hairs on the lobes; anthers cream, 3.3–3.7 mm long; style 3.3–3.9 mm long; ovary abortive, 0.08–0.12 mm long, 0.17–0.2 mm wide, glabrous or with biseriate trichomes; pappus 3.3–3.9 mm long, bristles 16–22, not twisted, apically slightly broadened.

*Female capitula* 5.4–8 mm long; florets 8–24; involucre 4.8–5.8 mm long, 4–6 mm wide, turbinate to cylindrical; phyllaries 3-seriate, light green or vinaceous, outer and median ones ovate, inner ones elliptic, margins dentate, scarious, apex rounded, lanose to glabrous; clinanthium plane, glabrous; corolla 2.3–2.8 mm long, apex with a wreath of filiform trichomes; style 3.9–4.2 mm long, branches 0.3–0.5 mm long. *Cypselae* 1.7–2 mm long, 0.79–0.9 mm wide, brown, glabrous, colliculate, oblong, 5–7-ribbed; pappus 4.8–5 mm long; bristles 48–80, not broadened apically. Chromosome number unknown.

**Etymology:**— The specific epithet refers to the spreading branches.

**Distribution and habitat:**— *Baccharis patens* occurs in southern Brazil (Rio Grande do Sul state) and south-eastern Uruguay (Canelones, Lavalleja, Maldonado, Montevideo, Rocha, and San José departments), known from several locations from the Serra Geral and the eastern hills of Serra do Sudeste, in Brazil, through the Serranías del Este, in Uruguay, and surrounding lowland areas, at elevations between 0 and 950 m a.s.l. (Fig. 11). It forms sparse populations on rocky basaltic soil, within the subtropical highland grasslands with in the Ombrophilous Mixed Forests of the Paranense province, and on granitic or conglomerate outcrops or rocky and shallow soils, in the low altitude temperate grasslands, sometimes reaching the coast and growing on rocky shores or coastal scrub vegetation on sandy soils, within the Pampean province.

**Phenology:**— Fertile specimens have been collected from July to December, with a flowering peak between August and September.

**Conservation status:**— Least concern (LC). It is known to occur inside a few natural reserves and in several non-protected primary areas. Although it is not threatened along its entire range, the increasing anthropization of native grasslands and rock outcrop environments are likely to threaten some locally morphological diverse and isolated populations.

**Vernacular names:**— romerillo (*Heiden & Iganci 1463*), vassourinha (*Heiden et al. 1395a, 1395b*).

The distribution of *Baccharis patens* is centered in two separate areas. The northern specimens are always shrubby and usually bear smaller leaves and capitula, which are always disposed in racemes. In contrast, the southern specimens can be shrubs or subshrubs bearing leaves and capitula slightly larger and, in addition to the capitula organized in racemes, sometimes present solitary capitula in the same plant. Plants from the Sierras de Minas and Punta Ballena in Uruguay, growing in rocks exposed to constant wind or under maritime influence, can display the growing habit as a spreading procumbent subshrub. However these specimens cannot be recognized as distinct taxa, since environmental influence is strong and intermediate forms between procumbent subshrubs and erect shrubs are found in the same area. Despite the apparently suitable habitats for the species in the hilly countryside of Cerro Largo department in Uruguay, no specimens were found during fieldwork on this area linking the two centres of distribution of the species, which are probably disjunct.

**Specimens examined:**— BRAZIL. RIO GRANDE DO SUL: Amaral Ferrador, September 1985, ♂, *M. Sobral 4198* (ICN); ♀, *M. Sobral 4199* (ICN, K, MBM, NY). Arroio dos Ratos, 27 August 1983, *S.*



*Carvalho s.n.* (ICN59361). Bagé, 30 September 1982, st., *J. Mattos 25647* (HAS); August 1987, ♀, *M. Sobral, S. Bordignon & J.N. Marchiori 5713* (ICN); ♂, *M. Sobral, S. Bordignon & J.N. Marchiori 5714* (FLOR, ICN, MBM, PACA). Cachoeira do Sul, Durasnal, October 1983, ♀, *M. Sobral 2529* (F, MBM, MO). Caçapava do Sul, 22 September 1981, ♂, *K. Hagelund 13561* (ICN); ♀, *K. Hagelund 13583* (ICN); 10 November 2011, ♀, *G. Heiden, A. Antonelli & J.R.V. Iganci 1768* (SPF); 21 October 1986, ♀, *J. Mattos 29765* (HAS); August 1987, ♀, *M. Sobral, S. Bordignon & J.N. Marchiori 5707* (FLOR, ICN, MBM), arroio Lajeado, 30 September 1983, st., *J. Mattos 25548* (HAS); Fazenda da Taleira, 21 September 1986, ♀, *M. Rossato et al. s.n.* (HUCS2008, MBM125415, MO5570246, NY00788070, US3072933); Passo do Cação, Vale do Camaquã, 26 September 1984, ♀, *B. Irgang et al. s.n.* (ICN92776); rio Camaquã, 27 October 2012, ♀, *G. Heiden et al. 2014* (SPF). Cambará do Sul, Parque Nacional de Aparados da Serra, Itaimbezinho, 13 October 1976, ♂, *D. Araújo 1259* (GUA, US); 919 m, bud, *G. Heiden et al. 1403* (ICN, RB, SPF, US); 900 m, 6 September 1971, ♂, *A. Sehnem 12411* (PACA). Canela 10 August 1998, ♂, *S. Diesel 1508* (US). Canguçu, Base do CINDACTA, 27 October 2011, ♀, *G. Heiden, E.R.T. Stumpf & S.Z. Fischer 1732* (CTB, GB, ICN, MVFA, RB, SPF). Capão do Leão, Horto Botânico, 16 July 1954, *J.C. Sacco 159* (HB, PACA, PEL, RB); Jazida do Silveira, 5 August 1999, ♂, *E.N. Garcia 376* (ICN). Caxias do Sul, Criúva, Ilhéus, 750 m, 17 September 1988, ♂, *R. Wasum et al. s.n.* (G345949, HUCS4435, INPA159689, MBM125414, MO4295620, NY00788071, US3100352); 17 November 1988, ♀, *M. Rossato et al. s.n.* (G345940, HUCS4433, MO4295619, US3100351). Cerro Grande do Sul, 28 September 1997, ♀, *J.A. Jarenkow 3543* (ESA, FLOR, ICN, MBM, PEL). Encruzilhada do Sul, 9 September 1977, ♀, *J. Mattos 17313* (HAS); 11 September 1971, ♀, *A. Sehnem 12429* (NY, PACA); ♂, *A. Sehnem 12430* (NY, PACA); Cerro da Cascavel, 9 September 1995, ♀, *J.A. Jarenkow 2748* (MBM, PEL); Quero-Quero, 1 October 1984, ♀, *M. Sobral 3051* (F, FLOR, G, ICN, MBM, MO, PAMG, S); ♂, *M. Sobral & Y. Folz 3052* (F, FLOR, G, ICN, MBM, MO, PAMG). Guaíba, Fazenda São Maximiano, 3 October 1993, ♀, *N.I. Matzenbacher s.n.* (ICN103661). Lavras do Sul, 13 November 1980, ♂, *J. Mattos 21631* (HAS); Fazenda do Posto, 17 October 1971, ♀, *J.C. Lindeman & B.E. Irgang s.n.* (ICN8648); Mina Volta Grande, 5 October 1984, ♀, *M. Sobral 3065* (ICN). Maquiné, 26 May 1979, ♂, *J. Mattos 80854* (HAS). Mariana Pimentel, *s.d.*, st., *N.I. Matzenbacher s.n.* (RB191677); Cerro Negro, 12 October 1983, ♀, *A.M. Jesien & S.G. Bauermann s.n.* (ICN61691). Morro Redondo, 15 October 1989, ♀, *J.A. Jarenkow 1363* (HAS, MBM, PEL). Pantano Grande, *s.d.*, ♂ & ♀, *J.C. Lindeman, B.E. Irgang & J.F.M. Valls s.n.* (ICN20542, CTES39909, HAS56844, LP *s.n.*). Pelotas, Pedreira Santa Luzia, 20 May 1959, st., *J.C. Sacco 1223* (F, HAS, HB, HBR, MBM, PEL, R, RB). Pinheiro Machado, 428 m, 26 February 2010, st. *G. Heiden & G. Heiden 1257* (SPF); 445 m, 15 July 2010, ♂, *G. Heiden et al. 1395a* (E, RB, SPF, US); ♀, *G. Heiden et al. 1395b* (E, RB, SPF, US). Porto Alegre, October 1896, *Brixen 74639* (LIL); 21 September 1956, ♀, *J. Mattos 6858* (PACA); 16 July 1948, ♂, *B. Rambo 37333* (LIL, MBM, PACA, SI); 2 November 1936, ♀, *W. Rau 22* (LP, RB); Agronomia, st., *J. Mattos 6041* (HAS); Belém Velho, January 1985, *I.S. Luz s.n.* (ICN62576); Ipanema, 1973, ♂, *N.I.*

*Matzenbacher s.n.* (RB162842); Jardim Botânico, 28 August 1979, ♀, *O. Bueno 1669* (CTES, HAS); Morro das Abertas, 14 August 1979, ♂, *O. Bueno 1644* (CTES, F, HAS, MBM, RB); Morro da Glória, 8 October 1980, ♂, *J. Mattos 21416* (HB); 15 August, 1945, ♂, *B. Rambo 29000* (LIL, PACA); 20 September 1949, ♀, *B. Rambo 43470* (LIL, PACA); ♂, *B. Rambo 43503* (PACA); Morro do Osso, 18 October 1996, *P. Brack 643* (ICN); 3 July 1996, ♀, *R.S. Rodrigues 12* (ICN); Morro da Polícia, 15 August 1969, bud, *L.R.M. Baptista & B. Irgang s.n.* (ICN5881); 22 November 1901, ♀, *G.O.A. Malme 499* (S); 9 September 1949, ♂, *B. Rambo 43330* (CTES, LIL, PACA); 9 September 1949, ♀, *B. Rambo 43341* (C, LIL, PACA); Morro Santana, 278 m, 22 August 2007, ♂, *A.C. Fernandes & M. Ritter s.n.* (ICN159165); 20 August 1200, *J. Mattos 1200* (HAS); 21 August 1958, *J.R. Mattos 6866* (HBR, PACA, PEL); 7 September 1991, *L.T. Pereira s.n.* (ICN119279); 11 November 1987, ♀, *M. Silveira 4767* (HAS); 2 June 1987, *N. Silveira 12580* (HAS); January 1990, ♀, *M. Sobral 6093* (ICN); April 2000, st., *M. Sobral & A. Schenkel 9026* (ICN); Morro São Pedro, 25 September 2008, ♀, *R. Setubal & P.M.A. Ferreira 646* (ICN); Teresópolis, August 1943, ♂, *J.E. Leite 3149* (SP); UFRGS, Campus do Vale, 16 September 1988, ♀, *N.F. Silveira 122* (HAS); Vila Manresa, 15 August 1945, ♂, *B. Rambo 29000* (B, PACA); 20 September 1949, ♀, *B. Rambo 43370* (B, PACA); ♂, *B. Rambo 43503* (B, PACA); 22 May 1950, ♂ & ♀, *B. Rambo 48809* (B, HBR, LIL, LP, PACA). Santa Maria, Serra do Pinhal, Campestre do Pinhal, 4 October 1947, ♂, *J.E. Vidal 1208* (R). São Lourenço do Sul, Barrinha, 22 August 2009, 4 m, ♂, *G. Heiden 1065* (SPF). Viamão, Beco do Capitão, Sítio Vassouras, 10 August 1987, ♂, *C. Mondin & A. Levy 138* (HAS); Granja Neugebauer, 27 September 1950, ♀, *B. Rambo 11922* (HBR, PACA); Parque Estadual de Itapuã, 60 m, 8 September 1985, ♂, *D.B. Falkenberg 3092 & 3095* (FLOR); 5 September 2003, ♂, *A.A. Schneider 62* (ICN); September 1983, ♀, *M. Sobral & P. Brack 2220* (F, INPA, MBM, NY); Lagoa Negra, ♀, *M.E. Beretta & M.R. Ritter 57* (ICN); Morro do Araçá, 13 September 2012, ♂, *M. Pinheiro 387* (ICN); Praia da Pedreira, 4 October 2003, ♀, *M.E. Beretta, M.R. Ritter & A.A. Schneider 36* (ICN); Toca do Tigre, 27 September 1950, ♀, *B. Rambo 48840* (LIL, PACA); Morro da Grota, 30 October 1979, ♀, *O. Bueno 1839* (HAS, RB); Vila Gaúcha, s.d., ♀, *J.R. Mattos 3743* (HBR). S.l., 1941, ♂, *E. Viana 109* (G, RB). URUGUAY. S.l. 1816-1821, *A. Saint-Hilaire 639 C<sup>2</sup> 2127* (LP, P). CANELONES: Cuchilla Alta, 14 August 2004, ♂, *F. Haretche 10* (MVJB); ♀, *F. Haretche 11* (MVJB). LAVALLEJA: Colon, Sierra de la Lorecita, 26 March 1996, st., *D. Bayce et al. s.n.* (MVFA25511). Minas, 303 m, ♀, *G. Heiden & J.R.V. Iganci 1463* (GB, ICN, MVFA, RB, SPF, US); 10 October 1907, ♂ & ♀, *C. Osten 5170* (LIL); 20 October 1920, ♂, *C. Osten 15244* (MO, S); Cerro Arequita, 3 October 1937, ♀, *D. Legrand 1120* (MVM); 10 October 1907, *C. Osten 5170* (MVM); 3 October 1907, *B. Rosengurt A-1343* (LIL, LP, MVFA, NY); Cerros del Molino, arroyo Mataojo, December 1939, ♀, *J. Chebataroff 3604* (LP); Cerro Guazubira, 7 January 1952, *G.W. Zeague s.n.* (P02463318); Cerro Verdún, 20 October 1962, ♀, *H.A.O. Del Puerto 8666* (MVFA); 20 October 1920, ♂, *C. Osten 15244* (MVM); Fuente Salus, October 1930, ♀, *A. Lombardo s.n.* (MVJB1305); Salto del Penitente, 26 August 1962, *E.H. Marchesi 202* (MVFA). Polanco, Sierra de Polanco, 24 November 1993, ♀, *D. Bayce et al. s.n.* (MVFA22285). S.l., 14

November 2005, ♀, *M. Bonifacino et al. 1842* (CTES, MVFA). MALDONADO: Aiguá, Grutas de Salamanca, 10 November 1988, *L. Delfino & M. Zunino s.n.* (MVJB20915). Gregorio Aznárez, Cerro Betete, 27 November 2004, ♀, *C. Callero s.n.* (MVJB23281); 10 December 2005, *I. Grela s.n.* (MVJB23924). Maldonado, 26 March 1935, st., *A. Gallinal 715* (MVFA). September 1932, ♀, *W.G. Herter 1500a* (F, G, HBG, MO, MVM, NY, RB, S, SI, US); December 1861, ♀, *Nadeaud s. n.* (P0315902). Pan de Azúcar, *s.d.*, ♀, *J. Arechavaleta 157* (G, MVM); *s.d.*, ♀, *C.M. Hicken 157* (SI). Piriápolis, August 1928, ♂, *A. Lombardo s.n.* (MVJB1209, MVJB2677); November 1936, ♀, *A. Lombardo s.n.* (MVJB1863); October 1937, ♂, *H.A.O. Del Puerto s.n.* (MVFA9309); ♂, *A. Lombardo s.n.* (MVJB2186); Cerro San Antonio, 1 November 1968, *H.A.O. Del Puerto & E.H. Marchesi 770* (MVFA). Punta del Este, Punta Ballena, 22 November 1970, *Arrillaga s.n.* (MVFQ2553); 4 January 2011, ♀, *G. Heiden & J.R.V. Iganci 1466* (SPF); 5 September 1970, 22 November 1971, *A. Lombardo s.n.* (MVFA10957). Solís, Cerro de las Ánimas, September 1934, ♀, *F. Rosa-Mato557* (LP, MVM); 4 August 1935, ♂, *B. Rosengurtt B162* (LP, MVFA); Sierra Ánimas, 21 September 1972, ♀, *H.A.O. Del Puerto & E. Marchesi s.n.* (MVFA11260); ♂, *H.A.O. Del Puerto & E. Marchesi s.n.* (MVFA11261); Marzo 1958, ♂, *A. Lombardo s.n.* (MVJB2945); 20-24 November 1917, ♀, *C. Osten 11623* (MVM); 11 October 1932, *C. Osten 22334b* (MVM). San Carlos, Abra de Perdomo, 21 November 1948, ♀, *B. Rosengurtii 5263* (MVFA); Cuchilla de la Ballena, 14 November 1899, ♀, *C. Osten 3884* (MVM); Sierra Ballena, 4 August 1940, ♂, *D. Legrand 2228* (LIL, MVM). ROCHA: Santa Teresa, February 1960, st., *A.L. Cabrera 13599* (LP). *S.l.*, Serras, March, ♂, *J. Arechavaleta s.n.* (MVM); 13 January 1956, *B.R. Arrilaga 234* (MVFA). SAN JOSÉ. Isusa, November 1955, *B.R. Arrilaga 159* (MVFA).

**III. *Baccharis* ser. *Tarchonanthoides*** (Heering) G.Heiden, *stat. nov.* Basyonim: *Baccharis* subgen. *Tarchonanthoides* Heering (1904: 26) [as “Tarchonantoides”].

Shoots virgate. Leaves petiolate, pinnate, semicraspedodromous, or rarely suprabasally 3-nerved, acrodromous imperfect. Capitulescences paniculate. Pappus bristles of male florets straight or basally tortuous. Female corollas without a subapical wreath of trichomes. Cypselae 5–6-ribbed, puberulous or glabrescent, pappus persistent, uniseriate.

A new status is proposed for *Baccharis* ser. *Tarchonanthoides*, comprising the type species of the subgenus. The series represents a lineage of two sister species occurring in high elevation tropical and subtropical grasslands and savannahs of South and Southeastern Brazil, and includes the same species of the homonym section fide Giuliano (2011).

**5. *Baccharis lychnophora*** Gardner (1848: 85). *Lanugothamnus lychnophorus* (Gardner) Deble (2012: 16). —Type: "Moist rocky places on the high mountains of the Diamond District". BRAZIL. Minas Gerais: July 1840, ♂, *G. Gardner 4898* (holotype BM! (000554168); isotypes B† photo in F! (OBN015009, Macbride negative number 15009), BHCb! (000042), F! (878646, fragment), G!

(00222623), GH! (00003953), K!, NY! (00162263), P! (00755476), R! (154123), W, US! (00129312)).

*Baccharis tarchonanthoides* var. *integrifolia* Baker (1882: 50). —Syntypes: “in prov. S. Paulo: Sello n. 175 (syntype not found); in Minas Geraës ad Itambé: Martius” (syntype not found, photo in US!).

Illustration: Borges & Forzza (2008: 139). Fig. 12, 13.

*Shrubs* to treelets 1–4 m tall, erect; fertile shoots virgate, branches axillary. *Stems* grey, shoots tomentose. *Leaves* 3–20 cm long, 0.9–4.5 cm wide, evenly distributed along the branches; petioles 4–30 mm long; leaf blade indurate, obovate, elliptic to oblanceolate, apex rounded or acute to obtuse, base acute to cuneate, margins entire, flat to slightly revolute; leaves pinnate, semicraspedodromous, adaxial surface glabrous or glabrescent, with a caducous lanose indumentum, abaxial surface with a persistent tomentose indumentum. *Capitulescences* terminal; panicles corymbiform, ellipsoid or broadly conical, 2–22 cm long, 2–23 cm wide. *Capitula* pedunculate; peduncles 0.1–1.2 cm long, tomentose. *Male capitula* 2.9–4 mm long; florets 18–24; involucre 2.8–3.3 mm long, 3.3–4.9 mm wide, hemispheric; phyllaries 3–4-seriate, light green or stramineous, outer ones ovate, median and inner ones elliptic, margins scarious, entire, apex rounded, pubescent apically; clinanthium concave, nearly glabrous, with scarce flageliform and biseriate trichomes; corolla 1.6–2.2 mm long, tube 0.7–0.9 mm long, throat 0.4–0.6 mm, biseriate hairs on the throat, lobes 0.5–0.7 mm long, lobes papillose; anthers yellow, 1.8–2 mm long; style 1.7–2.2 mm long; ovary abortive, 0.1–0.2 mm long, 0.05–0.07 mm wide, glabrous; pappus 1.5–2.1 mm long, bristles 24–28, straight, apically broadened. *Female capitula* 3.8–6.8 mm long; florets 8–16; involucre 3.8–5.8 mm long, 3–4.2 mm wide, cylindrical; phyllaries 3–4-seriate, light green or stramineous, outer ones ovate, median ones elliptic, inner ones oblanceolate, margins entire, apex rounded, pubescent apically; clinanthium plane, glabrous; corolla 2.5–3 mm long; style 2.8–3.2 mm long, branches 0.2–0.4 mm long. *Cypselae* 1.7–2 mm long, 0.5–0.8 mm wide, brown, glabrescent, sparse biseriate glandular trichomes near the apex, oblong, slightly narrowed at base, 5-ribbed; pappus 3–3.7 mm long; bristles 44–66, slightly broadened apically, with long protruding cell apices. Chromosome number unknown.

**Etymology:**— The specific epithet refers to the resemblance to the Brazilian genus *Lychnophora* Mart. (Asteraceae: Vernoniaeae), as circumscribed at the time of publication of the species.

**Distribution and habitat:**— *Baccharis lychnophora* occurs in southeastern Brazil (Minas Gerais), known from several locations in the heights of the Quadrilátero Ferrífero (Iron Quadrangle), the Serra do Espinhaço and the Serra do Ibitipoca, which is a portion of the Serra da Mantiqueira range, at elevations between 1250 and 2050 m a.s.l. (Fig. 14). It forms sparse populations on open or closed vegetations, as high altitude grasslands, thickets of dry forests or riverine vegetation on rocky grasslands (*campos rupestres* - a type of edaphic and orographic vegetation on quartzite and ironstone outcrops and soils, occurring in between the tropical savannahs along the Cerrado province).

**Phenology:**— Fertile specimens have been collected all year round, but with a low season between September and December.

**Conservation status:**— Vulnerable (VU D2). The species is represented in several conservation units and in non-protected primary areas. It was previously evaluated for the Brazilian Flora red list (Nakajima et al. 2013) and assessed as vulnerable due to the restricted area of occupancy and known habitat suppression or loss of habitat quality due to anthropogenic pressure, mainly related to mining of ironstone.

**Vernacular names:**— unknown.

Two collections were cited by Baker (1882) in the description of *Baccharis tarchonanthoides* var. *integrifolia*. Since none has been found so far, a lectotype cannot be designated here. During herbaria revision at US, a photo of *Martius s.n.* collected at Itambé and labelled as *B. tarchonanthoides* var. *integrifolia* was examined. The photo and the description provided in the protologue also agree with *B. lychnophora*, confirming this name as a synonym of *B. lychnophora*, as previously published by Barroso (1976).

*Baccharis lychnophora* is found mainly at high elevations across the rocky grasslands in southeastern Brazil. Due to the natural patchy distribution of its habitat and geographical isolation among its populations, leaf shape and size, and capitulescence shape and size are strongly variable among plants from different sites. Despite the great variation within the species, the variable characters are not correlated to each other, and cannot justify the recognition of segregated taxa.

*Baccharis tarchonanthoides* is sometimes sympatric with *B. lychnophora*, and both are frequently confused. In addition to the characters contrasted in the key, the robust and few-branched habit of *B. lychnophora* and the leaves with margins always entire helps to differentiate the species from *B. tarchonanthoides*, which is usually a small and much branched shrub, mostly with at least partially dentate leaves. Entire leaves can be found in *B. tarchonanthoides*, but this trait was not recorded up to now in areas where both species co-occur.

**Specimens examined:**— BRAZIL. MINAS GERAIS: Belo Horizonte, Serra da Piedade, 13 January 1971, ♀, *H.S. Irwin et al.* 30253 (NY). Belo Vale, Mina Casa de Pedra, 1500 m, 10 September 2003, *P.L. Viana* 992 (BHCB). Caeté, Serra da Piedade, 720 m, 6 December 1985, ♂, *L. Lobo & T.S.M. Grandi* 2166 (BHCB, FCAB); 10 VI 1933, ♀, *H.L. Mello-Barreto* 3863 (F); 16 June 1933, ♂, *H.L. Mello-Barreto* 3866 (SP); 15 July 1987, ♀, *J.A. Paula* 18550 (BHCB48903); 1800 m, ♀, *E. Pereira* 2682 & *G. Pabst* 3518 (HB, RB); *s.d.*, ♀, *E. Warming* 215 (C, K, S). Catas Altas, Serra do Caraça, *s.d.*, ♀, *G. Casaretto* 2772 (G); January 1840, *P. Claussen* 25 (G); 1600 m, 20 July 1972, ♂, *L. Emygdio et al.* 3522 (R); February 1884, *st.*, *A.F.M. Glaziou s.n.* (P02404225); Serra do Caraça, ♂, *A. Saint-Hilaire* 636 (P); Cova da Onça, 12 April 1884, ♂ & ♀, *A.F.M. Glaziou* 15052 (B, C, G, ICN, K, MO, NY, US); Pico Cangerana, 1901 m, 27 August 2008, ♂ & ♀, *C.T. Oliveira & L.L. Giacomini* 97 (BHCB); Pico Conceição, 1791 m, 26 August 2008, ♀, *C.T. Oliveira & L.L. Giacomini* 32 (BHCB); Pico do Inficionado, 5 April 2007, ♂, *A. Teles et al.* 378 (BHCB, S); 2030 m, ♀, 4 September 1999, *M.F. Vasconcelos s.n.* (BHCB48903, US3396170); 2060 m, 22 March 2000, ♂, *M.F. Vasconcelos s.n.* (BHCB53698 US3406777); 2050 m, 13 May 2000, ♀, *M.F. Vasconcelos s.n.* (BHCB53704,

US3406782); Pico do Sol, 1918 m, 25 April 2009, ♂, *C.T. Oliveira, L.L. Giacomini & R.S. Viveiros 414* (BHCB). Congonhas, Mineração Casa de Pedra, *s.d.*, *M.S. Mendes & A.E. Brina s.n.* (BHCB107365, RB451321). Couto Magalhães, Chapada do Couto, 17 July 1984, ♀, *M.G. Wanderley et al. CFCR 4613* (SP, SPF). Datas, rodovia Datas-Serro, Morro do Coco, 1300-1330 m, 8 January 1988, ♀, *R. Simão et al. CFCR11727* (BHCB, SPF). Diamantina, 1400 m, June 1934, ♂, *A.C. Brade 13960* (RB); 1370 m, 19 January 1969, *H.S. Irwin et al. 22259* (B, F, K, MO, NY, RB, UB, US); ♀, 6 July 1996, ♀, *V.C. Souza 12009* (ESA, K). Itabirito, Serra de Capanema, 1904 m, 12 July 2007, ♂, *F.F. Carmo 817* (BHCB); 10 June 1971, ♀, *L. Krieger 10679* (CESJ, RB). Jaboticatubas, 6 January 1973, ♂, *J. Semir & A.M. Joly 3753* (UEC). Lima Duarte, Parque Estadual do Ibitipoca, 8 August 2001, ♀, *F.S. Araújo 9* (CESJ); 25 March 2001, ♀, *R.M. Castro & M.A. Heluey 216* (CESJ); 24 April 2007, ♂, *F.M. Ferreira, P.L. Viana & F.R.G. Salimena 968* (CESJ); 31 March 2004, ♀, *R.C. Forzza et al. 3341* (RB); 28 May 1923, ♂, *J.P. Godoy 8402* (SP); 13 May 1970, ♂, *L. Krieger 8534* (CESJ, K, RB); 26 January 2010, 1710 m, ♀, *R. Mello-Silva et al. 3255* (SPF). Lombada, 20 January 2005, ♂, *R.C. Forzza et al. 3961* (K, RB, SPF); base do Pico do Peão, 16 May 2006, ♂, *M.M. Saavedra et al. 282* (RB, NY); ♀, *M.M. Saavedra et al. 283* (BCHB, RB); 1580-1600 m, 13 May 1970, ♂, *D. Sucre & L. Krieger 6752* (K, RB). Ouro Preto, *s.d.*, ♂, *J. Badini s.n.* (OUPR20828); April 1892, ♂ & ♀, *E. Ule 2583* (HBG, R); Cachoeira das Andorinhas, 1250 m, 15 July 1978, ♂, *A.M.V. de Carvalho 34* (HECT, JE, RB, SPF); Campo de São João, 29 July 1890, ♀, *A.F.M. Glaziou 18333* (K, P); Itacolomi, September 1941, ♂, *J. Badini 3937* (OUPR); 13 June, ♂, *M. Peron 193* (RB); August 1824, ♂ & ♀, *L. Riedel 412* (NY, P, US); Lavras Novas, 1941, ♂, *J. Badini 3924* (OUPR); ♂, *J. Badini 3931* (OUPR); Morro São Sebastião, July 1896, ♂, *A. Silveira 1545* (R); *s.d.*, ♀, *L. Damazio 1130* (G, RB); 11 August 1937, ♂, *H.L. Mello-Barreto 9184* (F, R); Serra do Antônio Pereira, ♂, *J. Badini s.n.* (OUPR20829); Serra das Camarinhas, 16 May 1979, ♂, *Barroso & Ferreira 56* (PAMG); *s.d.*, bud, *J. Badini s.n.* (OUPR19851); *s.d.*, ♂, *J. Badini s.n.* (OUPR20827); 1350-1400 m, 6 August 1980, ♀, *H.C. Lima 1334* (F, RB); 1350 m, 24 May 1979, ♂, *L. Mautone et al. 770* (CEPEC, F, R, RB). Rio Acima, Serra de Gandarela, 1624 m, 13 November 2007, ♀, *F.F. Carmo 1441* (BHCB). Rio Preto, Serra Negra, 20 April 2007, ♂, *A. Teles et al. 408* (BHCB). Santa Bárbara, Serra do Caraça, 27 May 1983, ♀, *J.R. Pirani & O. Yano 704* (SP, SPF). Santa Luzia, Serra do Cipó, estrada de Conceição, 1260 m, 12 December 1949, ♂, *A.P. Duarte 2295* (F, G, K, NY, RB); km 138, 4 November 1938, ♀, *H.L. Mello-Barreto 8842* (F, R); estrada do Pilar, km 139, 3 February, ♂, *s.l.* (R154125). Santana do Pirapama, Serra do Cipó, 9 March 2009, ♂, *D. Zappi et al. 1969* (K, SPF); Santo Antônio do Itambé, Pico do Itambé, 1550 m, 12 February 1972, ♂, *W.R. Anderson, M. Stieber & J.H. Kirkbride Jr. 35870* (COL, F, K, LIL, MO, NY, US); *s.d.*, bud, *M. Magalhães 1620* (ICN); 7 April 1998, ♂, *V.C. Souza et al. 21073* (ESA, K). São Gonçalo do Rio Preto, Parque Estadual do Rio Preto, Pico Dois Irmãos, 2 April 2004, ♂, *P.L. Viana et al. 1499* (BHCB). Serra do Cipó, Rio Preto, *s.d.*, bud, *A.F.M. Glaziou 19553* (K, P). Serro, Pico do Itambé, 5 May 1942, ♂, *G. Mendes-Magalhães 1619* (RB); 5 October 1942, ♀, *G. Mendes-Magalhães 1690* (RB). *S.l.*, Gandarela, 1570 m, 13 July 1972, ♂, *L. Emygdio*

3305 (R); ♀, *L. Emygdio et al.* 3309 (R); 1816-1821, ♀, *A. Saint-Hilaire* 481 (LP); ♀, *A. Saint-Hilaire* 639 D 93 (F, P); ♂, *A. Saint-Hilaire* 640 D 93 (P, US); ♂, *A. Saint-Hilaire* 641 C<sup>1</sup> 78 (P); s.l., s.d., ♂, *A.F.M. Glaziou* 18332 (C); s.l., 1841, ♂, *K.F.P. Martius* 750 (G, K, MO, NY, P, US).

**6. *Baccharis tarchonanthoides*** de Candolle (1836: 414). *Lanugothamnus tarchonanthoides* (DC.) Deble (2012: 16). —Type: “in Brasiliae prov. Minarum General.” BRAZIL. Minas Gerais: Mariana, 1833, ♂, *A.C. Vauthier* 275 (holotype G-DC! (00200472); isotypes F! (971094); G! (00169376), GH! (00004012), K! (000221895), P! (00755763; 00755764), W)

*Baccharis ibitiensis* Toledo ex Handro (1953: 67). —Type: BRAZIL. São Paulo: Amparo, Monte Alegre, encosta do Pico da Serra Negra, 1200 m, 30 August 1943, ♀, *M. Kuhlmann* 1032 (holotype SP! (50262); isotype HAS! (56507), HB! (55002), RB! (114847)).

Illustration: Baker (1882: tabula 20); Barroso (1976: 221, 223); Teodoro (1954: 19); Malagarriga (1973: fig. 47; 1977: dessin 148). Fig. 15, 16.

*Shrubs* 1–2.5 m tall, erect; fertile shoots ascending, branches axillary. *Stems* light brown; shoots villose. *Leaves* 2–10 cm long, 0.4–2.7 cm wide, evenly distributed along the branches; petioles 3–15 mm long; leaf blade indurate, elliptic to oblanceolate, apex acute, base acute to attenuate, margins entire or with 1–9 pairs of teeth; leaves pinnate semicraspedodromous, sometimes 1-nerved or rarely suprabasally 3-nerved, acrodromous imperfect, adaxial surface glabrescent, with a caducous lanose indumentum, abaxial surface with a persistent villous indumentum. *Capitulescences* terminal; panicles conical, 5–15 cm long, 3–10.3 cm wide. *Capitula* pedunculate; peduncles 0.1–1.2 cm long, villose. *Male capitula* 3.3–4.7 mm long; florets 16–32; involucre 3.3–3.8 mm long, 4–6.7 mm wide, cup-shaped; phyllaries 3–4-seriate, light green or stramineous, outer and median ones ovate, inner ones linear-lanceolate, margins entire, apex acute, pubescent apically; clinanthium plane or slightly concave, nearly glabrous, with scarce flageliform and biseriate trichomes; corolla 2.8–3.4 mm long, tube 1.6–1.8 mm long, throat 0.7–0.9 mm, lobes 0.5–0.7 mm long, biseriate hairs on the lobes; anthers yellow, 2.8–3.9 mm long; style 2.8–3.5 mm long; ovary abortive, 0.03–0.05 mm long, 0.08–0.1 mm wide, glabrous; pappus 2.7–3 mm long, bristles 20–24, basally tortuous, apically broadened. *Female capitula* 5–6.3 mm long; florets 16–34; involucre 3.9–4.5 mm long, 3.7–6.5 mm wide, turbinate to cylindrical; phyllaries 3–4-seriate, light green or stramineous, outer ones ovate, median and inner ones lanceolate to linear-lanceolate, margins entire, apex rounded to acute, pubescent apically; clinanthium plane, glabrous or with biseriate trichomes; corolla 2.7–3.5 mm long; style 2.8–3.7 mm long, branches 0.15–0.26 mm long. *Cypselae* 1.4–1.6 mm long, 0.25–0.5 mm wide, brown, puberulous, evenly covered by twin trichomes, oblong, 5–6-ribbed; pappus 2.7–3.2 mm long; bristles 20–48, slightly broadened apically with short protruding cell ends. Chromosome number  $n=9$  (Coleman 1970).

**Etymology:**— The specific epithet refers to the resemblance to the African genus *Tarchonanthus* L. (Asteraceae: Tarchonantheae).

**Distribution and habitat:**— *Baccharis tarchonanthoides* occurs in southeastern Brazil (Minas Gerais, Rio de Janeiro, and São Paulo states) and southern Brazil (Paraná and Santa Catarina states), known from several disjunct locations in the heights of the Quadrilátero Ferrífero (Iron Quadrangle), Serra do Espinhaço, Serra do Caparaó, Serra da Mantiqueira, Serra do Mar, Planalto Paulista, Planalto de Curitiba, Planalto de Ponta Grossa, and Serra Geral, at elevations between 640 and 2250 m a.s.l. (Fig. 14). It forms sparse to dense populations on open or closed vegetations, in savannahs, grasslands, thickets of dry forests or riverine vegetation on shallow and rocky soils, occurring in rocky grasslands (campos rupestres), between the tropical savannahs along the Cerrado province, or in the high altitude tropical and subtropical highland grasslands, within the Atlantic and Paranense provinces.

**Phenology:**— Fertile specimens have been collected all year round, with a flowering peak between September and December.

**Conservation status:**— Least concern (LC). It is known to occur in some natural reserves and in non-protected primary areas. Although it is not threatened along its entire naturally fragmented range, its isolated populations could face some risk of local extinctions, and hence regional state assessments are encouraged with the aim to keep the great variability found in populations preserved.

**Vernacular names:**— Alecrim (*Andrade 248, 534; Heiden & Baumgratz 812, 813*); carrasco-do-campo (*Campos Novaes CGG3175; Glaziou 7717; Hoehne 1505, 1523*).

*Baccharis tarchonanthoides* has a wide distribution with several disjunct populations. Due to the broad geographical range and geographic isolation, leaf characteristics of shape, size, dentition and venation vary greatly along its geographical range. Curiously, specimens from the northern and southern limits of distribution usually have similar larger leaves that are always dentate, while specimens with dentate or entire margins are commonly found amongst populations from Rio de Janeiro. On the other hand, the greatest variation in leaf shape is found among geographically close populations from Paraná, where leaf shape, dentition and venation are correlated to the procedence of the specimens. However, as this characters are not correlated to any other vegetative or reproductive trait, no attempt is made to recognize segregated or infrageneric taxa within *B. tarchonanthoides*.

The specimen *Blanchet 3167* with no date and no specific locality data other than state is the only known record referring to Bahia, Northeastern Brazil. Since the collection site is imprecise, the occurrence of the species in Bahia is not confirmed by the available data. The specimens *Heiden & Iganci 1668, 1669* are the first records of *B. tarchonanthoides* to Santa Catarina.

**Representative specimens examined:**— BRASIL. *S.l., s.d., Martii Herbar Florae Brasil 755* (F, G, HBG, K, NY, P); *s.d., F. Sellow 806* (K). BAHIA: *S.l., s.d., Blanchet 3167* (MG). MINAS GERAIS: Alto Caparaó, Pico da Bandeira, 1969, ♀, *P. Jouvin 463* (PAMG). Baependi, Parque Estadual da Serra do Papagaio, 24 July 2010, *F.R.G. Salimena & P.H. Nobre 2796* (CESJ). Barbacena, *s.d., ♂, Pohl 168* (F, NY). Belvedere, 28 September 1984, ♀, *G.A.A. Silveira 16478* (UEC). Bocaina de Minas, Parque Nacional do Itatiaia, Alto dos Brejos, 13 September 2007, ♂, *G. Heiden & J.F.A. Baumgratz 847* (RB); Morro Cavado, 30 May 1962, ♀, *A. Castellanos 23340* (GUA, LIL). Camanducaia, 15



August 1966, ♀, *J.R. Coleman 431* (SP, US); ♂, *J.R. Coleman 432* (SP, US); Carmo do Rio Claro, Fazenda Córrego Bonito, 7 September 1961, ♂, *A.G. Andrade 1075 & M. Emmerich 1036* (HB). Cambuquira, 16 October 1905, *Diogo 42* (R). Caxambu 4 October 1956, ♂, *E.P. Heringer 5360* (RB, UB); 27 November 1968, ♀, *L. Monteiro 89 & M.C. Vianna 308* (GUA, US). Conceição do Mato Dentro, 10 September 1994, bud, *M. Brandão 24636* (PAMG). Delfim Moreira, São Francisco dos Campos, Morro da Boa Vista, 7 June 1950, ♀, *M. Kuhlmann 2537* (RB). Diamantina, *s.d.*, ♂, *G. Gardner 4897* (E, F, G, K, P, R, S, US). Itabirito, Serra de Itabirito, Morro do Cristo, 25 October 1987, ♀, *Q.O.A. Carvalho s.n.* (BHCB11578); 13 September 1887, ♀, *A.F.M. Glaziou 17069* (P). Itabira, Serra de Itabira, 2 September 1887, ♂, *Schwacke s.n.* (R). Itamonte, Parque Estadual do Papagaio, Bairro Colina, 7 November 2007, ♀, *N.F.O. Mota , P.L. Viana & L.E. Andrade 933* (BHCB); Parque Nacional do Itatiaia, 28 July 1979, ♀, *S. Nunes 159* (RB); Brejo da Lapa, 12 September 2007, ♀, *G. Heiden 806* (RB); ♂, *G. Heiden 807* (K, RB); 22 October 1998, ♂, *R.L. Esteves 980* (R), ♀, *R.L. Esteves 981* (R). Lavras, Reserva Municipal de Poço Bonito, August 1984, ♀, *M. Brandão 8149* (PAMG); 4-6 October 1978, MF, *S.J. Sarti 8484-A* (MBM, UEC). Lima Duarte 19 September 2006, ♂, *R.A.X. Borges 263* (BHCB, CTES, ESA, F, K, MBM, NY, RB, SPF); Conceição do Ibitipoca, 13 September 1940, ♀, *G.M. Magalhães 517* (BHCB, HB, LP, RB, SP); Parque Estadual do Ibitipoca, 27 September 1970, ♂, *L. Krieger 9284* (CESJ, K, MBM, RB); September 1987, ♂, *M. Sobral 5594* (BHCB, G, ICN, MBM); 1 October 1970, ♂, *U.C. Câmara 9459* (CESJ, K, RB). Maria da Fé, 31 August, 1946, ♀, *A.P. Duarte 244* (G, RB). Mariana, *s.d.*, *Claussen 275* (P); Mina de Alegria, 4 October 2006 ♀, *R.C. Mota , P.L. Viana & L.E. Andrade 3198* (BHCB); Parque Estadual do Itacolomi, Trilha da Serrinha, 17 November 2005, ♀, *G.S.S. Almeida 165* (RB). Mercês de Água Limpa, Serra do Curral, 25 July 1956, bud, *L. Roth 1642* (CESJ, RB). Ouro Branco, Serra de Ouro Branco, 1 October 1988, ♀, *A.R. Miranda s.n.* (BHCB13943). Ouro Preto, 8 September 1947, ♀, *L. Damazio s.n.* (RB56936); 12 November 1991, st., *P. Veríssimo 872* (PAMG); Antonio Pereira, 18 September 1996, ♀, *M.B. Roschel 250* (OUPR); 6 November 2008, ♀, *S.G. Rezende 2834* (BHCB); Cachoeira do Campo, 1857, ♀, *Casaretto 2885* (G); Campo da Caveira, July 1972, bud, *J. Badini s.n.* (OUPR20097); Campo do Saco, 31 August 1981, ♂, *H.F. Leitão Filho 1123, 1125* (UEC); 27 August 1980, ♂, *J.Y. Tamashiro 103* (UEC); Fazenda do Taquaral, 1874, ♀, *A.F.M. Glaziou 7715* (G, S); bud, *A.F.M. Glaziou 7717* (G, K, P); Floresta Estadual do Uaimii, 1158 m, 29 January 2008, ♂, *J.R. Stehmann 4874* (BHCB); Itacolomi, August 1824, ♀, *L. Riedel 415* (NY, P); ♂, *L. Riedel 419* (NY); Parque Estadual do Itacolomi, 24 August 2005, ♂, *G.S.S. Almeida 95* (RB); 23 October 2001, ♂, *M.C.T.B. Messias & V.F. Dutra 489* (OUPR); 23 October 2001, ♀, *M.C.T.B. Messias & V.F. Dutra 495* (OUPR); 22 November 2001, ♀, *M.C.T.B. Messias & V.F. Dutra 551* (OUPR); Taquaral, 20 October 1974, ♀, *M.A. Lisboa s.n.* (OUPR4122); Tesoureiro, January 1942, ♀, *G.M. Magalhães 1040* (HB); Veloso, 22 September 1974, ♀, *M.A. Lisboa s.n.* (OUPR4129). Passa Quatro, Serra Fina, Campim Amarelo, 11 June 2005, ♂, *L.D. Meireles 1807* (BHCB, RB); 12 September 2006, ♂, *L.D. Meireles 2507* (BHCB, RB, UEC); 12 September 2006, ♀, *L.D. Meireles 2544* (RB); ♂, *L.D. Meireles*

2545 (RB, UEC); 12 September 2006, ♂, *L.D. Meireles* 2546 (RB); Serra da Mantiqueira, October 1948, ♀, *J. Vidal* 1935 (R). Poços de Caldas, September 1873, ♂, *H. Mosén* 334 (S); 25 September 1973, ♀, *H. Mosén* 586 (S); *s.d.*, ♂, *A.F. Regnell* I-218 (C, O, P, S); Alto de Santa Cruz, 31 August 1964, ♀, *O. Leoncini* 104 (R); Campo do Saco, 30 August 1965, ♂, *O. Roppa* 671 (R, RB); Morro do Ferro, 19 December 1963, ♂, *M. Emmerich* 1636 (R); 8 September 1964, ♂, *M. Emmerich* 1991 (R); 9 September 1964, ♀, *M. Emmerich* 2013 (R); ♂ & ♀, *M. Emmerich* 2005 (R, RB); 26 July 1965, ♂, *M. Emmerich* 2480 (R); 22 September 1981, ♀, *H.F. Leitão Filho* 1167 (UEC); 14 July 1964, ♂, *O. Leoncini* 70 (R, RB); 27 August 1964, ♂, *O. Leoncini* 125 (B, R, RB); 10 September 1964, ♂, *O. Roppa* 171 (R, RB); Pedreira de Bortolan, 8 September 1978, ♀, *L.A.F. Carvalho* 1033 (MBM, RB); Seminário, 1 September 1964, ♂, *O. Leoncini* 118 (R, RB). Santa Bárbara, Serra do Caraça, 10 September 1990, ♂, *J.R. Stehmann s.n.* (BHCB18943); 28 September 1987, ♂, *M.B. Horta* 257 (BHCB). São João del Rei, September 1846, *Comissão Geographica e Geologica de Minas* 1668 (R). São Roque de Minas, Parque Nacional da Serra da Canastra, 20 October 1983, ♀, *R. Guedes* 481 (HECT, JE, RB, SPF); Vale dos Cândidos, 22 August 1997, ♀, *J. Nakajima* 2739 (F, UEC, US); ♂, *J.N. Nakajima* 2743 (F, US). São Sebastião do Paraíso, 12 August 1945, ♀, *E. Maria* 6 (E, F, ICN, K, LP, MT, P, SI, SPF, SPSF, US) ♀, *E. Maria* 7 (F, ICN, K, LP, MT, P, R, SI, SPF, SPSF, US); 8 September 1944, ♀, *I.T. Luis* 132, 135, 136, 137, 139 (F, ICN, LP, MT); 29 March 1945, ♂, *I.T. Luis* 144, 160, 162 (IAC, ICN, R). Tiradentes, 7 November 1952, ♀, *A.P. Duarte* 4077 (F, K, NY, RB). *S.l.*, 1845, ♂, *Widgren s.n.* (K, R, RB110741, S, US1403889). Três corações, September 1999, ♀, *B.G. Pereira s.n.* (PAMG54451). *S.l.*, August-April 1840, ♀, *P. Claussen* 16 (G, NY, P); ♀, *P. Claussen* 255 (F, G, MO, P). PARANÁ: Adrianópolis, Parque Estadual das Lauráceas, 12 November 2007, ♂, *J.M. Silva* 6167 (MBM). Balsa Nova, São Luís do Purunã, 21 November 2005, ♂, *J.R. Stehmann* 4213 (BHCB, SP); 31 January 1985, ♂, *J.M. Silva* 17 (CORD, MBM, MO); 6 December 1979, ♀, *L.T. Dombrowski* 10772 (MBM, RB). Bocaiúva do Sul 30 October 1990, ♂, *G. Hatschbach & D. Guimarães* 54791 (CORD, HUEFS, MBM, SPSF, UPGB); Serra da Bocaina, 16 January 2004, ♂, *O.S. Ribas, J.M. Silva & G.F. Simon* 5790 (CTES, MBM, MO); ♀, *O.S. Ribas, J.M. Silva & G.F. Simon* 5811 (MBM); Serra Santana, 10 November 1998, ♂, *J.M. Silva & L.M. Abe* 2593 (C, G, HBG, MBM, US). Campina Grande do Sul, Serra do Ibitiraquire, 1 January 1997, ♂, *J.M. Silva, E. Barbosa & O.S. Ribas* 2039 (C, FLOR, HBG, INPA, MBM); 7 November 2003, ♂, *J.M. Silva* 3886 (C, G, HBG, MBM, RB); 19 October 1997, ♂, *O.S. Ribas & L.B.S. Pereira* 1969 (BHCB, K, MBM, NY, SP); 19 October 1997, ♀, *O.S. Ribas* 1971 (C, HBG, MBM); Pico Caratua, 4 September 2006, bud, *G.O. Romão & A.P.T. Dantas* 1514 (ESA). Campo Largo, São Luís do Purunã, 26 November 1904, ♀, *P.K.H. Dusén* 13482 (E, K, NY, SI); 4 December 1949, ♂, *G. Hatschbach* 1634 (LIL, MBM, PACA, US). Campo Magro, Morro da Palha, 22 October 2002, ♂, *J.M. Silva* 3697 (BHCB, HUEFS, MBM, RB). Castro, Fundão, 2 October 1964, ♂, *G. Hatschbach* 11654 (MBM); 2 October 1964, ♀, *G. Hatschbach* 11656 (LP, MBM). Curitiba, Parque Barigui, 3 October 1995, ♂, *D.J.S. Carrião & V.A.O. Dittrich s.n.* (MBM206977, UEC30098, UPGB30098). Guaratuba, Usina Chaminé, 9 November 2000,

♂, *E. Barbosa, J. Cordeiro & E.F. Costa* 552 (BHCB, C, CESJ, CTES, ESA, G, HBG, MBM, PEL, SI, SPF, SPSF). Iporanga, Boa Vista, Furnas, 7 November 1958, ♂, *G. Hatschbach* 5201 (MBM). Jaguaraiá, Fazenda Samambaia, 14 October 2006, ♂, *E. Barbosa, J.M. Silva & E.M. Cunha* 1704 (MBM); 13 November 1974, ♂, *G. Hatschbach* 35457 (HBG, MBM); 22 October 1910, ♀, *P.K.H. Dusén* 10728 (S, US); Sertão de Cima, 18 November 1970, ♂, *G. Hatschbach* 25503 (MBM, UPCB). Lapa, Pedra da Gruta do Monge, 6 November 2005, ♂, *R. Wasum, G. Heiden & D. Alessandretti* 3104 (HUCS, MBM); 18 January 2006, ♀, *R. Wasum, L. Scur & M. Sartori* 3453 (HECT, HUCS); Rio Passa Dois, 23 November 1981, ♂, *G. Hatschbach* 44403 (GB, HBG, MBM, NY, UB, US). Morretes, Serra Marumbi, Pico Olimpo, 1400 m, 23 October 1995, ♂, *O.S. Ribas, E.P. Santos & J.M. Cruz* 861 (BAB, MBM). Palmeira, Fazenda Santa Rita, 10 November 2005, ♂, *J.M. Silva* 4452 (MBM, SPSF); Recanto dos Papagaios, 15 December 2010, st., *G. Heiden* 1430 (GB, ICN, JE, K, MBM, MVFA, RB, SPF, US). Piraí do Sul, Estrada do Cerne, Serra das Furnas, 26 September 1970, ♂, *G. Hatschbach* 24760 (C, HB, MBM, NY, UEC). Joaquim Murтинho, 18 November 1976, ♂, *G. Hatschbach* 39190 (MBM, NY, UEC). Ponta Grossa 27 October 1995, ♂, *O.S. Ribas & J. Cordeiro* 877 (BHCB, ESA, MBM, PEL); Buraco do Padre, 27 October 1995, ♀, *O.S. Ribas* 899 (HUEFS, MBM); Passo do Pupo, 21 November 2005, ♂, *J.R. Stehmann* 4217 (BHCB, SP); Buracão, 1014 m, ♀, *G. Heiden et al.* 1436 (BHCB, FLOR, LP, MO, SP, SPF, UEC); 27 October 1995, ♀, *O.S. Ribas & E.P. Santos* 899 (CTES, E, MBM, NY); Rodovia do Café, Rio Tibagi, 3 June 1975, ♂, *R. Kummrow* 960 (C, MBM); Vila Velha, 25 February 1908, ♂, *P.K.H. Dusén* 7250 (HBG). Rio Branco do Sul, 14 October 1971, ♂, *L.T. Dombrowski* 3748 (MBM); Curiola, 27 October 1967, ♂, *G. Hatschbach* 17582 (C, F, LP, MBM, NY, UPCB); 14 October 1971, ♀, *L.T. Dombrowski* 3666 (MBM). Tamandaré, 4 October 1912, ♂, *I.G. Jönsson* 1026a (F, G, S, MO). RIO DE JANEIRO: Itatiaia, 19 November 1876, ♀, *A.F.M. Glaziou* 8773 (K, P); Parque Nacional do Itatiaia, 3 November 1964, ♀, *S.V. Andrade* 248 (RB); 10 September 1965, ♂, *S.V. Andrade* 534 (RB); 29 September 1977, ♂ & ♀, *J. Barire* 1186 (RB); September 1933, ♂, *A.C. Brade* 12691 (RB); 25 August 1984, ♂, *F. Cavalleiro* 6 (R); 16 May 1902, bud, *P.K.H. Dusén* 14 (R); 11 August 2004, ♂, *D.M. Ferreira* 77 (RB); 20 November 1984, ♀, *V.F. Ferreira* 3632 (GUA); 20 September 1955, ♀, *M.E.K. Fidalgo* 2 (RB); 26 October 1927, ♀, *A. Ginzberger* 218 (F); 13 September 1994, ♂, *R. Guedes* 2418 (RB); s.d., ♂, *J.H. Haas* 620 (HB); 13 April 2008, ♀, *G. Heiden* 985 (HECT, K, RB); 13 April 2008, ♂, *G. Heiden* 986 (RB); 6 September 1970, ♂, *N. Imaguire* 468 (MBM); 6 May, ♂, *H. Luederwaldt* 16607 (SP, US); Abrigo Rebouças, 10 September 1966, ♂, *J.R. Coleman* 441 (SP, US); 11 October 1977, ♀, *P.J.M. Maas & G. Martinelli* 3184 (K, RB, US); 19 November 1980, ♀, *P. Occhioni* 9233 (MBM); Prateleiras, 2 September 1972, ♀, *P.I.S. Braga* 2575 (K, R); Registro, 23 October 1970, ♂, *A.P. Duarte* 13890 (HB, NY); Retiro, 25 May 1902, ♀, *P.K.H. Dusén* 136 (F, G, R, S, US); 27 June 1902, ♂, *P.K.H. Dusén* 285 (R). Petrópolis, Araras, Pedra Maria Comprida, 10 August 1968, ♀, *D. Sucre* 3458 (CTES, RB). Resende, Parque Nacional do Itatiaia, 1 November 1965, ♂, *G. Eiten & L.T. Eiten* 6493 (K, RB, UB, US); 18 October 1977, ♀, *V.F. Ferreira* 178 (RB); 12 September 2007, ♀, *G. Heiden* 812 (K, RB); ♂, *G. Heiden* 813 (RB). SANTA

CATARINA: Rancho Queimado, Serra da Boa Vista, 1014 m, 14 October 2012, ♂, *G. Heiden & J.R.V. Iganci 1968* (SPF); *G. Heiden & J.R.V. Iganci 1969* (SPF). SÃO PAULO: Bananal, 23 October 1979, ♀, *W. Mantovani 142* (RB, SI, SP); 28 September 1994, ♂, *E.A. Rodrigues 228* (SPF, UEC). Bom Sucesso de Itararé, Fazenda São Nicolau, 13 November 1994, ♂, *V.C. Souza 7171* (ESA, K, MBM, RB, UEC). Caieiras, 22 August 1945, ♂, *W. Hoehne 1505* (RB, SPF, UEC); 22 August 1945, ♀, *W. Hoehne 1523* (HBR, ICN, MO, PEL, RB, SPF, UEC). Campos do Jordão 22 September 1993, MF, *K.D. Barreto et al. 1232* (ESA, UEC); Capivari, 1568 m, 18 November 2011, st., *G. Heiden et al. 1814* (SPF); Estação São Cristovão, 17 August 1974, ♂, *M. Sakane 153* (NY, SP); Parque Estadual dos Mananciais, 23 September 1991, ♂, *M.J. Robim 728* (MBM, SPSF); 6 September 1994, ♂, *M.J. Robim & R.Evangelista 796* (SPSF); 15 October 1992, ♀, *S. Xavier 306* (SPSF); ♂, *S. Xavier 307* (SPSF); 9 September 1991, BUD, *S. Xavier & E. Caetano 232* (HUEFS, SPSF, UEC); 21 October 1991, ♂, *S. Xavier & E. Caetano s.n.* (SPSF15575); Vila Matilde, 19 October 1975, bud, *M. Sakane 344* (SP). Cunha, 8 November 1976, ♂, *P.E. Gibbs et al. 3436* (E, MBM, NY, SP, UEC); Parque Estadual da Serra do Mar, 27 October 2006, ♂, *M.C. Souza, M. Sobral & F. Salgueiro 472* (RB); Serra da Bocaina, 10 October 1957, ♀, *A.C. Brade 21178* (F, G, NY, RB, US); September 1879, bud, *Schwacke 1919* (R). Espírito Santo do Pinhal 1 January 1895, ♂, *J. Campos Novaes CGG3175* (SP). Franco da Rocha, Parque Estadual do Juquery, 17 September 2011, ♀, *G. Heiden, B.F.P. Loeuille, & C.L. Silva-Luz 1708* (BHCB, ICN, JE, K, LP, MBM, MVFA, RB, SPF, SPSF, UB, US). Itararé 19 October 2008, ♂, *B.B. Brancalion 9* (ESA); 20 October 1966, ♂, *J. Mattos 13992* (SP); 23 September 1989, ♂, *C.A.M. Scaramuzza & V.C. Souza 479/953* (ESA); 2 October 1993, bud, *C.M. Sakuragui 363* (ESA, SPF, UEC); 27 November 1993, ♀, *V.C. Souza 4754* (ESA); Fazenda São Nicolau, 30 October 1993, ♂, *V.C. Souza 4432* (ESA, MBM, SPF, UEC). Jundiaí, Serra do Japi, 28 August 1985, ♀, *L.P.C.M. Fonzar 17776* (IBGE, MBM, UEC); 18 September 2007, ♂, *J.A. Lombardi 6895* (UEC); 25 August 1997, ♀, *F.N. Sá s.n.* (UEC91713); 22 September 1983, ♀, *M. Sugiyama & S. Corrêa 15508* (UEC). Mogi Mirim, 3 October 1947, ♀, *J. Mattos s.n.* (HAS61717). Monte Alegre, Amparo, 20 August 1943, *M. Kuhlmann 907* (SP). São Paulo, Jaraguá, 13 September 2007, ♂, *R.L. Esteves 225* (SPSF); Moóca, 6 October 1912, ♂, *A.C. Brade 5490* (S, SP, US). *S.l.*, 7 September 1879, ♂, *A.F.M. Glaziou 11113* (G, K, P, US)

**B. *Baccharis* sect. *Canescentes*** Giuliano (2005: 535). —Type: *Baccharis helichrysoides* DC.

*Lanugothamnus* sect. *Sericicarpus* Deble (2012: 13). —Type: *Lanugothamnus leucocephalus* (Dusén) Deble (= *Baccharis leucocephala* Dusén).

Chamaephytes; shoots whitish to canescent. Leaves green adaxially, whitish to canescent abaxially. Pappus of female florets multiseriate, accrescent.

The circumscription of *Baccharis* sect. *Canescentes* is reassessed to include only species presenting a chamaephyte life form and female florets with accrescent pappus. This circumscription result in a slightly narrower delimitation with the exclusion of *B. patens*, which is transferred to *B.*

sect. *Tarchonanthoides*. As currently defined, *B.* sect. *Canescentes* differs minimally from the original proposition by Giuliano (2005), and comprises two series and seven species occurring in a diverse array of ecosystems in Southeastern South America, from Eastern Paraguay and Southeastern Brazil south to the province of Buenos Aires in Argentina.

**IV. *Baccharis* ser. *Gnaphalioides*** G.Heiden, *ser. nov.* —Type: *Baccharis gnaphalioides* Sprengel.

Differs from the type series by the male florets with lobes without long filiform trichomes.

Male florets with glabrous lobes.

The new series represents a lineage of two sister species occurring on rather dry environments on rock outcrops and sandy soils amidst the subtropical and temperate grasslands and the coastal vegetations.

**7. *Baccharis gnaphalioides*** Sprengel (1826: 461). *Lanugothamnus gnaphalioides* (Spreng.) Deble (2012: 13). —Type: "Ad fl. magnum Amer. austr. Sello". URUGUAY. s.d., ♂, *F. Sellow d585* (holotype P!; isotypes GH! (00247130; 00247131), K! (00022190; 000221905)).

*Baccharis radicans* de Candolle (1836: 416). —Type: "in Brasiliae prov. Rio-Grande. ... (v. s. in h. Mus. reg. Par. à Mus. imp. Bras. sub n. 906 miss.)". BRAZIL. Rio Grande do Sul: s. d., ♂, *F. Sellow s.n.* = *M. I. B. 906* (holotype P! (00755689); isotypes B† photo in F! (0BN037718), G-DC! (00200458)).

*Baccharis psammophila* Malme (1933: 70). —Type: "Santa Catharina: Laguna 24/6 09 (n. 8425). Hab. in arena mobili". BRAZIL. Santa Catarina: Laguna, 24 June 1909, *P.K.H. Dusén 8425* (lectotype S! (S-R-597, ♂), designated by Heiden & Pirani (2012a: 44)). —Remaining syntype: BRAZIL. Santa Catarina: Laguna, 24 June 1909, *P.K.H. Dusén 8425* (S! (0-22439, ♀)).

Illustration: Barroso (1976: 220, 221, 222, 224, as *Baccharis radicans*); Malme (1933: Tab. IV); Malagarriga (1973: 47a as *B. radicans*; 47b as *B. psammophila*; 1977: dessin 65, as *B. radicans*; dessin 66, as *B. psammophila*). Fig. 17, 18.

*Subshrubs* 10–70 cm tall, decumbent, rarely erect; fertile shoots ascending, branches axillary, radicate. *Stems* light brown to stramineous, shoots tomentose. *Leaves* 0.3–1.8 cm long, 1.1–4.9 mm wide, sessile, evenly distributed along the branches; leaf blade indurate, elliptic, oblong, ovate, lanceolate, linear-lanceolate to linear, apex acute or obtuse, sometimes mucronulate, base attenuate, obtuse or subcordate, margins entire, revolute; leaves 1-nerved, adaxial surface glabrous, abaxial surface with a persistent lanose indumentum. *Capitulescences* corymbose, rarely capitula paired or solitary, terminal, 1.5–16 cm long, 2–10 cm wide. *Capitula* sessile or pedunculate; peduncles 0.1–1.5 cm long, tomentose. *Male capitula* 3.8–6.2 mm long; florets 42–76; involucre 3.4–5.8 mm long, 6–10 mm wide, hemispheric; phyllaries 3–5-seriate, white, purple or stramineous, outer ones ovate, median ones oblong, inner ones linear-lanceolate, margins entire, apex acute, villose; clinanthium plane or slightly convex, glabrous or with sparse filiform trichomes; corolla 3.2–3.5 mm long, tube 1.4–1.5 mm long,

throat 0.6–0.7 mm, lobes 1.2–1.3 mm long, biseriate hairs on the lobes; anthers stramineous, 2–2.3 mm long; style 3.3–3.8 mm long; ovary abortive, 0.05–0.1 mm long, 0.1–0.3 mm wide, covered by biseriate and twin trichomes; pappus 4.3–4.8 mm long, bristles 18–24, tortuous, apically not broadened. *Female capitula* 6.9–11.4 mm long; florets 38–78; involucre 5.9–8.6 mm long, 7.3–9.9 mm wide, cylindrical to hemispheric; phyllaries 4–7-seriate, white, purple or stramineous, outer ones ovate, median ones oblong, inner ones lanceolate, margins entire, apex acute, villose; clinanthium plane, glabrous or completely covered with filiform trichomes; corolla 3–4.1 mm long, with a wreath of filiform trichomes; style 5.5–6.1 mm long, branches 0.9–1.3 mm long. *Cypselae* 1.2–1.9 mm long, 0.5–0.8 mm wide, stramineous, sericeous, evenly covered by twin trichomes, oblong, slightly narrowed at base, 4–5-ribbed; pappus 4–7.5 mm long persistent; bristles 60–82, not broadened apically, strongly accrescent. Chromosome number unknown.

**Etymology:**— The specific epithet refers to the resemblance of the species with species of the genus *Gnaphalium* L. (Asteraceae: Gnaphalieae).

**Distribution and habitat:**— *Baccharis gnaphalioides* occurs from southern Brazil (Rio Grande do Sul and Santa Catarina states) and southeastern Uruguay (Canelones, Maldonado, Montevideo, Rocha, Rivera and San José departments) to Eastern Argentina (Buenos Aires province), mostly along the coastal plain or rarely inland on the eastern hills of Serra do Sudeste, in Brazil, through the Serranías del Este reaching the western Cuchilla de Haedo, in Uruguay, south to the Sierras de la Tandilia, in Argentina, at elevations between 0 and 400 m a.s.l. (Fig. 19). It forms sparsely distributed populations, growing mainly on sand dunes or sandy well drained soils in the transitional zone of the maritime coastal vegetations and the coastal scrub vegetation, within the Ombrophilous Dense Forest biome of the Atlantic forest province, and the maritime coastal vegetations and the temperate grasslands on sandy or granitic well drained soils and granite outcrops, within the low altitude temperate grassland biome of the Pampean province.

**Phenology:**— Fertile specimens have been collected all year round, with a flowering peak between March and May.

**Conservation status:**— Least concern (LC). *Baccharis gnaphalioides* is known to occur inside some natural reserves and in several non-protected primary areas. Although it is not threatened along its entire range, the increasing anthropization of coastal environments due to urbanization is likely to threaten several locally morphological diverse populations, mainly on its northern range where the morphological variability is wider. Despite being common in coastal Southern Brazil and Eastern Uruguay, the inland and the southern range Argentinean populations are quite isolated geographically and could face risk of regional extinctions. The species has not been collected in Argentina for the last 60 years.

**Vernacular names:**— Vassourinha-das-dunas (*Heiden & Heiden 1189*).

Leaf shape and peduncle length show a wide variation in *Baccharis gnaphalioides*. Malme (1933) described *B. psammophila* based on specimens with small ovate leaves and congest few-

capitulate corymbs from Laguna, Santa Catarina. Leaf shape is somewhat geographically correlated in *B. gnaphalioides* and there is a gradient from specimens with elliptic leaves, observed in northern populations, to linear leaves, in southern populations. Conversely, capitulescence size, peduncle length, number of capitula per capitulescence and capitula size are aleatory, and follow no geographic pattern. Due to complete overlapping of the morphology and geographic range used by Malme (1933) to differentiate *B. psamophilla*, this binomium is here considered a synonym of *B. gnaphalioides*.

The area of *Baccharis gnaphalioides* in Argentina is considerably disjunct from the main area of distribution, however its specimens present vegetative and reproductive characteristics similar to the southern Uruguayan specimens. Despite the same habitat of coastal maritime vegetation on sandy soils along the coast of Buenos Aires province, the specimens in Argentina are confined to a small area around the lower slopes of the Sierras de la Tandilia and adjacent coastal plains and our attempts to find the species in intermediary areas were not successful.

**Specimens examined:**— ARGENTINA. BUENOS AIRES: Balcarce, Cerro Bachicha, 10 June 1947, ♂, A. Krapovickas 3435 (LIL, LP, SP). Camet, February 1944, F.O. Azamor s.n. (LIL192116). Mar Chiquita, 23 February 1944, Etchichury s.n. (LIL189698). S.l., Pampas, s.d., ♂, J. Tweedie s.n. (K000222035). BRAZIL. RIO GRANDE DO SUL: Arroio do Sal, Balneário Rondinha Velha, 20 July 1991, ♀, M.G. Rossoni 678 (ICN). Barra do Ribeiro, 5 April 1950, ♀, B. Rambo 46620 (B, LIL, PACA). Canoas, March 1939, ♀, I. Teodoro 3133 (R, RB). Capão da Canoas, 25 February 1990, ♂, N.I. Matzenbacher s.n. (ICN86072). Cerrito, 146 m, 26 February 2010, ♀, G. Heiden & G. Heiden 1249 (SPF); ♂, G. Heiden & G. Heiden 1250 (SPF) Cidreira, Lagoa da Porteira, 14 October 1988, st., H.M. Longhi-Wagner & I. Boldrini 1743 (ICN). Mostardas, Parque Nacional da Lagoa do Peixe, 18 May 2008, ♂, Demétrio 79 & 103 (PACA); ♀ Demétrio 107 & 115 (PACA); 11 m, 21 July 2009, ♂, G. Heiden, T Ceolin & M. Vanini 1059 (SPF). Osório, Fazenda do Arroio, 14 April 1950, ♂, B. Rambo 46789 (LIL, PACA); ♀, B. Rambo 46790 (LIL, PACA). Palmares do Sul, Lagoa da Porteira, 17 April 1997, ♂, J. Mauhs s.n. (PACA); 22 June 2004, ♀, J. Mauhs s.n. (PACA94156); Quintão, 30 April 1995, ♀, V.L. Gonçalves & J. Larocca s.n. (PACA96620). Pelotas, Laranjal, 7 March 1956, ♀, J.C. Sacco 512 (HB, HBR, IPA, NY, PACA, PEL, R). Porto Alegre, Morro da Glória, 19 September 1931, ♂ & ♀, B. Rambo 501 (G, LIL, PACA); Morro Santana. 278 m, 27 May 2008, ♀, A.C. Fernandes s.n. (ICN159164); Morro São Pedro, 19 March 2006, ♂, R. Setubal & M. Grings 66 (ICN); Vila Manresa, 23 May 1945, ♂, B. Rambo 28923 (PACA). Rio Grande, 14 November 1901, st., G.O.A. Malme 424 (S); 27 March 1902, ♀, G.O.A. Malme 1546 (R, S); 3 May 1946, ♀, J. Swallen 9243 (US); Ilha dos Marinheiros, s.d., ♂, M. Fox 276 (K); 4 m, 25 May 2009, ♀, G. Heiden, R.S. Neitzke & C.M. Romano 1051 (SPF); Praia do Cassino, 2 m, 29 January 2010, ♂, G. Heiden & G. Heiden 1189 (SPF); Taim, 12 m, 29 January 2010, ♀, G. Heiden & G. Heiden 1195 (SPF). São José do Norte, 22 February 1981, T.M. Pedersen 12988 (C, CTES, MO, SI). São Leopoldo, April 1941, ♀, J. Eugenio s.n. (NY00787666, R41176); 22 August 1944, ♀, J.E. Leite 2631 (SP). Sapucaia do Sul, 1 April 1949, ♀, B. Rambo 40766 (B, PACA); ♂, B. Rambo 40767 (PACA). Torres, 10 July 1972, ♂, L. Baptista &

*M.L. Lorscheitter serie 548* (CTES, HAS); 6 August 1952, st., *A.A. Beetle 1868* (LP, P, US); 15 April 1949, ♀, *P.N. Capparelli 357* (LP); 1969, bud, *K. Hagelund 5533* (ICN); 16 January 1982, ♀, *A. Krapovickas & C.L. Cristóbal 37701* (CTES, ICN, LIL); 28 May 1966 ♀, *A. Sehnem s.n.* (NY01080567); 6 February 1984, ♀, *N. Silveira 1129* (HAS); 25 February 1972, ♀, *J.F.M. Valls s.n.* (ICN9722); February 1939, bud, *J. Vidal s.n.* (R39917); Guarita, 4 February 1990, st., *M. Falkenberg 274* (ICN); Itapeva, 28 June 1985, ♂, *D.B. Falkenberg 2424* (FLOR); 7 April 1990, ♀, *A. Jasper 627* (HAS); 9 July 2005, ♀, *C. Palma 7* (ICN); Mampituba, 20 March 1984, ♀, *J.Mattos 26138* (HAS); 8 January 1045, st., *N. Silveira 1045* (HAS); 20 May 1984, ♀, *N. Silveira 1133* (HAS); Parque Estadual da Guarita, 20 March 1984, ♂, *J. Mattos 29040* (HAS); 30 March 1989, ♀, *N. Silveira 7717* (HAS); Praia da Guarita, 19 January 2011, st., *G. Heiden et al. 1554* (SPF); 31 March 1991, bud, *R. Wasum et al. s.n.* (B, G393756, HUCS7552, MBM148327, MO, NY00788025, US3236507); Rondinha Nova, Arroio Caniço, 10 March 1988, ♀, *C. Mondin 349* (HAS). Viamão, Coxilha das Lombas, 17 April 1950, ♀, *B. Rambo 46874* (LIL, PACA); ♀, *B. Rambo 26898* (LIL, PACA); Itapuã, March 2000, ♀, *M. Sobral 8952* (MBM); 3 April 1950, ♀, 3 April 1950, ♂, *B. Rambo 46565* (B, LIL, PACA, SI); ♂, *B. Rambo 46569* (B, LIL, PACA, SI); Morro da Grota, 10 June 1980, ♀, *O. Bueno 2609* (CTES, HAS, RB). *S.L., Estação Azevedo*, 6 May 1949, ♀, *B. Rambo 41437* (B, LIL); Praia de Fora, 1 April 2003, ♀, *A.A. Schneider 34* (ICN). Xangri-lá, Rainha do Mar, January 1977, st., *Normann 950* (ICN). SANTA CATARINA: Araranguá, Morro dos Conventos, 6 m, 13 January 2011, st., *G. Heiden & J.R.V. Iganci 1514* (SPF). Florianópolis, 30 May 1954, *Bruxel s.n.* (PACA6852); Campeche, 17 February 1967, ♂, *R.M. Klein 7250* (FLOR, HBR, LP, MBM); Dunas da Joaquina, 25 February 1993, bud, *D. Falkenberg 6091* (FLOR, MBM); 10 May 1981, ♀, *M.H. Queiroz 414* (FLOR); Joaquina, 8 April 1983, ♀, *A. Reis 273* (FLOR); Lagoa da Conceição, 16 March 1966, ♀, *R.M. Klein 6716* (FLOR, HBR, ICN, LP); Lagoinha do Leste, Pântano do Sul, 20 January 1970, *R.M. Klein 8801* (FLOR, HBR, LP, RB); Praia da Galheta, 5 m, April 1988, ♂, *D.B. Falkenberg 4706 & 4709* (FLOR); ♀, *D.B. Falkenberg 4707* (FLOR). Imbituba, Itapirubá, 12 February 1978, bud, *G. Hatschbach & E. Zardini 41007* (CTES, K, LP, MBM, MO, SI, UEC); 21 May 1985, ♂ & ♀, *G. Hatschbach 49364* (B, FLOR, MBM). Jaguaruna, Balneário Esplanada, 4 m, 13 January 2011, *G.Heiden & J.R.V. Iganci 1513* (SPF). Laguna, 29 February 1952, st., *R. Reitz & R.M. Klein 239* (HBR); April 1890, ♂, *E. Ule 1593* (CORD, HBG); 26 January 1952, ♂, *R. Reitz 4443* (HBR, LP); Cigana, 9 May 1982, *G. Hatschbach 44889* (F, GB, HBG, MBM, MT, NY, SPF, UB); Mar Grosso, 31 March 1972, ♂, *G. Hatschbach & O. Guimarães 29373* (C, COL, HB, MBM, MVFA, NY, S); ♀, *G. Hatschbach & O. Guimarães 29375* (COL, HB, HBG, MBM, MVFA, NY, UPCB); Santa Marta, 14 November 2001, ♀, *G. Hatschbach, A.C. Cervi & E. Barbosa 72705* (HEPH, MBM, SPF, UPCB); 14 March 2005, bud, *G. Hatschbach, E. Barbosa & E.F. Costa 79144* (G, HUEFS, MBM, MO, RB, SP); 25–29 February 1952, ♀, *L.B. Smith & R. Reitz 5814* (US). Mampituba, 3 September 1972, ♂, *J.C. Lindeman s.n.* (ICN20750). Palhoça, Campo do Maciambu, 2 m, 14 May 1953, ♂, *R. Reitz & R.M. Klein 635* (B, HB, HBR, LP, MBM, NY, PACA, S, US); 15 February 1978, ♂, *R.M. Klein & E.M. Zardini 11824* (HBR, LP). Sombrio,



Praia de Gaivotas, 15 April 1994, ♂, *G. Hatschbach & E. Barbosa 60599* (ESA, FLOR, HAS, MBM, MO, UEC); 25 April 1945, ♂, *R. Reitz 1029* (HBR, LP). *S.L.*, 1816–1821, ♀, *A. Saint-Hilaire C2, N 1787, n 630* (P). URUGUAY. CANELONES: Atlantida, 1940, bud, *L. Barattini s.n.* (MO1224468); 25 February 1930, ♀, *C. Osten 21922* (LP, MVM). Balneário Carrasco, *s.d.*, ♂, *Felippone 4707* (SI); 18 May 1948, *R. Hernandez s.n.* (MVFQ3871); April 1926, ♂, *G. Herter 490* (B, F, G, HBG, LIL, MO, NY, S, SI); March–April 1934, ♀, *D. Legrand 6* (F, LIL, LP, MVM); 20 March 1966, ♂ & ♀, *E.H. Marchesi 1552* (MVFA); 3 March 1912, ♂ & ♀, *C. Osten 4425* (MVM); 13 March 1910, ♂, *C. Osten 5362* (HBG, LIL, MVM); 28 April 1935, ♂ & ♀, *B. Rosengurt B-157* (LP, MVFA, MVM). Balneario La Floresta, February 1934, ♂, *A. Lombardo 1372* (MVJB); September 1923, st., *C. Steer s.n.* (HBG); March 1956, ♂, *G. Zorron 1433* (LP); Arroyo Sarandí, 3 January 1961, bud, *B. Izaguirre 163* (MVFA). Balneario Santa Ana, 3 April 1999, ♀, *M. Bonifacino & R. Beyhaut s.n.* (MVFA28844). Costa Azul, 14 March 1996, ♀, *E. Marchesi s.n.* (MVFA25489). El Pinar, 5 March 1956, ♀, *B.R. Arrilaga 350* (MVFA). Solymar, 28 November 2004, st., *C. Callero 245* (MVJB). MALDONADO: Balneário Solis, 16 February 1941, bud, *A.L. Cabrera 7136* (LP). Maldonado, 24 March 2002, ♂, *E. Alonso Paz & M.J. Bassagoda 4149* (MVFQ); 9 April 1925, ♀, *W. Herter 17635* (MVM); 20 March 1917, ♂, *C. Osten 10365* (MVM); Cuchilla Alta, 27 February 1944, ♀, *H. Osório 15* (MVM). Punta Ballena, 23 April 1964, ♀, *H.A.O. Del Puerto & E. Marchesi 3434* (MVFA); April 1942, ♀, *A. Lombardo 6202* (MVJB); Bosque Lussich, 18 April 1944, ♂, *B. Rosengurt B-4650* (MBM, MVFA, MVM, P, PACA, RB, UEC, US); 28 March 1966, ♂, *B. Rosengurt 10178* (MVFA). MONTEVIDEO: Montevideo, April 1874, ♂, *J. Arechavaleta 4096* (K, LP, MVM); 1898, ♀, *J. Arechavaleta s.n.* (G); 10 February 1900, ♀, *M.B. Berro 741* (MVFA, P); January 1876, *M. Fruchaud s.n.* (P); April 1836, ♂ & ♀, *M. Gaudichaud s.n.* (B, F974382, G, P03159254); February 1881, ♀, *J.E. Gibert 1633* (MVM); April 1877, ♂ & ♀, *J.E. Gibert s.n.* (LP28590); January 1937, st., *F. Rosa-Mato 1508* (LIL, LP); Barra de Santa Lucía, February 1919, ♀, *A. Lombardo 83* (MVJB); Buceo, 21 March 1907, ♂, *M.B. Berro 3773* (MVFA); March 1912, ♀, *M.B. Berro 6222* (MVFA); La Colorada, 3 October 2003, ♂, *C. Brussa s.n.* (MVJB24323); 26 April 1947, ♀, *D. Legrand 1211* (MVM); Malvín, 20 April 1912, ♂, *M.B. Berro 6575* (MVFA); February 1926, ♀, *A. Lombardo 615* (MVJB); 23 April 1946, ♂ & ♀, *B. Rosengurt B-4387* (LP, MO, MVFA, S, SP); Pajas Blancas, 9 April 1944, ♀, *B. Rosengurt B-4340* (MVFA, MVM, SP, US); Punta Gorda, 16 March 1913, ♀, *C. Osten 6612* (HBG, LIL, MVM, SI, US). RIVERA: Tranqueras, Portones Negros, Arroyo Souzal, 28 March 1985, ♂ & ♀, *E.H. Marchesi s.n.* (MVFA17576). ROCHA: Cabo Polonio, 23 March 1961, ♂, *D. Legrand 4600* (MVM); La Calavera, May 2001, ♂, *L. Delfino s.n.* (MVJB10021). La Coronilla, 14 February 1962, bud, *H.A.O. Del Puerto 1290* (MVFA); La Pedrera, 19 February 1935, bud, *C.C. Hosseus 48* (CORD). Santa Teresa, 23 March 1966, ♂, *H.A.O. Del Puerto & E. Marchesi 6094* (MVFA); Fortaleza, April 1947, ♂, *A. Lombardo 3871* (MVJB); Playa Grande, 22 April 2004, ♀, *M. Bonifacino, G. Speroni & A. González 1124* (MVFA); 28 February 2007, ♀, *C. Callero s.n.* (MVJB26109). SAN JOSÉ: Playa Pascual, 28 April 1979, ♀, *E.H. Marchesi 16133* (MVFA).

**8. *Baccharis leucopappa*** de Candolle (1836: 415). *Baccharis helichrysoides* var. *leucopappa* (DC.) Baker (1882: 51). *Lanugothamnus leucopappus* (DC.) Deble (2012: 13). —Type: "in prov. Rio-Grande Brasiliae. (h. Mus. imp. Bras. n. 330)". BRAZIL. Rio Grande do Sul: [between Encruzilhada do Sul and Caçapava do Sul fide Malagarriga (1957)], ♀, *F. Sellow 3111* = *M. I. B. 830* (holotype P! (00755454); isotypes B! (100093163), G-DC! (00200391), P! (00755455)).

Illustration: Baker (1882: tabula 21: II, as *B. helichrysoides* var. *leucopappa*); Barroso (1976: 211, 218, 224); Malagarriga (1973: fig. 16; 1977: dessin 62). Fig. 20, 21.

*Subshrubs* 0.5–1 m tall, erect; fertile shoots ascending, branches axillary. *Stems* light brown, shoots villose. *Leaves* 0.7–3.3 cm long, 3–9 mm wide, sessile, evenly distributed along the branches; leaf blade thin to indurate, ovate to cordate, apex acute, base truncate, subcordate to cordate, margins entire, plane or revolute; leaves 1-nerved, adaxial surface with a caducous pilose indumentum, abaxial surface with a persistent tomentose indumentum. *Capitulescences* corymbose, terminal; 1.5–8 cm long, 2–7 cm wide. *Capitula* pedunculate; peduncles 0.1–1.3 cm long, villose. *Male capitula* 3.8–5 mm long; florets 45–68; involucre 3–4.6 mm long, 4.3–7.9 mm wide, campanulate; phyllaries 3–4-seriate, white, outer ones ovate, median and inner ones oblanceolate, margins entire, apex acute, villose; clinanthium plane, glabrous; corolla 2.2–2.7 mm long, tube 0.8–1 mm long, throat 1.1–1.3 mm, lobes 0.3–0.4 mm long, biseriate hairs on the lobes; anthers white, 2.2–2.7 mm long; style 2.3–2.8 mm long; ovary abortive, 0.05–0.07 mm long, 0.1–0.12 mm wide, covered by filiform trichomes; pappus 2.8–3.4 mm long, bristles 16–20, flexuous, apically not broadened. *Female capitula* 4.9–7.3 mm long; florets 58–80; involucre 4.1–6 mm long, 4.8–6.5 mm wide, cylindrical to campanulate; phyllaries 4–6-seriate, white, outer ones elliptic, median and inner ones linear-lanceolate, margins entire, apex acute, villose; clinanthium plane, nearly glabrous, with scarce flageliform and biseriate trichomes; corolla 2.6–3.3 mm long; style 2.9–3.3 mm long, branches 0.3–0.4 mm long. *Cypselsae* 0.9–1.1 mm long, 0.35–0.47 mm wide, stramineous, sericeous, evenly covered by twin trichomes, obconical, 4–5-ribbed; pappus 2.4–3.6 mm long, deciduous; bristles 38–48, not broadened apically, accrescent. Chromosome number unknown.

**Etymology:**— The specific epithet refers to the white colour of the pappus bristles.

**Distribution and habitat:**— *Baccharis leucopappa* occurs in southern Brazil (Rio Grande do Sul and Santa Catarina states), known from some disjunct locations from the Serra Geral and the eastern hills of Serra do Sudeste and surrounding lowland areas, at elevations between 50 and 950 m a.s.l. (Fig. 19). It forms sparse populations on rocky basaltic soil, within the subtropical highland grasslands of the Paranense province, and on granitic, sandstone or basaltic outcrops or rocky and shallow soils, in the low altitude temperate grasslands, within the Pampean province.

**Phenology:**— Fertile specimens have been collected from the end of September to early December, with a flowering peak in November.

**Conservation status:**— Vulnerable (VU D2). *Baccharis leucopappa* is represented only in few conservation units and in non-protected primary sites. The populations are naturally fragmented and the area of occupancy is restricted. Few populations still persist, all of them under anthropogenic pressure caused by urbanization and extensive cropland, leading to habitat suppression and loss of habitat quality.

**Vernacular names:**— Vassourinha-do-barranco (*Heiden & Iganci 2142, 2143*).

Since Baker (1882) there is a great confusion in the application of the names *Baccharis leucopappa* and *B. phyllicifolia*. Baker (1882) proposed the combination *B. helichrysoides* var. *leucopappa*, provided a short description and illustration for its variety, and did not mention *B. phyllicifolia* in *Flora brasiliensis*. The analysis of the short description and illustration provided by that author, and the study of the type specimens of *B. leucopappa* and *B. phyllicifolia*, lead to the conclusion that *B. helichrysoides* var. *leucopappa* fide Baker (1882) is the same taxon represented by the type specimen of *B. phyllicifolia*, while the type specimen of *B. leucopappa* belongs to a clearly distinct species. Probably as a result of the misapplication by Baker (1882) of the name *B. leucopappa*, Barroso (1976), Malagarriga (1977) and Barroso & Bueno (2002) based the circumscription of *B. leucopappa* on specimens belonging to both *B. leucopappa* and *B. phyllicifolia*, while Barroso (1976), Barroso & Bueno (2002) and Deble (2012) applied the name *B. phyllicifolia* to specimens belonging to *B. uleana*.

Thus, in the current taxonomic revision the application of the name *B. leucopappa* is clarified as referring to a species occurring solely in rather dry environments in the states of Santa Catarina and Rio Grande do Sul, while *B. phyllicifolia* is a species widely distributed in moist or flooded habitats from the mountains of Itatiaia in the boundary between Minas Gerais and Rio de Janeiro, south to the highlands of northeastern Rio Grande do Sul. *Baccharis leucopappa* is a shrub with ascending villose shoots (vs. virgate tomentose shoots in *B. phyllicifolia*), presenting leaves with a caducous pilose indumentum adaxially (vs. leaves with a caducous, deciduous or persistent sericeous indumentum adaxially), with male florets lobes glabrous (vs. male florets with filiform trichomes on lobes) and sericeous cypsela (vs. puberulous).

**Specimens examined:**— BRAZIL. RIO GRANDE DO SUL: Barra do Ribeiro, 1 November 2013, ♂, *G. Heiden & J.R.V. Iganci 2142* (SPF); ♀, *G. Heiden & J.R.V. Iganci 2143* (SPF). Cacequi, Sangão do Macaco Branco, 28 September 1983, ♂, *R. Bueno s.n.* (ICN 92617). Cambará do Sul, December 2000, ♀, *M. Sobral & A.L. Silva 9188* (ICN, MBM). Caxias do Sul, Vila Oliva, 30 May 1954, st., *P. Buck s.n.* (PACA 37167). Jaguari, 26 September 1985, ♂, *S. Eisinger & B. Irgang s.n.* (ICN 81133). Jaquirana, 1150 m, 9 November 1961, ♀, *G. Pabst 6678 & E. Pereira 6852* (B, HB, PEL, RB); Parque Estadual do Tainhas, 3 November 2013, ♂, *G. Heiden & J.R.V. Iganci 2145* (SPF). Mariana Pimentel, Reserva Biológica de Cerro Alegre, s.d., ♂, *N.I. Matzenbacher s.n.* (RB 191676). Pareci Novo, 14 October 1945, ♂ & ♀, *E. Henz s.n.* (PACA, SI). Parobé, Santa Cristina do Pinhal, 9 September 2002, st., *S. Bordignon s.n.* (ICN 129249). Portão, ♂, 23 September 1949, *B. Rambo 43509* (LIL, PACA).

Porto Alegre, Morro da Glória, 10 September 1931, ♀, *B. Rambo* 501 (LP), 5 October 1940, ♂, *T. Luis & E. Maria* 4101 (LP, MT, SPF); Morro da Polícia, 20 September 1948, ♂, *B. Rambo* 37696 (LIL, PACA, SI); Morro Santana, 14 July 2008, st., *T.L.S. Alves* 6 (ICN); 138 m, 4 October 2007, ♂, *A.C. Fernandes & M. Ritter s.n.* (ICN 158663); 8 October 2004, ♂, *G.H. Silveira* 283 (ICN). Rio Pardo, 24 October 1978, ♂, *J. Mattos* 19919 (HAS). São Francisco de Assis, 24 October 2012, ♂, *G. Heiden et al.* 2000 (SPF); ♀, *G. Heiden et al.* 2001 (SPF); vale do rio Ibicuí, 24 October 2012, bud, *G. Heiden et al.* 2004 (SPF). São Francisco de Paula, 21 October 2012, ♂, *G. Heiden et al.* 1974 (SPF); ♀, *G. Heiden et al.* 1975 (SPF). São Leopoldo, 6 November 1946, ♂ & ♀, *E. Henz s.n.* (NY, PACA, S, SI); September 1941, st., *J.E. Leite* 2822 (SP); Morro das Pedras, October 1932, ♂, *G. Malme* 1397 (S); Vila Diehl, 5 November 1949, ♀, *B. Rambo* 44258 (LIL, PACA). Sapucaia do Sul, morro Sapucaia, s.d., ♀, *J.E. Leite* 692 (NY); s.d., ♀, *J.E. Leite* 2129 (SP); 5 September 1945, ♂, *B. Rambo* 29543 (PACA, SI); 10 November 1948, ♀, *B. Rambo* 37913 (B, LIL, PACA); 17 October 1949, ♀, *B. Rambo* 43927 (B, LIL, PACA); 17 October 1949, ♂ & ♀, *B. Rambo* 43928 (LIL, PACA); 5 November, 1949, ♂, *B. Rambo* 44256 (B, LIL, PACA); ♀, *B. Rambo* 44258 (PACA); 1 September 1956, ♂, *B. Rambo* 57463 (B, PACA, S). Viamão, Parque Estadual de Itapuã, October 1983, ♂ & ♀, *M. Sobral* 2430 (F, MBM); morro do Araçá, 13 November 2002, *M. Pinheiro* 493 (ICN). SANTA CATARINA: Capão Alto, 3 November 2013, ♂, *G. Heiden & J.R.V. Iganci* 2147 (SPF); ♀, *G. Heiden & J.R.V. Iganci* 2148 (SPF). Lajes, morro do Pinheiro Seco, 1 November 1963, ♂, *R.M. Klein* 4502 (FLOR, HBR, LP, RB).

**V. *Baccharis* ser. *Canescentes*** (Giuliano) G.Heiden, *stat. nov.* Basyonim: *Baccharis* sect.

*Canescentes* (Giuliano 2005: 535). —Type: *Baccharis helichrysoides* DC.

Male florets lobes with filiform trichomes.

*Baccharis* ser. *Canescentes* represents a lineage of five species easily recognized by the peculiar presence of long tortuous filiform trichomes on the lobes of male florets. Most of the species of the series occur in moist or water saturated environments such as forest edges, peat bogs and acid swamps.

**9. *Baccharis gibertii*** Baker (1882: 52). *Lanugothamnus gibertii* (Baker) Deble (2012: 13). —Type: “ad Maldonado et Montevideo, ad ripas fluminis S. Lucia: Capt. King! Gibert n. 813! 814! Arechavaleta n. 4104! Cunningham!”. URUGUAY. Montevideo: Santa Lucia, 1867, ♀, *J. E. Gibert* 814 (lectotype K, first-step lectotype designated by Barroso 1976: 63, second-step lectotype designated by Heiden & Pirani (2012a: 42) K! (000222026, right hand branch in the top)); isolectotype K! (000222026, left hand branch at the bottom). —Remaining syntypes: URUGUAY. Maldonado: 7 December 1866, ♀, *Cunningham* (K!); s.d., ♂, *P.P. King* 63 (K! 000222025). Montevideo: December 1846, ♂ & ♀, *J. Arechavaleta* 4104 (K!); Santa Lucia, 1867, ♂, *J.E. Gibert* 813 (K! 000222027);. Illustration: Malagarriga (1973: fig. 12; 1977: dessin 64). Fig. 22, 23.

*Subshrubs* 0.5–1.7 m tall, erect; fertile shoots ascending, branches axillary. *Stems* light brown or stramineous, shoots villose. *Leaves* 0.7–3.8 cm long, 0.3–1.2 cm wide, sessile, evenly distributed along the branches; leaf blade thin, cordate, ovate to oblong, apex acute, base truncate to subcordate, margins entire, slightly revolute; leaves 1-nerved, adaxial surface with a persistent sparse sericeous indumentum, abaxial surface with a persistent dense sericeous indumentum. *Capitulescences* racemose, terminal; 4–17 cm long, 2.5–9 cm wide. *Capitula* sessile to pedunculate; peduncles 0.1–1.3 cm long, villose. *Male capitula* 4.7–6 mm long; florets 38–50; involucre 4.6–5 mm long, 6.7–8.3 mm wide, campanulate; phyllaries 3-seriate, light-green, outer, median and inner ones linear-lanceolate, margins entire, apex acute, pilose; clinanthium conical, densely covered with scarce filiform and biseriate trichomes; corolla 3.8–4.3 mm long, tube 1.6–1.8 mm long, throat 1.4–1.5 mm, lobes 0.8–1 mm long, biseriate trichomes on the throat and filiform trichomes on the lobes; anthers light brown, 3.7–4.1 mm long; style 3.9–4.5 mm long; ovary abortive, 0.25–0.4 mm long, 0.4–0.45 mm wide, covered by twin trichomes; pappus 3.5–4 mm long, bristles 18–28, flexuous, apically not broadened. *Female capitula* 6.2–6.7 mm long; florets 58–86; involucre 5–5.9 mm long, 5–6.3 mm wide, cylindrical; phyllaries 4-5-seriate, light green, outer ones ovate, median ones linear-elliptic, inner ones linear-lanceolate, margins entire, apex acute, pilose; clinanthium conical, densely covered with scarce filiform and biseriate trichomes; corolla 3.4–4.1 mm long; style 4–4.7 mm long, branches 0.4–0.6 mm long. *Cypselae* 1.2–1.4 mm long, 0.37–0.5 mm wide, light brown, villose, evenly covered by long twin trichomes, obconical, 4–5-ribbed; pappus 3.5–7.5 mm long, deciduous; bristles 40–60, not broadened apically, strongly accrescent. Chromosome number unknown.

**Etymology:**— The species was named after the Uruguayan chemistry José Ernesto Gibert (1818-1886), collector of the type specimen.

**Distribution and habitat:**— *Baccharis gibertii* occurs from Southern Brazil (Rio Grande do Sul state) to southeastern Uruguay (Canelones, Cerro Largo, Maldonado, Montevideo, Rocha and San José departments), known from few disjunct locations, mostly along the coastal plain or rarely inland at elevations between 0 and 150 m a.s.l. (Fig. 24). It forms dense but unevenly distributed populations, growing on sandy and periodically flooded soils, mainly along riverbanks, on acid swamps or peat bogs, within the temperate grassland biome, and in the transitional zone of the temperate grasslands and the maritime coastal vegetations of the Pampean province.

**Phenology:**— Fertile specimens have been collected from October to early February, with a flowering peak between November and December.

**Conservation status:**— Vulnerable (VU B1 ; B2a ; b i, ii, iii). *Baccharis gibertii* is represented only in few not effective conservation units and in non-protected primary sites. The populations are naturally fragmented and the area of occupancy is restricted and decreasing. Few known populations still persist, all of them under anthropogenic pressure caused by drainage, urbanization and extraction of peat, leading to habitat suppression and loss of habitat quality. The only record to Brazil was made

60 years ago in a currently urbanized area, and a regional assessment of conservation associated with the search of new sites of occurrence in the country is needed.

**Vernacular names:**— unknown.

*Baccharis gibertii* is known from few sites in the surroundings of Montevideo, one additional area in the department of Cerro Largo, close to the Brazilian border, and a single old collection from southern Rio Grande do Sul, Brazil. Heering (1904), Barroso (1976) and Barroso & Bueno (2002) cite the occurrence of the species to Santa Catarina referring to the specimen *Ule 1510*. However, *B. gibertii* is not recorded to this state and the specimen cited is the type collection of *B. uleana*, a clearly distinct species.

**Specimens examined:**— BRAZIL. RIO GRANDE DO SUL: Pelotas, 10 November 1946, ♂, *E. Maria 22* (LP, SPF, US); ♀, *E. Maria 23* (LP, MT, P, SP, SPF, US). URUGUAY. CANELONES: Arroyo Tropa Vieja, 7 Octubre 1965, ♂, *H.A.O. Del Puerto & E.H. Marchesi 5316* (MVFA). Balneario Jaureguiberry, 28 October 2005, ♂, *F. Haretche 22* (MVJB); ♀, *F. Haretche 23* (MVJB); Carrasco, December 1941, ♀, *D. Legrand 3618* (MVM); 6 November 1960, ♀, *B. Rosengurt 7782* (MVFA); Ciudad de la Costa, Ruta Interbalneária, km 28, 1 November 2011, ♂, *G. Heiden et al. 1757* (GB, ICN, MBM, MVFA, RB, SPF); ♀, *G. Heiden et al. 1758* (BHCB, FLOR, GB, K, LP, PEL, SPF); El Pinar, 7 December 1962, ♀, *H.A.O. Del Puerto 2260* (K, MVFA); 21 December 1972, ♀, *A. Lombardo & H.A.O. Del Puerto s.n.* (MVFA 11896); Arroyo Pando, 300 m de la Interbalnearia, 10 Octubre 2004, bud, *C. Callero & F. Ferreyro 77* (MVJB); 24 Octubre 2004, ♂ & ♀, *C. Callero & L. Dominguez 157* (MVJB); 1 November 2011, ♂, *G. Heiden et al. 1759* (GB, RB, SPF); ♀, *G. Heiden et al. 1760* (GB, MBM, MVFA, RB, SPF, US). Pando, 8 November 1947, ♂, *A.L. Cabrera & D. Legrand 2672* (LP, MVFA); December 1944, ♀, *A. Lombardo s.n.* (LIL 206914); December 1946, ♀, *A. Lombardo 3806* (MVJB); November 1947, ♂, *A. Lombardo 4052* (MVJB); 12 January 1944, ♀, *B. Rosengurt 4326* (MVFA). Bañado del Negro, Arroyo Pando, 1 December 1946, ♀, *A. Castellanos 17223* (CTES, LIL); Interbalnearia km 27, El Palmar, 29 Octubre 2000, ♀, *E. Alonso Paz & J. Bassagoda 3415* (MVFQ); 6 December 2000, ♂, *E. Alonso Paz & J. Bassagoda 3071* (MVFQ). CERRO LARGO: Sierra de Ríos, 27 November 2011, ♀, *M. Bonifacino 4091* (MVFA, SPF). MALDONADO: 7 December 1866, ♀, *Cunningham s.n.* (K); s.d., ♂, *P.P. King 63* (K). MONTEVIDEO: Santa Lucia, November 1811, ♂ & ♀, *J. Arechavaleta 4104* (LP, MVM); December 1846, ♂ & ♀, *J. Arechavaleta 4104* (K); 30 October 1900, ♂, *M.B. Berro 1772* (MVFA, P); 1872, ♀, *M. Fruchard s.n.* (P03159282); 1896, ♂ & ♀, *M. Fruchard s.n.* (LP, MVFA, SI, P 03159286); 1867, ♂, *J.E. Gibert 813* (K); ♀, *J.E. Gibert 814* (K). ROCHA: Sierra de Ríos, 27 November 2011, ♀, *M. Bonifacino 4091* (MVFA, SPF). SAN JOSÉ: Barra de Santa Lucía, February 1876, ♂ & ♀, *J. Arechavaleta s.n.* (MVM 2120, 2121, 2122, 2123); November 1940, ♀, *J. Chebataroff 2268* (MVM); s.d., ♀, *J. Chebataroff 3701* (LP); March 1926, st., *A. Lombardo 799* (MVJB); December 1927, ♀, *A. Lombardo 1063* (MVJB); 9 February 1919, ♀, *C. Osten 14759* (MVM); 28 October 1947, ♂, *B.*

*Rosengurtt 5047* (LIL, LP, MBM, MVFA, MVM). *S.l.*, September 1870, st., *A. Arechavaleta s.n.* (P03159285). *S.l., s.d., D. Legrand 4566* (MVM).

**10. *Baccharis leucocephala*** Dusén (1910: 24). *Lanugothamnus leucocephalus* (Dusén) Deble (2012: 13). —Type: "Wächst in Gebüsch; bei Roça nova, den 24. Nov. 1903, (Nr. 2208), und bei Itapirusú, den 17. Nov. 1908". BRAZIL. Paraná: Piraquara, Roça Nova, 24 November 1903, ♀, *P. K. H. Dusén 2208* (lectotype S! (10-22317), designated by Barroso 1976: 62; isolectotypes HBG!, R! (37746, ♂)). —Remaining syntypes: BRAZIL. Paraná: Itaperuçú, 17 November 1908, ♂ & ♀, *P. K. H. Dusén 7169* (syntypes E!, NY! (00162259), S! (10-22319; 10-22321; 10-22323)).

Illustration: Dusén (1910: Taf. 1, Fig. 5, 6); Barroso (1976: 221, 222); Malagarriga (1977: dessin 67). Fig. 25, 26.

*Shrubs* 1–2 m tall, erect or leaning; fertile shoots pendulous, branches axillary. *Stems* brown, shoots villose. *Leaves* 2–12.5 cm long, 0.3–1.5 cm wide, sessile, evenly distributed along the branches; leaf blade thin, lanceolate, apex attenuate, base rounded or attenuate, margins entire, revolute; leaves basally 3-nerved, acrodromous imperfect, with a secondary brochidromous reticulum, adaxial surface with a caducous sericeous indumentum, abaxial surface with a persistent tomentose indumentum. *Capitulescences* racemose, terminal; racemes oblong or conical, 3–25 cm long, 4–11 cm wide. *Capitula* sessile to pedunculate, pendulous; peduncles 0.1–2.3 cm long, villose. *Male capitula* 6.5–8 mm long; florets 24–44; involucre 5.5–6.7 mm long, 7.2–12 mm wide, campanulate; phyllaries 3–4-seriate, light green or purple, outer and median ones ovate, inner ones linear-lanceolate, margins entire, apex acute, villose; clinanthium conical, densely covered with filiform trichomes; corolla 4–4.6 mm long, tube 2.1–2.3 mm long, throat 1.1–1.3 mm, lobes 0.8–1 mm long, biseriate hairs on the tube and throat, filiform trichomes on the lobes; anthers brown, 4.2–4.7 mm long; style 4.2–4.9 mm long; ovary abortive, 0.16–0.2 mm long, 0.2–0.27 mm wide, covered by filiform trichomes; pappus 4–4.5 mm long, bristles 20–34, flexuous, not apically broadened. *Female capitula* 8–20 mm long; florets 30–44; involucre 8–11 mm long, 6–11 mm wide, cylindrical to turbinate; phyllaries 4–5-seriate, light green or purple, outer ones ovate, median and inner ones linear-lanceolate, margins entire, apex acute, villose; clinanthium conical, densely covered with filiform trichomes; corolla 2.7–6.3 mm long; style 2.9–6.8 mm long, branches 0.2–0.6 mm long. *Cypselae* 2–2.4 mm long, 0.85–1.1 mm wide, stramineous, sericeous, evenly covered by long twin trichomes, obconical, 3–4-ribbed; pappus 7–12.8 mm long, deciduous; bristles 104–128, not broadened apically, strongly accrescent. Chromosome number unknown.

**Etymology:**— The specific epithet refers to the white colour of the female capitula given by the strongly accrescent pappus bristles.

**Distribution and habitat:**— *Baccharis leucocephala* occurs in southern Brazil (Paraná, Rio Grande do Sul and Santa Catarina states), known from several locations along highland areas of the Serra do Mar, Planalto de Curitiba, Planalto de Ponta Grossa, and Serra Geral, at elevations between 800 and

2200 m a.s.l. (Fig. 24). Isolated individuals or in small populations are found on semi-shaded habitats, along the forest edges and glades of Ombrophilous Mixed Forest (with *Araucaria*) or, less commonly, in edges of Ombrophilous Dense forest, in the Paranense province or in the transitional zone to the Atlantic province.

**Phenology:**— Fertile specimens have been collected from middle October to early February, with a flowering peak between October and November.

**Conservation status:**— Least concern (LC). *Baccharis leucocephala* is known to occur in protected and in non-protected primary and secondary sites. Populations in the southern range of distribution tend to be rarer and could become locally extinct due to the decrease of habitat quality caused by forestry with exotic species.

**Vernacular names:**— Vassoura-da-mata (*Heiden & Iganci 1452, 1453*); vassoura-do-pinhhal (*Heiden & Oliveira 1786, 1787*).

Even though *Baccharis leucocephala* is a very distinctive species, it is sometimes confused with *B. helichrysoides*. Both species can be contrasted easily since *B. leucocephala* has lanceolate leaves (vs. linear, oblong, cordate to ovate in *B. helichrysoides*), capitula organized in pendulous racemes (vs. erect panicles), male florets with flexuous pappus bristles (vs. tortuous pappus bristles) and sericeous cypselae (vs. puberulent).

**Specimens examined:**— BRAZIL. PARANÁ: Adrianópolis, Parque Estadual das Lauráceas, 12 November 2007, ♀, *J.M. Silva & J. Cordeiro 6154* (MBM); Balsa Nova, Serra de São Luiz do Purunã, 28 October 1996, ♀, *O.S. Ribas & M.F. da Luz 1538* (MBM); 21 November 2005, ♀, *J.R. Stehmann 4214* (BHCB,SP). Bituruna, 1032 m, 23 November 2005, ♀, *J.R. Stehmann 4289* (BHCB); ♀, *Stehmann 4296* (BHCB); rio Iguaçu, Salto Grande, 17 October 1967, *G. Hatschbach 14949* (MBM). Bocaiúva do Sul, Serra Santana, 10 November 1998, ♂, *J.M. Silva & L.M. Abe 2597* (MBM). Campina Grande do Sul, 22 October 1985, ♂, *E.F. Paciornik & C.B. Poliquesi 178* (MBM); Serra Ibitiraquire, 19 October 1997, ♀, *O.S. Ribas & L.B.S. Pereira 1967* (MBM). Colombo, 1 December 1972, ♀, *L.T. Dombrowski 4440 & Y. Kuniyoshi 3618* (MBM); 5 January 2006, ♂, *R.F.S. Possette 593* (RB); Hotel Betânia, *s.d.*, ♀, *P.R.P. Andrade s.n.* (MBM297617). Curitiba, Bacacheri, 4 November 1950, ♂, *G. Tessmann s.n.* (RB74678); Barigui, October 1969, ♀, *L.T. Dombrowski 2988* (MBM); ♂, *L.T. Dombrowski 2989* (MBM); November 1969, ♀, *L.T. Dombrowski 4729* (MBM, RB); ♂, *L.T. Dombrowski 4730* (MBM, RB); December 1972, ♀, *L.T. Dombrowski 4741* (MBM, RB); 25 October 1960, ♀, *R.B. Lange 1335* (RB); Campo Comprido, November 1964, ♀, *L.T. Dombrowski 1010* (LP, MBM); Capão da Imbuia, 28 November 1975, ♀, *L.T. Dombrowski 6157* (MBM); Colônia Orleans, October 1971, ♂, *L.T. Dombrowski 3643* (MBM); ♀, *L.T. Dombrowski 3644* (MBM); 3 November 1974, ♀, *L.T. Dombrowski 5489* (MBM); ♂, *L.T. Dombrowski 5491* (MBM); Pilarzinho, October 1964, ♂, *L.T. Dombrowski 652* (LP, MBM); ♂, *L.T. Dombrowski 653* (MBM); Santa Felicidade, November 1966, ♂, *L.T. Dombrowski & Y. Kuniyoshi 1736* (MBM); ♀, *L.T. Dombrowski 2164* (MBM); ♂, *L.T. Dombrowski 2165 & Y. Kuniyoshi 1890* (MBM); Santa Mônica, 15 November



1984, ♀, A. Bidá, L.A. Acra & C.E.L. Schinchet 574 (UEC, UPCB); Umbará, October 1974, ♂, L.T. Dombrowski 5378 (MBM); February 1980, ♀, L.T. Dombrowski 14674 (MBM); November 1989, ♀, L.T. Dombrowski 14116 (MBM). Irati, Colônia Florestal, 26 November 1972, ♀, P. Carvalho 116 (MBM). Itaperuçu, October 1908, ♂ & ♀, P.K.H. Dusén s.n. (HBG). Paulo Frontin, Vicinal 9, 7 November 2005, ♀, R. Wasum, G. Heiden & D. Alessandretti 3194 (HECT, HUCCS, MBM, O). Piraquara, Estrada da Graciosa, Volta Grande, February 1945, ♀, B. Hertel 143 (SP); Fazenda Experimental da Agronomia, 22 November 1972, ♀, N. Imaguire 3123 (MBM); ♀, N. Imaguire 3081B (MBM); Roça Nova, 982 m, 17 December 2010, ♀, G. Heiden et al. 1452 (SPF); ♂, G. Heiden et al. 1453 (SPF). Quatro Barras, December 1966, ♀, Y.S. Kuniyoshi 1938 (MBM); Serra da Baitaca, 24 October 1996, ♂, J. Cordeiro & J.M. Cruz 1347 (C, FLOR, G, HBG, MBM, SPF). Rio Branco do Sul, Itarerama, 22 November 1978, ♀, G. Hatschbach 41818 (HBG, INPA, MBM, UB); Serra do Votuvoru, 9 September 1975, ♂, G. Hatschbach 37312 (MBM). São José dos Pinhais, Contenda, 23 October 1980, ♂, G. Hatschbach & G.L. Smith 43225 (C, COL, GB, MBM, MO, UEC); 10 November 1993, O.S. Ribas, J. Cordeiro & E. Barbosa 615 (MBM); 2 November 2004, ♀, J.M. Silva 4181 (MBM); ♂, J.M. Silva 4187 (MBM). São Mateus do Sul, Usina de Xisto da Petrobrás, 25 April 1986, ♀, R.M. Britez & S.M. Silva 655 (UEC). Tamandaré, 12 November 1942, ♀, J. Moura 150 (LP, MBM). Teixeira Soares, Valinhos, 11 November 1910, ♀, P.K.H. Dusén 10763 (E, F, G, K, MO, NY, S). S.L., Banhado, 4 November 1915, ♂ & ♀, P.K.H. Dusén 17284 (F, G, MO, S, SI); Carvalho, 7 November 1911, ♂ & ♀, P.K.H. Dusén 13326 (F, G, K, S); Trancheira, 12 October 1914, ♂, I.G. Jönsson 1104a (F, G, NY, S). RIO GRANDE DO SUL: Cambará do Sul, Itaimbezinho 5 June 1954, ♂, B. Rambo 54561 (HBR, LP, PACA). SANTA CATARINA: Anitápolis, 28 December 1951, R. Reitz 4537 (B, G, LP, MBM, NY, S). Bom Jardim da Serra, Boca da Serra, 24 December 1982, ♀, A. Krapovickas & A. Schinini 38293 (CTES, IBGE, SI). Bom Retiro, Campo dos Padres, rio Canoas, 22 November 1956, ♀, L.B. Smith & R.M. Klein 7864 (HBR, LP). Campo Alegre, Serra do Quiriri, Rio Negro, 29 November 2001, ♂, O.S. Ribas 3689 (HEPH, MBM). Curitiba, 6 December 1984, ♀, L.B. Smith & R. Klein 8355 (HBR, LP, NY, RB). Garuva, Serra do Quiriri, 16 October 2004, ♂, J.M. Silva, O.S. Ribas & M.R. Bornschein 4126 (MBM, SPSF). Lebon Régis, Rio dos Patos, 29 October 1962, ♂, R. Reitz & R.M. Klein 13876 (LP, HBR, RB). Matos Costa, estrada para Calmon, 24 November 2005, ♂, J.R. Stehmann 4315 (BHCB, ICN). Porto União, São Miguel, 27 October 1962, ♂, R. Reitz & R.M. Klein 13692 (HBR, LP, RB). Urubici, Cascata do Avencal, 18 October 2006, ♀, A.A. Schneider 1344 (ICN); estrada para o Campo dos Padres, 1100 m, 18 October 2006, ♂, A.A. Schneider 1352 (ICN); Morro da Igreja, 8 December 2000, ♀, G. Hatschbach, A.C. Cervi & E. Barbosa 71624 (G, MBM, UPCB); 1233 m, 13 November 2011, ♂, G. Heiden & C.T. Oliveira 1786 (SPF); ♀, G. Heiden & C.T. Oliveira 1787 (SPF); 14 November 2008, ♂, J.M. Silva et al. 7109 (MBM); Serra do Corvo, 13 December 1995, ♀, S. Bordignon s.n. (ICN110964). S.L., entre Papanduva e Mafra, 10 November 1961, ♀, G. Pabst 6708 & E. Pereira 6882 (B, HBG, K, NY, PEL, R, RB).

**11. *Baccharis uleana*** Malagarriga (1977: 139). —Type: “Strauch in den Sümpfen der Estive dos Pregos bei Tubarão”. BRAZIL: Santa Catarina, Capivari de Baixo, Banhado da Estiva dos Pregos, November 1889, *E. Ule 1510* (lectotype HBG! (♂, *E. Ule*. Herbarium Brasiliense) **designate here**; holotype P (♀), not found; isoelectotypes F! (1520199, ♂)).

Illustration: Malagarriga (1977: dessin 368). Fig. 27, 28.

*Shrubs* 0.5–1.5 m tall, erect; fertile shoots virgate, branches axillary. *Stems* light brown, shoots felted. *Leaves* 1–3.7 cm long, 3–9 mm wide, sessile, evenly distributed along the branches; leaf blade thin, elliptic, lanceolate to ovate, apex acute to obtuse, sometimes mucronulate, base attenuate to rounded, margins entire, plane or slightly revolute; leaves basally 3-nerved, acrodromous imperfect, adaxial surface with a deciduous or persistent tomentose indumentum, abaxial surface with a persistent felted indumentum. *Capitulescences* paniculate, terminal; panicles corymbiform, 5–25 cm long, 4.5–23 cm wide. *Capitula* pedunculate; peduncles 1.9–9 mm long, tomentose. *Male capitula* 3.6–4 mm long; florets 14–22; involucre 3.6–3.8 mm long, 4.8–6.8 mm wide, campanulate; phyllaries 3-seriate, canescent, outer and median ones ovate, inner ones elliptic, margins entire, apex acute, villose; clinanthium globose, puberulous, glabrescent or not, with scarce biseriate and filiform trichomes; corolla 2–2.3 mm long, tube 0.8–0.9 mm long, throat 1–1.1 mm, lobes 0.2–0.3 mm long, filiform trichomes on the lobes; anthers light brown, 2–2.3 mm long; style 2–2.3 mm long; ovary abortive, 0.1–0.15 mm long, 0.05–0.8 mm wide, covered by biseriate and filiform trichomes; pappus 1.9–2.3 mm long, bristles 12–20, twisted, apically not broadened. *Female capitula* 4–7.9 mm long; florets 20–26; involucre 3.9–4.4 mm long, 4.3–6 mm wide, cylindrical; phyllaries 3-seriate, canescent, outer ones ovate, median ones elliptic, inner ones linear-lanceolate, margins entire, apex acute, villose; clinanthium globose, puberulous, glabrescent or not, covered by filiform and biseriate trichomes; corolla 2.2–2.5 mm long; style 2.5–2.8 mm long, branches 0.2–0.3 mm long. *Cypselae* 1–1.2 mm long, 0.4–0.6 mm wide, light brown, pilose, sparsely covered by filiform twin trichomes, elliptical, 2–4-ribbed; pappus 3–3.6 mm long, deciduous; bristles 48–66, not broadened apically, slightly accrescent. Chromosome number unknown.

**Etymology:**— The species was named after the German botanist Ernst Heinrich Georg Ule (1854–1915), collector of the type specimen.

**Distribution and habitat:**— *Baccharis uleana* has a disjunct distribution, occurring in highland areas of the Planalto Paulista in São Paulo state, Southeastern Brazil, and along lowland areas in Southern Brazil, from coastal Ilha de Santa Catarina, through mainland along of the Santa Catarina state maritime shores and the coastal plains of Lagoa Guaíba and Lagoa dos Patos, reaching also adjacent hills of the Serra do Sudeste in Rio Grande do Sul state, at elevations between 0 and 800 m a.s.l. (Fig. 29). It grows in locally dense but unevenly distributed populations, generally on acid swamps at the high altitude tropical grasslands in the Atlantic province or on acid swamps or peat bogs, in the transitional zones of the coastal scrubs with the lowland forests of the Atlantic and lowland temperate grassland biomes of the Pampean provinces.

**Phenology:**— Fertile specimens have been collected between October and November.

**Conservation status:**— Vulnerable (VU B1 ; B2a ; b i, ii, iii). *Baccharis uleana* is represented only in few conservation units and in non-protected primary sites. The populations are naturally fragmented and the distribution area is restricted and decreasing. Few known populations still persist, all of them under anthropogenic pressure caused by drainage and urbanization, leading to habitat suppression and loss of habitat quality. The species is not recorded to São Paulo state for more than 60 years, and was not found in suitable habitats close to the former known distribution. Regional state assessments are encouraged with the aim to maintain the few remaining known populations preserved in the other Brazilian states.

**Vernacular names:**— vassourinha-do-banhado (*Heiden & Oliveira 1812, 1813*).

As previously discussed, the type collection of *Baccharis uleana* was mistakenly thought to be *B. gibertii* by Heering (1904), while Barroso (1976), Barroso & Bueno (2002) and Deble (2012) misapplied the name *B. phyllicifolia* to other specimens of *B. uleana*. Malagarriga (1977) described *B. uleana* based on a female specimen of the collection *Ule 1510*, indicating one female specimen in P as holotype and stating that staminate specimens of the new taxon were not seen. After examination of a male isotype found at F, completely in agreement with the type locality and the vegetative and capitulescence description of the protologue diagnosis, Heiden & Pirani (2012) recognized *B. uleana* as a distinct species belonging to *B.* subgen. *Tarchonanthoides*. After revision of the herbarium specimens of *Baccharis* at P, the holotype *Ule 1510* has not been found. However, two additional male isotypes of *Ule 1510* were found during herbarium revision at HBG, and they are as well congruent with the type locality information and the vegetative and capitulescence description of the protologue diagnosis of *B. uleana* provided by Malagarriga. Since a representative amount of Ernst Ule collections are housed at HBG and no one female duplicate of the holotype was found, the male duplicate of *Ule 1510* bearing the label “E. Ule. Herbarium Brasiliense” is here designated as lectotype of *B. uleana*.

**Specimens examined:**— BRAZIL. RIO GRANDE DO SUL: Novo Hamburgo, Hamburgerberg, 22 October 1892, ♀, *G.O.A. Malme 224* (R, S). Pelotas, praia do Laranjal, 10 November 1946, ♂, *E. Maria 15* (P). *S.l., s.d., st., C. Gaudichaud 1833 (H.I.B. 890)* (P). Portão, 30 November 1935, ♂, *B. Rambo 2310* (PACA). Porto Alegre, Morro da Glória, 16 April 1934, ♂, *B Rambo 494* (LP). SANTA CATARINA: Capivari de Baixo, Banhado da Estiva dos Pregos, November 1889, ♂, *E. Ule 1510* (F, HBG). Florianópolis, Ilha de Santa Catarina, Canasvieiras, 6 October 1964, ♂, *R.M. Klein 5908* (FLOR, HBR, LP, RB). Palhoça, Massiambú, 4 m, 15 November 2011, ♂, *G.Heiden & C.T. Oliveira 1812* (SPF); ♀, *G.Heiden & C.T. Oliveira 1813* (SPF). Reserva Municipal Campos de Maciambu, 7 m, 29 November 2006, ♀, *A.A. Schneider 1398* (ICN). SÃO PAULO: São Bernardo do Campo, 26 October 1913, ♂ & ♀, *A.C. Brade 6639* (RB, SP). São Paulo, Interlagos, 13 November 1946, ♀, *W. Hoehne 1935* (ICN, LP, P, RB, SPF, SPSF, UEC, US), ♂, *W. Hoehne 1936* (F, ICN, LP, MT, RB, SI, SPF, SPSF, UEC, US). *S.l., s.d., st., F. Sellow d463* (US).

**12. *Baccharis phylicifolia*** de Candolle (1836: 415) [as “*phylicaeifolia*”]. *Lanugothamnus phylicifolius* (DC.) Deble (2012: 13). —Type: “in Brasiliae prov. Sancti-Pauli. ... (v. s. in h. Mus. reg. Par. à Mus. imp. Bras. sub n. 491 miss.)”. BRAZIL. São Paulo: s.d., ♂, *F. Sellow s.n.* = *M. I. B. 491* (holotype P! (00755658); isotype G-DC! (00200390), F! (979317, fragment)).

*Baccharis anabelae* (Deble) G.Heiden (2013: 2). *Lanugothamnus anabelae* Deble (2012: 20). —Type: BRAZIL. Rio Grande do Sul, São José dos Ausentes, cânion Monte Negro, 1000 m, 7 November 2005, ♀, *L.P.Deble & A.S. Oliveira-Deble 4128* (holotype MBM; isotype SI!).

Illustration: Malagarriga (1954: 19); Barroso (1976: 217); Malagarriga (1977: dessin 61); Deble (2012: 21, as *L. anabelae*). Fig. 30, 31.

*Shrubs* 0.5–1 m tall, erect; fertile shoots virgate, branches axillary. *Stems* light brown, shoots tomentose. *Leaves* 0.5–2.5 cm long, 2–8 mm wide, sessile, evenly distributed along the branches; leaf blade thin to indurate, ovate to linear oblong, apex acute, rarely rounded, rounded, obtuse or subcordate, margins entire; leaves 1-nerved or basally 3-nerved, acrodromous imperfect, adaxial surface with a caducous, deciduous or persistent sericeous indumentum, abaxial surface with a persistent tomentose indumentum. *Capitulescences* corymbose, 2–20 cm long, 2–15 cm wide. *Capitula* sessile to pedunculate; peduncles 0.1–1 cm long, tomentose. *Male capitula* 4.3–5.7 mm long; florets 20–34; involucre 3.6–4.5 mm long, 6.9–9.6 mm wide, campanulate; phyllaries 3-seriate, canescent, outer ones ovate, median ones oblong, inner ones linear-lanceolate, margins entire, apex rounded to acute, villose; clinanthium conical, pubescent, covered by filiform trichomes; corolla 2.2–2.8 mm long, tube 1.2–1.4 mm long, throat 0.6–0.8 mm, lobes 0.4–0.8 mm long, biseriate trichomes on the throat and filiform trichomes on the lobes; anthers violet, 2.2–2.8 mm long; style 2.2–2.8 mm long; ovary abortive, 0.2–0.25 mm long, 0.15–0.2 mm wide, covered by filiform trichomes; pappus 3–4.1 mm long, bristles 42–62, tortuous, apically not broadened, with short-protruding cell apices. *Female capitula* 6–8 mm long; florets 26–44; involucre 5.7–6.6 mm long, 4.7–8.9 mm wide, turbinate to cylindrical; phyllaries 3-4-seriate, canescent, outer and median ones ovate, inner linear-oblong, margins entire, apex acute, villose; clinanthium plane or slightly convex, pubescent, covered by filiform trichomes; corolla 2.2–2.7 mm long; style 2.4–2.9 mm long, branches 0.2–0.3 mm long. *Cypselae* 0.8–1.1 mm long, 0.3–0.5 mm wide, light brown, pilose, evenly covered by twin trichomes, obconical, 5-ribbed; pappus 3.3–5.4 mm long, deciduous; bristles 94–110, not broadened apically, accrescent. Chromosome number unknown.

**Etymology:**— The specific epithet refers to the resemblance of the leaves with the leaves of some species of the African genus *Phylica* L. (Rhamnaceae).

**Distribution and habitat:**— *Baccharis phylicifolia* occurs in southeastern (Minas Gerais, Rio de Janeiro and São Paulo states) and southern Brazil (Paraná, Rio Grande do Sul and Santa Catarina states), known from several disjunct locations along the highlands of Serra da Mantiqueira, Planalto Paulista, and Serra Geral, at elevations between 900 and 2800 m a.s.l. (Fig. 29). It forms sparse populations on open and generally moist or seasonally flooded vegetations, growing on patches of

high altitude tropical and subtropical highland grasslands, in between the Ombrophilous Dense Forest and the Ombrophilous Mixed forest (with *Araucaria*), along the Atlantic and Paranaense provinces.

**Phenology:**— Fertile specimens have been collected from February to July, with a flowering peak between March and April.

**Conservation status:**— Near threatened (NT). *Baccharis phyllicifolia* is known to occur in some natural reserves and in few non-protected primary areas, and it seems not to persist in secondary and anthropized environments. Some populations along the range of distribution are in risk of becoming locally extinct, while habitat quality is decreasing and habitat loss is increasing along its naturally fragmented range. Regional state assessments are encouraged with the aim to keep the great variability found in populations preserved.

**Vernacular names:**— Vassourinha-das-turfeiras (*Heiden & Iganci 1493*).

As discussed in the commentaries of *Baccharis leucopappa* and *B. uleana*, specimens of *B. phyllicifolia* were mistakenly considered as *B. leucopappa* by Baker (1882), and merged in the circumscription of this species by subsequent authors, whilst the name *B. phyllicifolia* was being misapplied to specimens of *B. uleana*, a previously neglected name referring to a distinct species. The examination of the type specimens along with protologues and the study of additional specimens allowed us clarify the application of these three names in the current taxonomic study.

Deble (2012) described *Lanugothamnus anabelae* based on specimens collected at the highlands of the boundary between Santa Catarina and Rio Grande do Sul states. Heiden (2013) provided the combination *B. anabelae* for this taxon. Further study of the protologue, illustration and isotype picture of *B. anabelae*, along with additional specimens collected in the same area, allowed us to conclude that *B. anabelae* shall undoubtedly be considered as synonym of *B. phyllicifolia*. In the protologue of *B. anabelae*, Deble (2012) compare the putative new species to *B. phyllicifolia*, however the characters described to *B. phyllicifolia* by him endorse that this name was being misapplied to specimens of *B. uleana* in the comparison.

*Baccharis phyllicifolia* has a wide distribution with several disjunct areas. Due to the broad geographical range and geographic isolation among populations, leaf characteristics of shape, size, venation and persistence of the indumentum vary greatly along its entire geographical range. As observed in other species of *B.* subgen. *Tarchonanthoides*, capitulescence size, peduncle length and number of capitula per capitulescence may vary enormously within the same population and these traits are not correlated geographically.

**Specimens examined:**— BRAZIL. *S.l., s.d.*, ♂ & ♀, *F. Sellow 4445* (K); ♂ & ♀, *F. Sellow 4197* (NY). MINAS GERAIS: Passa Quatro, Serra Fina, Pedra da Mina, 2664 – 2792 m, 15 May 2005, ♂, *L.D. Meireles, J.A. Nunes & T.R. Cordeiro 1665* (BHCB, RB, UEC); 7 June 2006, ♂, *L.D. Meireles, J.A. Nunes & G.G. Castanho 2402* (BHCB, RB, UEC). *S.l., s.d.*, *A.F.M. Glaziou 19522* (C). PARANÁ: Palmas, Horizonte, 1303 m, 8 February 2011, bud, *G. Heiden, J.M. Silva & J. Vaz 1582* (SPF). RIO DE JANEIRO: Itatiaia, Parque Nacional do Itatiaia, 2330 – 2750 m, May 1950, ♀, *A.C.*

*Brade 20360* (RB); 27 October 1927, *A. Ginzberger 251* (HBG); 9 July 1872, bud, *A.F.M. Glaziou 5901* (K, P); 21 January 1873, ♀, *A.F.M. Glaziou 6594* (C, G, K, MG, P); 13 April 2008, *G. Heiden 999* (RB); 14 April 1985, ♀, *T.M. Lewinsohn s.n.* (UEC18146); 13 May 1906, ♀, *L. Luederwaldt 1998* (US); April 1921, ♀, *P. Occhioni s.n.* (RB 16469); 26 March 1943, ♀, *E. Pereira 2913* (HB, RB); 4 April 2007, ♀, *M.M. Saavedra et al. 372* (HECT, RB); ♂, *M.M. Saavedra et al. 374* (HECT, RB); Pedra Assentada, 2200 m, 8 February 1945, ♂ & ♀, *A.C. Brade 17418* (MO, NY, RB); Retiro de Ramos, 2100 m, 8 July 1902, st., *P.K.H. Dusén 648* (S); 24 May 1902, ♀, *P.K.H. Dusén 137* (BHCB, HBG, R, S); s.d., st., *E. Hemmendorff 613* (R, S); Serra das Agulhas Negras, 28 February 1984, ♀, *K. Kubitzki 84-25* (HBG, NY); Serra do Itatiaia, 2000 m, March 1894, ♂, *E. Ule 178* (CORD, HBG, R); ♂, *E. Ule 186* (R); Serra da Mantiqueira, 3 March 1931, 2300 m, bud, ♂, *R.W. Kaempfe 420* (RB); 26 March 1943, *E. Pereira 29 B* (HB). Resende, Parque Nacional do Itatiaia, 1975, ♀, *A.M. Camerik 130* (RB); 3 April 1966, ♂, *J.R. Coleman 376* (K, SP, US); 6 February 1970, ♂, *T. Koyama & P.G. Windisch 13700* (SP, US); 2000 m, 25 May 1978, ♀, *G. Martinelli 4552* (RB, SI); March 1953, ♀, *SERRA-I 244* (NY, R); Prateleiras, 16 April 1967, ♀, *J.C. Lindeman & J.H. Haas 5211* (NY, UB). S.L., Vargem Grande, 2250 m, 23 May 1985, *T.M. Lewinsohn & R.F. Monteiro 5100* (UEC). RIO GRANDE DO SUL: Bom Jesus, Serra da Rocinha, 1280 m, 11 January 1987, bud, *D.B. Falkenberg, P. Berry & L. Brako 4193 & 4202* (FLOR); 12 February 1941, ♂, *B. Rambo 4616* (PACA); 28 February 1946, ♂, *B. Rambo 32411* (LIL, SP); 14 February 1947, ♂, *B. Rambo 35190* (PACA); 18 January 1950, bud, *B. Rambo 45325* (CTES, LIL, PACA, SI); 3 February 1953, ♂, *B. Rambo 53839* (B, PACA); 1000 m, 18 January 1950, ♀, *A. Sehnem 4244* (B, PACA, SI); 7 February 1988, ♂, *N. Silveira 6350* (HAS). Cambará do Sul, Aparados da Serra, 4 March 1965, ♂, *R. Brescia & E. Marchesi 4241* (MBM, MVFA); 5 February 1985, ♂, *N. Silveira 1975* (HAS); 28 March 1989, ♂, *N. Silveira 9178* (HAS); Fortaleza, 17 January 2011, bud, *G. Heiden et al. 1540* (SPF); 15 April 1993, ♂, *G. Hatschbach, M. Hatschbach & J.M. Silva 58154* (C, HBG, MBM, MO, NY); 11 February 1987, ♂, *N. Silveira 4464* (HAS); 17 January 2011, Itaimbezinho, 900 m, 16 March 2006, ♀, *A.A. Schneider 1230* (ICN); 924 m, 22 October 2012, ♂, *G. Heiden et al. 1989* (SPF); 1000 m, 30 January 1950, bud, *B. Rambo 45583* (LIL, PACA); Serra do Faxinal, 21 February 1951, ♂, *B. Rambo 50131* (C, LIL, PACA, SI, SP, US); ♀, *B. Rambo 50132* (CTES, LIL, PACA). São Francisco de Paula, 13 July 2002, st., *J. Paz 131* (ICN). São José dos Ausentes, 1327 m, 16 January 2011, bud, *G. Heiden et al. 1528* (SPF); Monte Negro, 27 May 2005, ♂, 1100 m, *F. Marchett 249* (HUCS, MBM, O); March 1999, ♂, *M. Sobral 8815* (ICN, MBM, SP). São Francisco de Paula, Fazenda Englert, 8 February 1941, ♂, *B. Rambo 4606* (LIL). SANTA CATARINA: Alfredo Wagner, Morro do Trombudo, 7 February 2007, bud, *G. Hatschbach & O.S. Ribas 79680* (MBM). Água Doce, Rio Roseira, 16 February 1978, ♀, *A. Krapovickas & C.L. Cristóbal 33674* (CTES). Bom Jardim da Serra, 1400 m, 28 January 1971, *U. Eskuche 1760-9* (SI); March 1953, ♂, *J.R. Mattos 2083* (HBR); Curral Falso, 1500 m, 19 February 1959, ♂, *R. Reitz & R.M. Klein 8391* (HBR, LP, NY, RB, US); Serra do Oratório, Rio Capivaras, 1200 m, 16 January 1952, bud, *L.B. Smith & R. Reitz 10133* (HBR, LP, US); Serra do Rio do Rastro, 1200

m, 7 April 1991, *G. Hatschbach, M. Hatschbach & D. Guimarães 55321* (HBR, MBM, US). Bom Retiro, Campo dos Padres, 25 January 1957, bud, *L.B. Smith & R. Reitz 10425* (HBR, LP, RB, US). Calmon, 15 March 1910, ♂, *P.K.H. Dusen 9329* (E, NY, S). Campo Alegre, Serra do Quiriri, 3 March 2001, ♂, *O.S. Ribas et al. 3356* (CESJ, MBM). Rancho Queimado, Campo de Boa Vista, s.d., ♂, *F. Müller 258* (K, R); Serra da Boa Vista, 1000 m, 2 March 1961, ♂, *R. Reitz & R.M. Klein 10778* (FLOR, HBR, LP, RB). São Joaquim, 1750 m, June 1986, *D.B. Falkenberg 3434* (FLOR, MBM, PACA, PEL); Fazenda Velha, 1953, st., *J Mattos 1487* (HAS); 1957, bud, *J. Mattos 4647* (HAS); Prisco, 27 February 1966, ♀, *J. Mattos 13354* (HAS). Timbé do Sul, Serra da Rocinha 13 March 2005, ♂, *G. Hatschbach, E. Barbosa & E.F. Costa 79107* (MBM, RB, SPF); Urubici, Parque Nacional de São Joaquim, 10 February 2007, ♂, *G. Hatschbach & O.S. Ribas 79965* (MBM); Morro da Igreja, 1820 m, 24 May 1991, ♀, *D.B. Falkenberg 5512* (FLOR); ♀, *D.B. Falkenberg 5520* (FLOR); 1800 m, 4 March 1992, ♀, *D.B. Falkenberg 5651* (FLOR); 25 February 1995, ♀, *D.B. Falkenberg 7178* (FLOR); ♂, *D.B. Falkenberg 7182* (FLOR); 1750 m, 29 April 1995, ♂, *D.B. e*; ♀, *D.B. Falkenberg 7485* (FLOR); 1850 m, 10 March 2005, ♀, *G. Hatschbach, E. Barbosa & E.F. Costa 79004* (ICN, MBM); ♂, *G. Hatschbach, E. Barbosa & E.F. Costa 79007* (CESJ, HUEFS, MBM, RB, SI); 2 April 20120, ♂, *G. Heiden, T.E. Särkinen & J.R.V. Iganci 1332* (SPF); ♀, *G. Heiden, T.E. Särkinen & J.R.V. Iganci 1333* (GB, HECT, ICN, K, MBM, MVFA, RB, SPF, SPFR, US); 12 Januray 2012, bud, *G. Heiden & J.R.V. Iganci 1493* (SPF); 22 January 1960, bud, *J.R. Mattos 7229* (HAS); bud, *J.R. Mattos 8242* (HBR); 14 may 2004, ♂ & ♀, *J.M. Silva & L.R. Lima 4053* (MBM, SPSF, UB). Urupema, Fazenda Farofa, 1426 m, 8 April 2007, ♂, *R.L.G. Coelho et al. 209* (SPF). S.L., Serra Geral, Campos de Capivari, February 1891, ♂, *E. Ule 1778* (HBG). SÃO PAULO: Campos do Jordão, April 1937, ♀, *L. Lanstyack s.n.* (RB33181). Queluz, 2500 – 2600 m, 18 February 1997, ♂ & ♀, *G.J. Shepherd et al. 97-64* (UEC).

**13. *Baccharis helichrysoides*** de Candolle (1836: 415). *Lanugothamnus helichrysoides* (DC.) Deble (2012: 11). —Type: "in Brasiliae prov. Rio-Grande et Sancti-Pauli. ... (v. s. ... in h. Mus. reg. Par. à Mus. imp. Bras. sub n. 811 et 492 miss.)". BRAZIL. Rio Grande do Sul: [between Piratini and Pelotas fide Malagarriga (1957)], 1824, ♀ & ♂, *F. Sellow d2013 = M. I. B. 811* (lectotype P! (00468143), designated by Malagarriga 1958: 284; isolectotypes: G-DC! (00200392), K!). —Remaining syntypes: BRAZIL. São Paulo, s. d., ♀, *F. Sellow s.n. = M. I. B. 492* (syntype P! (00468144)). BRAZIL. S.l., s. d., ♂ & ♀, *F. Sellow s.n.* (probable syntypes, fide Müller (2010), G! (00222633; 00222634), GH! (00247134), W).

*Baccharis lanuginosa* Gardner (1848: 82). —Type: "Dry bushy places between Villa do Principe and Cocaes". BRAZIL. Minas Gerais: [between Serro and Arraial dos Cocais, between 18<sup>th</sup> and 26<sup>th</sup> August 1840, fide Hind, pers. comm.], Sept. 1840, ♀, *G. Gardner 4900/1* (holotype BM! (000756675)).

Illustration: Baker (1882: tabula 21: I); Barroso (1976: 224); Teodoro (1954: 19); Barroso (1976: 210); Malagarriga (1977: dessin 63). Fig. 32, 33.

*Shrubs* 0.7–2 m tall, erect; fertile shoots virgate, branches axillary. *Stems* light brown to stramineous or light green, shoots villose. *Leaves* 1.6–5.5 cm long, 0.5–1.2 cm wide, sessile, evenly distributed along the branches; leaf blade thin, linear, oblong, cordate to ovate, apex acute, base obtuse or cordate, margins entire, revolute; leaves 1-nerved or basally 3-nerved, acrodromous imperfect, adaxial surface with a deciduous sericeous indumentum, abaxial surface with a persistent tomentose indumentum. *Capitulescences* paniculate, terminal; panicles pyramidal, rarely corymbiform, 4.5–45 cm long, 3–15 cm wide. *Capitula* sessile to pedunculate; peduncles 0.1–13 mm long, villose. *Male capitula* 5.5–6.2 mm long; florets 15–42; involucre 5.3–5.5 mm long, 6.4–9.3 mm wide, campanulate; phyllaries 3-seriate, canescent, outer ones ovate, median and inner ones linear-oblong, margins entire, apex acute to rounded, villose; clinanthium conical, pubescent, covered by filiform trichomes; corolla 3.6–4.2 mm long, tube 1.3–1.6 mm long, throat 0.9–1 mm, lobes 1.4–1.6 mm long, biseriate trichomes on the throat and filiform on the lobes; anthers light brown, 3.5–4.2 mm long; style 3.6–4.2 mm long; ovary abortive, 0.05–0.11 mm long, 0.2–0.25 mm wide, glabrous; pappus 3.6–4.2 mm long, bristles 12–16, tortuous, apically not broadened. *Female capitula* 8–15 mm long; florets 22–45; involucre 5.8–7.5 mm long, 4.5–7.7 mm wide, turbinate to cylindrical; phyllaries 3–4-seriate, canescent, outer ones ovate, median and inner ones linear-lanceolate, margins entire, apex acute, villose; clinanthium conical, pubescent, covered by filiform trichomes; corolla 3.6–4 mm long; style 3.8–4.1 mm long, branches 0.1–0.2 mm long. *Cypselae* 1.2–1.4 mm long, 0.5–0.6 mm wide, light brown, puberulent, evenly covered by twin trichomes, obconical, 5-ribbed; pappus 5.4–9.9 mm long, deciduous; bristles 52–66, not broadened apically, strongly accrescent. Chromosome number  $n=9$  (Coleman 1968).

**Etymology:**— The specific epithet refers to the resemblance of the species with species of the genus *Helichrysum* Mill. (Asteraceae: Gnaphalieae).

**Distribution and habitat:**— *Baccharis helichrysoides* occurs in northeastern Argentina (Misiones province), centre-western (Mato Grosso do Sul state), southeastern (Minas Gerais, Rio de Janeiro and São Paulo states) and southern Brazil (Paraná, Rio Grande do Sul and Santa Catarina states), and eastern Paraguay (Alto Paraná, Amambay, Caaguazú, Caazapá and Guairá departments). It is known from several locations along mountainous areas in the Quadrilátero Ferrífero (Iron Quadrangle), Serra do Espinhaço, Serra do Caparaó, Serra da Mantiqueira, Serra do Mar, Planalto Paulista, Planalto de Curitiba, Planalto de Ponta Grossa, Serra Geral and surrounding hilly areas reaching the Cordillera de Amambay/Serra de Amambaí westwards, at elevations between 100 and 2200 m a.s.l. (Fig. 34). It forms small populations on open habitats, growing generally on banks or areas with dry and shallow rocky soils, in savannahs, high altitude tropical and subtropical highland grasslands, edges of Ombrophilous Dense Forest, Omphophilous Mixed Forest (with *Araucaria*) and Semideciduous Forest, or even in anthropic areas, within the Cerrado, Atlantic and Paranense provinces.



**Phenology:**— Fertile specimens have been collected from October to early July, with a flowering peak between December and March.

**Conservation status:**— Least concern (LC). *Baccharis helichrysoides* is known to occur in several natural reserves and in non-protected primary, secondary and anthropized areas too. Although it is not threatened along its entire range, isolated populations in Mato Grosso do Sul (Brazil) and adjacent Amambay (Paraguay) could face some risk of local extinctions and regional assessments are encouraged.

**Vernacular names:**— Alecrim (*Duarte 1048*).

*Baccharis helichrysoides* is the most common and widespread species of *B.* subgen. *Tarchonanthoides*. Despite the wide distribution, variability of vegetative and reproductive characters is narrower when compared to the other consubgeneric species. Leaf shape can vary more when comparing basal and upper leaves from the same specimen, than among individuals of the same population or from different localities. Capitulescences are mostly pyramidal, but corymbiform panicles can be found. Individuals with corymbiform panicles are rare, and co-occur with individuals presenting pyramidal capitulescences, in Paraguay and Parque Nacional do Itatiaia, in the boundary between Minas Gerais and Rio de Janeiro states in Brazil.

Baker (1882) cites one specimen of *B. helichrysoides* collected by *Silva Manso* in Cuiabá, Mato Grosso, Brazil. Since this specimen could not be located and examined, the occurrence of the species in Mato Grosso is not confirmed with the available data.

**Selected specimens examined:**— ARGENTINA. MISIONES: Bonpland, 9 February 1908, ♂, *E.L. Ekman 218* (LP, S). BRAZIL. MATO GROSSO DO SUL: Amambaí, tribo Caiuá, 1979, ♂, *W.G. Garcia s.n.* (UEC13693). MINAS GERAIS: Conceição do Mato Dentro, Serra do Cipó, 1340 m, 17 February 2011, ♀, *G. Heiden & J.R. Pirani 1625* (BHCB, CTB, GB, ICN, JE, LP, MBM, MVFA, RB, SPF, UEC, US); ♂, *G. Heiden & J.R. Pirani 1626* (SPF). Jaboticatubas, Serra do Cipó, 1350 m, 18 February 2011, ♀, *G. Heiden & J.R. Pirani 1619* (BHCB, GB, K, ICN, MBM, RB, SPF, US); ♂, *G. Heiden & J.R. Pirani 1620* (BHCB, GB, K, MBM, SPF). *S.L.*, Cachoeira, Hermilo Alves, 10 January 1948, ♂, *A.P. Duarte 1048* (RB). PARANÁ: Candói, BR 373, 960 m, 7 February 2011, bud, *G. Heiden 1573* (ICN, MBM, RB, SPF, US). RIO DE JANEIRO: Itatiaia, 28 May 1935, ♀, *A.C. Brade 14567* (RB); 10 March 1943, ♀, *E. Pereira 42* (HB, RB). Petrópolis, 13 April 1968, ♀, *D. Sucre 2754* (RB). Teresópolis, 23 February 1949, ♂, *C. Rizzini 434* (RB); 3 March 1963, *G.F.J. Pabst 7325* (HB); 10 February 1968, ♀, *D. Sucre 2311 & P.I.S. Braga 154* (GUA, HB, RB). Vassouras, 23 March 1940, ♀, *H. Monteiro Filho 2237* (RBR). RIO GRANDE DO SUL: Giruá, 1 March 1976, *K. Hagelund 10124* (ICN). SANTA CATARINA: Alfredo Wagner, 495 m, 6 May 2013, ♂, *G. Heiden & J.R.V. Iganci 2096* (SPF); ♀, *G. Heiden & J.R.V. Iganci 2097* (SPF). Curitiba, 969 m, 10 June 2012, ♀, *G. Heiden & J.R.V. Iganci 1912* (RB, SPF). Praia Grande, Serra do Faxinal, 424 m, 19 January 2011, bud, *G. Heiden 1553* (MVFA, RB, SPF). SÃO PAULO: São Paulo, Área de Proteção Ambiental Capivari-Monos, 695 m, st., *G. Heiden 1691* (SPF); Jaguaré, 759 m, 7 November 2010, st., *G. Heiden*

1409 (SPF). PARAGUAY. ALTO PARANÁ: Alto Paraná, 1909/10, ♀, *K. Fiebrig 6004* (G). AMAMBAY: Sierra de Amambay, 1907/08, ♀, *E. Hassler 10240a* (G, LIL). CAAGUAZÚ: Caaguazú, 1905, *E. Hassler 8910* (LIL). CAAZAPÁ: Caazapá, 2 km del Destacamento Militar, 21 December 1988, *N. Soria 3063* (MO). GUAIRÁ: Colonia Independencia, March 1924, ♂, *T. Rojas 4792A* (MO).

### Acknowledgements

GH acknowledges FAPESP (processes 2010/00519-8, 2011/18385-0 and 2012/17911-3), IAPT Research Grants in Plant Systematics 2010, and the Smithsonian Institution's 2011 Cuatrecasas Fellowship Award for providing financial support. JRP is supported by a CNPq research grant. Authors are thankful to João Iganci for preparing the invaluable illustrations; Rafael Augusto Xavier Borges and Caetano Troncoso Oliveira for providing pictures of *B. lychnophora*; Benoît Patrice Francis Loeuille, Carolina Moriani Siniscalchi, Caetano Troncoso Oliveira and Cíntia Luz from Universidade de São Paulo; Clarisse Bolfe Poliquesi, Joel Morais da Silva, Joel Vaz and Osmar dos Santos Ribas from Museu Botânico Municipal de Curitiba; Guilherme Heiden from Universidade Federal de Pelotas; João Iganci from Universidade Federal do Rio Grande do Sul, Mariana Bünger and Vanessa Leite Rezende from Universidade Federal de Minas Gerais, and Rosa Lía Barbieri from Embrapa Clima Temperado, for helping with fieldworks in Brazil; Gisela Sancho from Museo de La Plata and Santiago Catalano from Instituto Miguel Lillo for helping with fieldworks in Argentina; and José Mauricio Bonifacino from Universidad de la República for helping with fieldwork in Uruguay.

### References

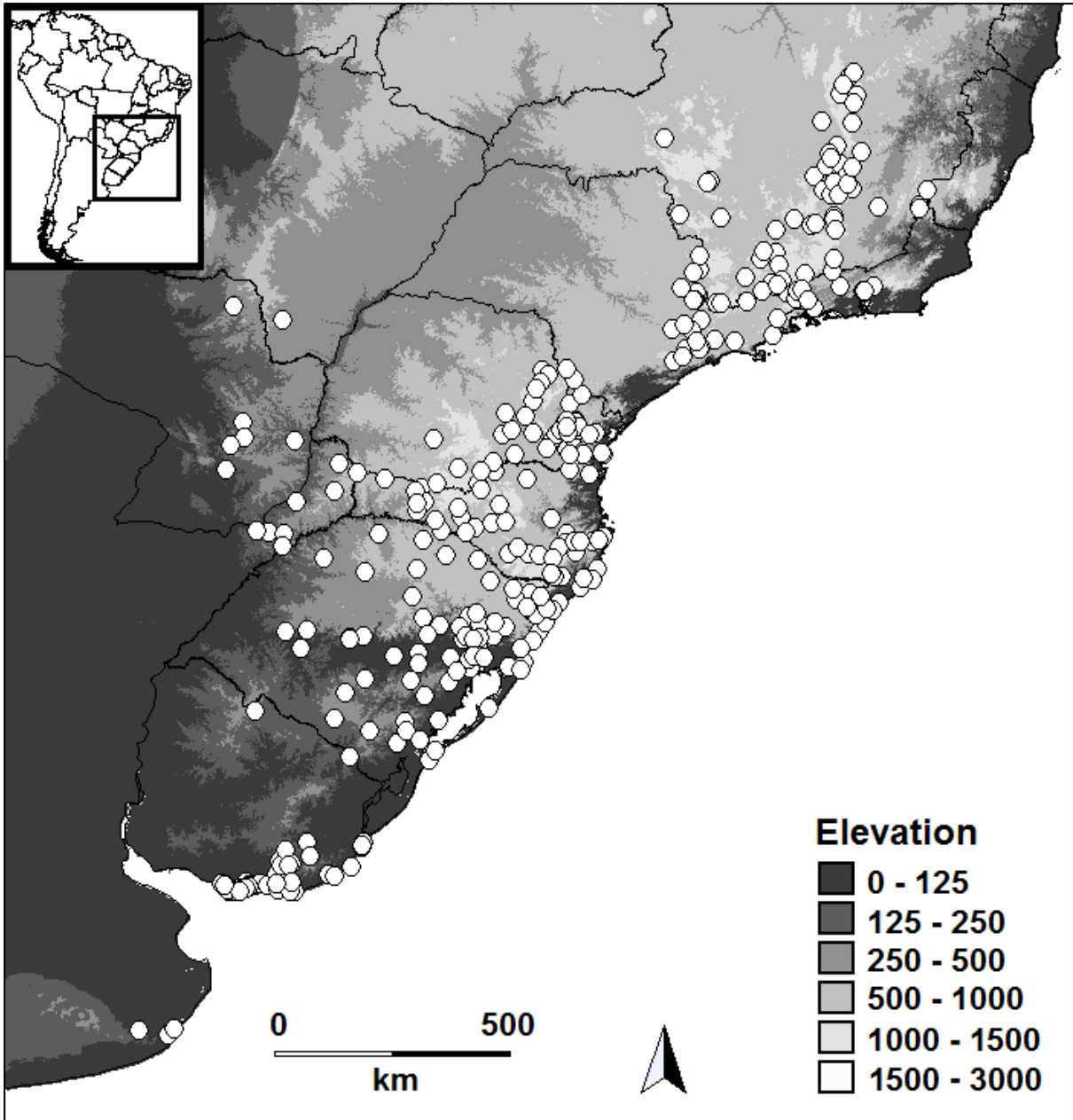
- Baker, J.G. (1882) Compositae. III. Asteroideae, Inuloideae. *In*: Martius, C.F.P.† & Eichler, A.G. (eds). *Flora brasiliensis enumeratio plantarum in Brasilia hactenus detectarum quas suis aliorumque botanicorum studiis descriptas et methodo naturali digestas partim icone illustratas* 6: 1-134. Monachii, Lipsiae: Fleischer.
- Barroso, G.M. (1976) Subtribo Baccharidinae Hoffman. Estudo das espécies ocorrentes no Brasil. *Rodriguésia* 28: 1–281.
- Bremer, K. (1994) *Asteraceae: Cladistics & Classification*. Portland: Timber Press. 752 pp.
- Candolle, A.P. de. (1836) *Prodromus systematis naturalis regni vegetabilis sive enumeratio contracta ordinum, generum specierumque plantarum huc usque cognitarum, juxta methodi naturalis normas digesta*, vol. 5. Paris: Treuttel & Würtz.

- Cuatrecasas, J. (1967) Revisión de las especies colombianas del género *Baccharis*. *Revista de la Academia Colombiana de Ciencias Exactas, Físicas y Naturales* 13: 5-102.
- Deble, L.P. (2012) Studies in Baccharidinae (Asteraceae: Astereae). I: *Lanugothamnus* a new genus from South America. *Balduinia* 37: 2–25.
- Dusén, P.K.H. (1910) Neue Gefässpflanzen aus Paraná (Südbrasilien). *Arkiv för Botanik* 9: 1-37.
- Falkenberg, D.B. & Deble, L.P. (2010) *Baccharis chionolaenoides* (Asteraceae), a new species of subgenus *Tarchonanthoides* from Santa Catarina state (Brazil). *Darwiniana* 48: 64-67.
- Gardner, G. (1848) Contributions towards a Flora of Brazil, being the distinctive characters of some new species of Compositae, belonging to the tribe Asteroideae. *The London journal of botany: containing figures and descriptions of such plants as recommend themselves by their novelty, rarity, history, or uses: together with botanical notices and information and occasional portraits and memoirs of eminent botanists* 7: 78-90.
- Giuliano, D.A. (2005) New infragenera in *Baccharis* (Asteraceae, Astereae). *Novon* 15: 534-541.
- Giuliano, D.A. & Freire, S. E. (2011) Nuevas secciones en *Baccharis* (Asteraceae, Astereae) de América Del Sur. *Annals of the Missouri Botanical Garden* 98: 331–347.
- Handro, O. (1953) Novidades taxonômicas de J.F. Toledo. *Arquivos de Botânica do Estado de São Paulo* 3: 67-97.
- Heering, W. (1904) Die *Baccharis*-Arten des Hamburger Herbars. *Jahrbuch der Hamburgischen Wissenschaftlichen Anstalten* 21: 1–46.
- Heiden, G. (2008) A New Species of *Baccharis* subgen. *Tarchonanthoides* Heering (Asteraceae-Astereae) from Rio Grande do Sul, Brasil. *Bradea* 13: 5–9.
- Heiden, G. & Pirani, J.R.. (2012a) A synopsis and notes for *Baccharis* subgen. *Tarchonanthoides* (Asteraceae: Astereae). *Phytotaxa* 60: 41–49.
- Heiden, G. & Pirani, J.R.. (2012b) *Baccharis napaea* (Asteraceae, Astereae): a new species of subgen. *Tarchonanthoides* sect. *Coridifoliae* from the subtropical highlands of southern Brazil. *Phytotaxa* 66: 49–54.
- Hooker, W. J. & Arnott, G.A.W. (1841) Contributions towards a Flora of South America and the islands of the Pacific. I. Extra-tropical South America. Subtribe II. Baccharideae Less. *Journal of Botany* (Hooker) 3: 19-47.

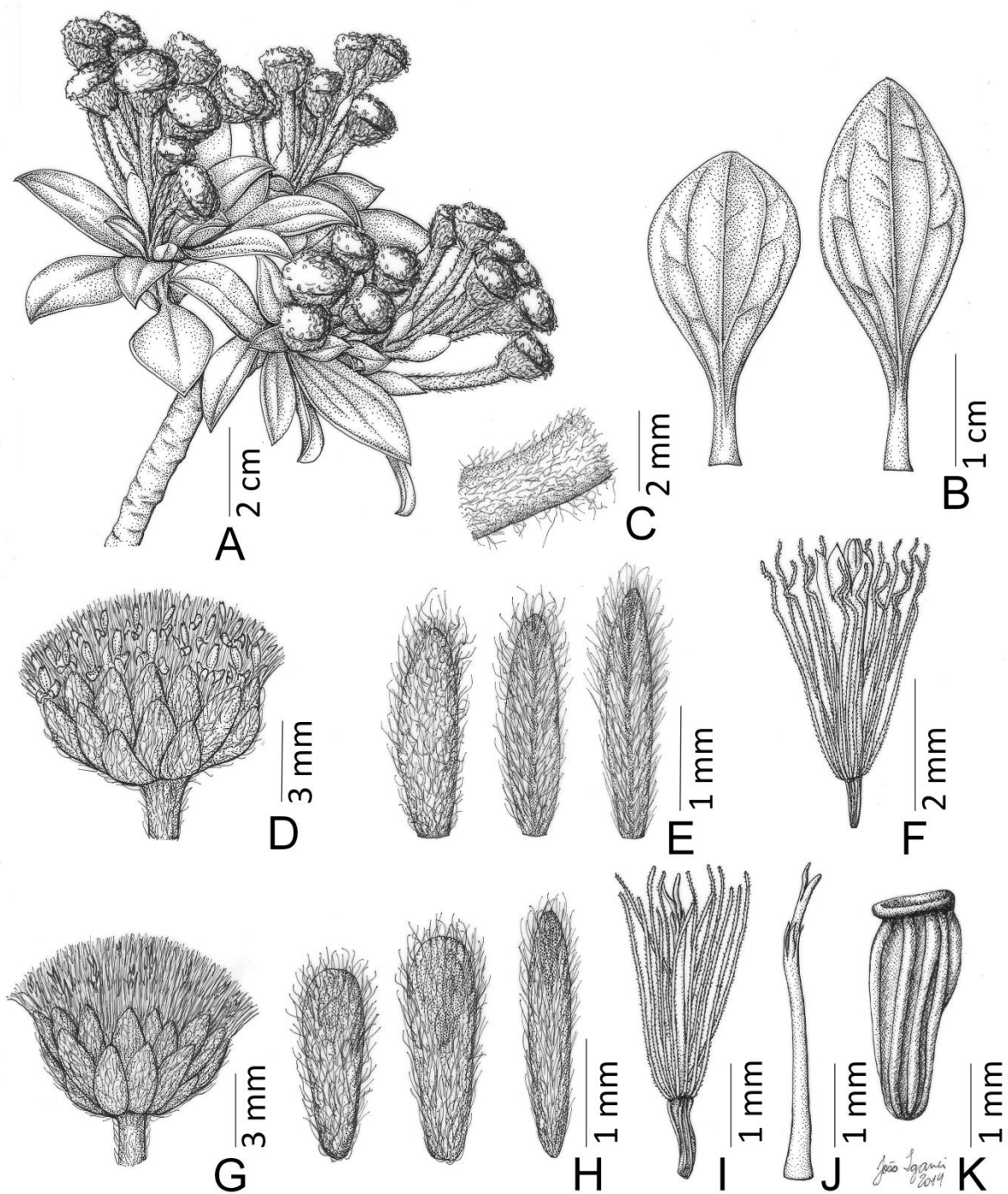
- Kunth, C.S. (1818) *Nova genera et species plantarum quas in peregrinatione ad plagam aequinoctialem orbis novi collegerunt, descripserunt, partim adumbraverunt Amat. Bonpland et Alex. de Humboldt*. Vol. 4. Ed. folio. Paris: N. Maze.
- Linnaeus, C. (1753) *Species plantarum*. Vol. 2. Stockholm: L. Salvius.
- McNeill, J., Barrie, F. R., Burdet, H. M., Demoulin, V., Hawksworth, D. L., Marhold, K., Nicolson, D. H., Prado, J., Silva, P. C., Skog, J. E., Wiersema, J. H. & Turland, N. J. (eds) (2006) *International Code of Botanical Nomenclature (Vienna Code) adopted by the Seventeenth International Botanical Congress Vienna, Austria, July 2005*. Gantner, Ruggell. (Regnum Vegetabile, 146). i–xviii, 568 pp.
- Malagarriga Heras, R.P. [as Irmão Teodoro Luis] (1957) Para o estudo da Flora Sul-Riograndense qual o valor da “Flora Brasiliensis” de Martius? *Contribuições do Instituto Geobiológico La Salle* 8: 1-61.
- Malagarriga Heras, R.P. [as Irmão Teodoro Luis] (1958) Notes critiques a propos des Baccharidinae de l'herbier du laboratoire de phanérogamie du museum d'histoire naturelle de Paris. *Bulletin du Muséum national d'Histoire naturelle* 2: 275-298.
- Malagarriga Heras, R.P. (1977) [1976]. Nomenclator baccharidinarum omnium. *Memoria de la Sociedad de Ciencias Naturales La Salle* 37: 129-224.
- Malme, G.O.A. (1933) Compositae paranenses dusenianae. *Kongliga Svenska Vetenskaps-Akademiens Handlingar* 12: 1-122.
- Müller, J. (2006) Systematics of *Baccharis* (Compositae–Astereae) in Bolivia, including an overview of the genus. *Systematic Botany Monographs* 76: 1–341.
- Müller, J. (2010) *World checklist of Baccharis L. (Compositae–Astereae)*. Available from: <http://www2.uni-jena.de/biologie/spezbot/herbar/Baccharis.htm>. (22 March 2012).
- Oliveira, A.S. & Deble, L.P. (2006) Duas novas espécies sul-brasileiras de *Baccharis* L. (Asteraceae–Astereae). *Balduinia* 9: 4-9.
- Oliveira-Deble, A.S. & Deble, L.P. (2008) New species of *Baccharis* (Asteraceae, Astereae) from Brazil. *Bonplandia* 17: 13-24.
- Persoon, C.H. (1807). *Synopsis plantarum, seu enchiridium botanicum ...* vol. 2. Paris: Craemer; Tübingen: Cotta.

Ruiz, H. & Pavón, J.A. 1798. *Systema vegetabilium florum peruvianae et chilensis*, ... vol. 1. [Madrid:]  
Sancha.

Sprengel, K. (1826) *Systema vegetabilium*, ed.16, vol. 3. Gottingensis: Dieterich.

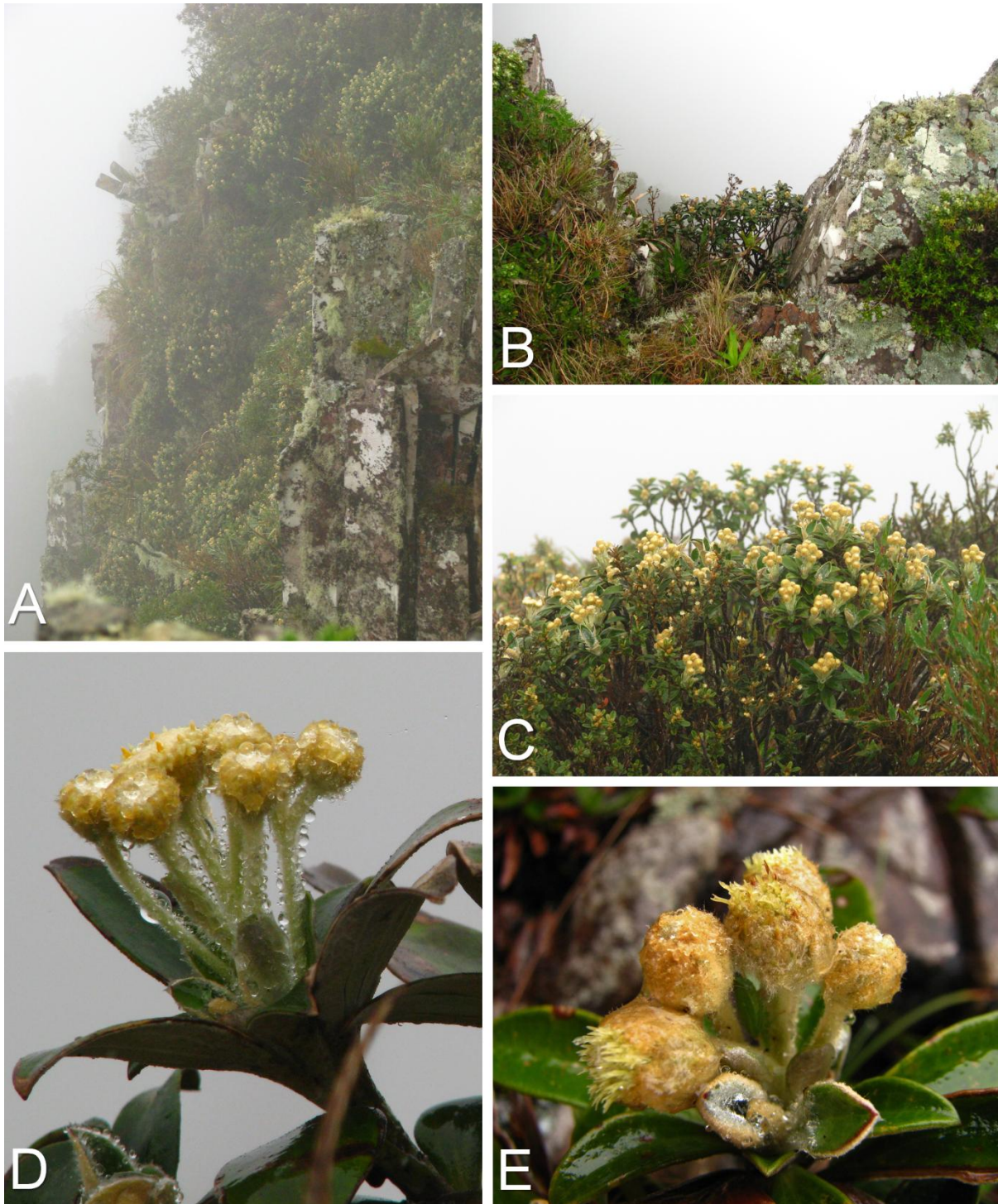


**Figure 1.** Distribution of *Baccharis* subgen. *Tarchonanthoides* in Southeastern South America (○).



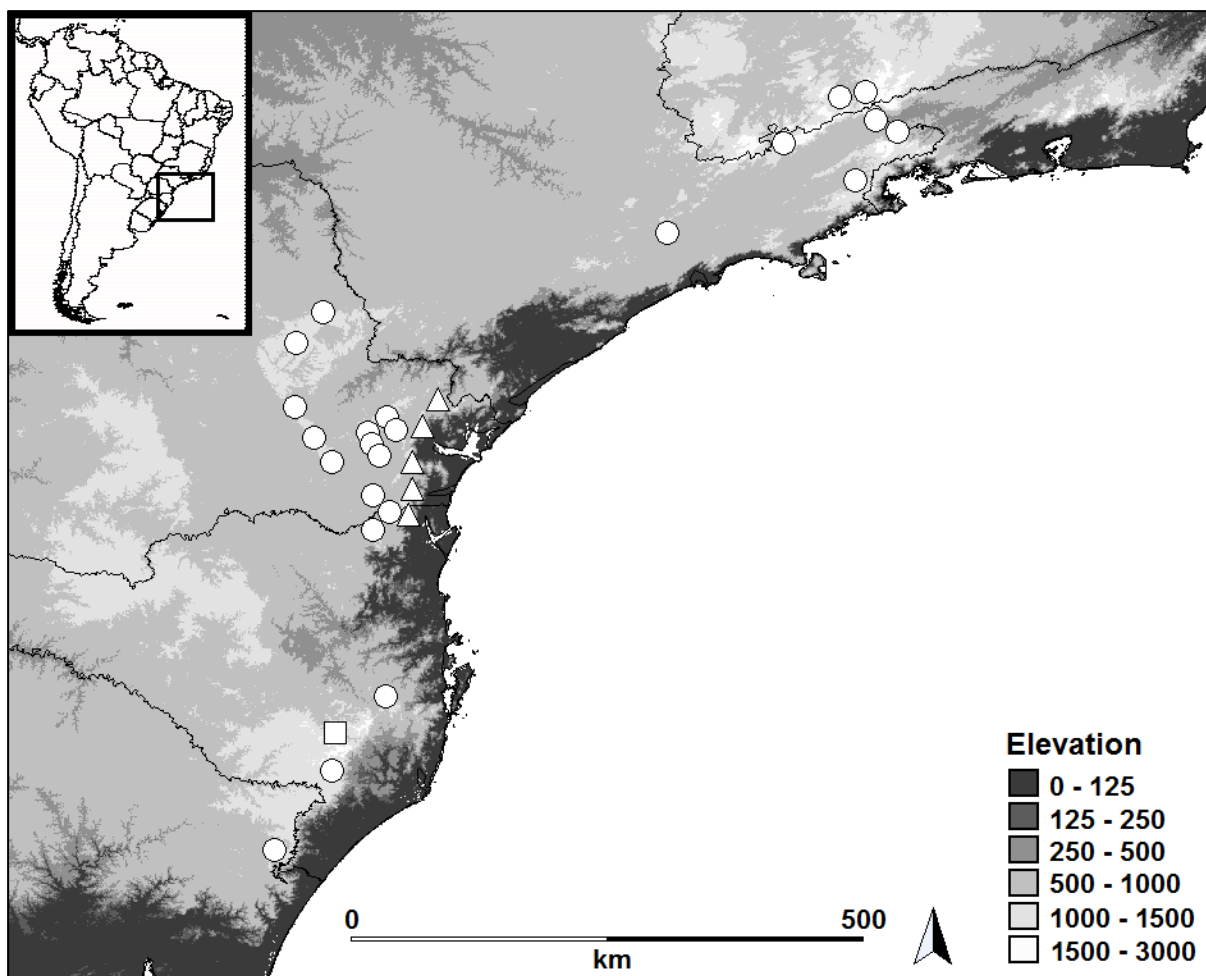
**Figure 2.** *Baccharis chionolaenoides*. A. Fertile shoot of estaminate plant. B. Leaves. C. Portion of lanose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A–F: *Heiden 1799* (SPF). G–K: *Heiden 1800* (SPF). Illustration by João Iganci.



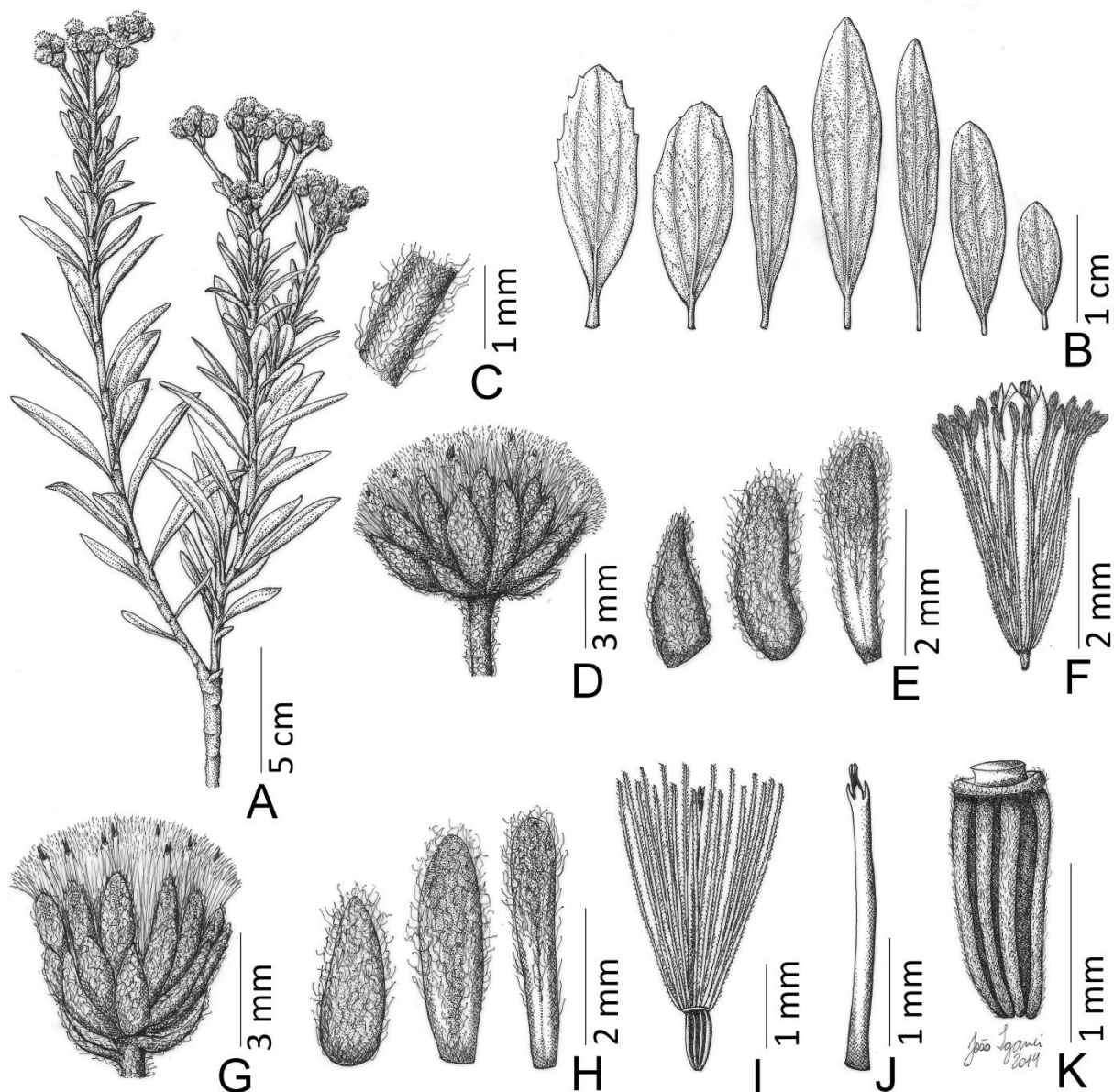


**Figure 3.** *Baccharis chionolaenoides*. A. Habitat on steep cliffs in the transition between bare rocks and cloud forests at Morro da Igreja, Parque Nacional de São Joaquim, Urubici, Santa Catarina, Brazil. B. View from above of a specimen growing in a basaltic crevice. C. Habit. D. Male capitulescence. E. Female capitulescence. Photos by G. Heiden.

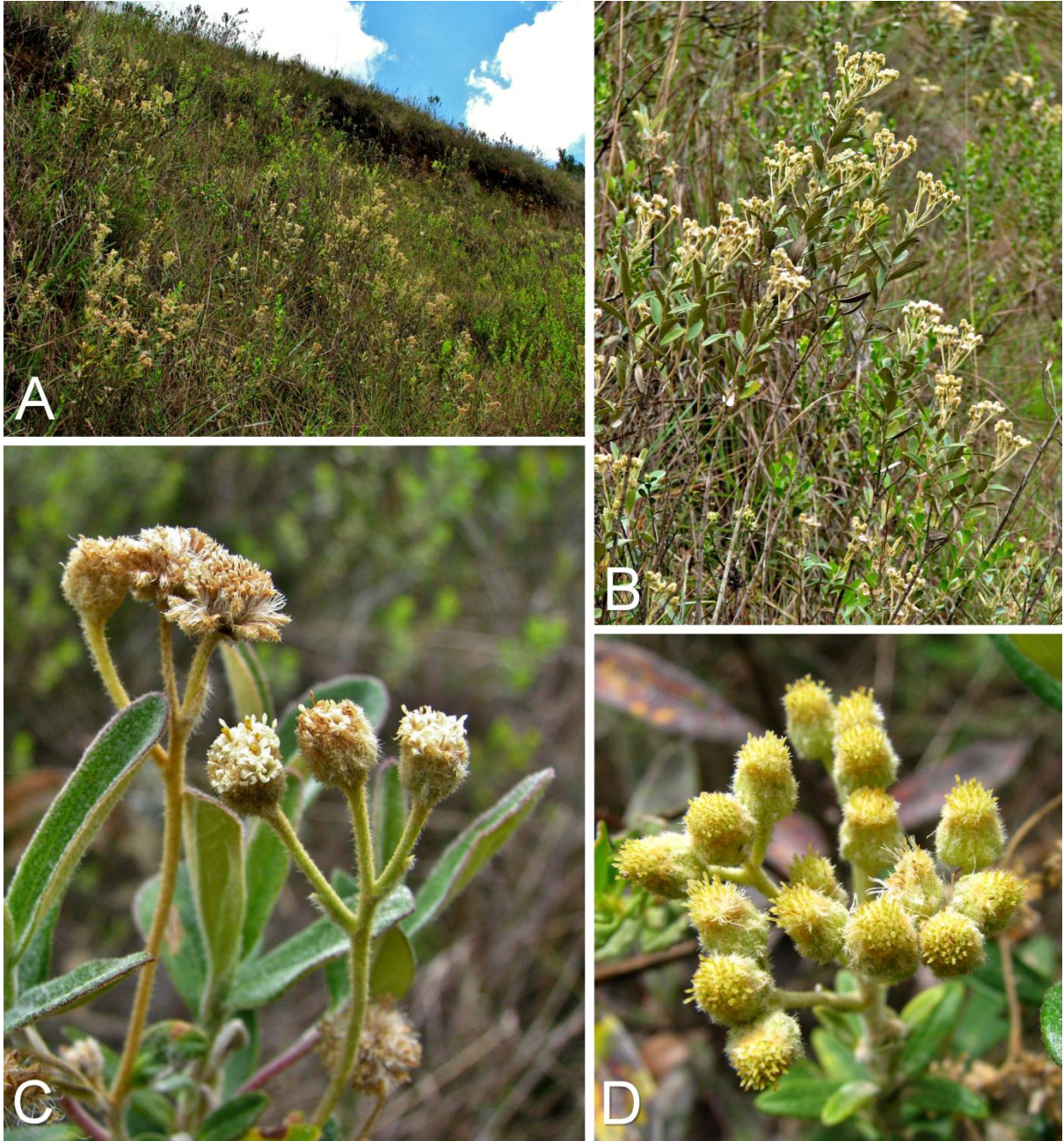




**Figure 4.** Distribution of *Baccharis chionolaenoides* (□), *B. curitybensis* (○) and *B. nebularis* (△).

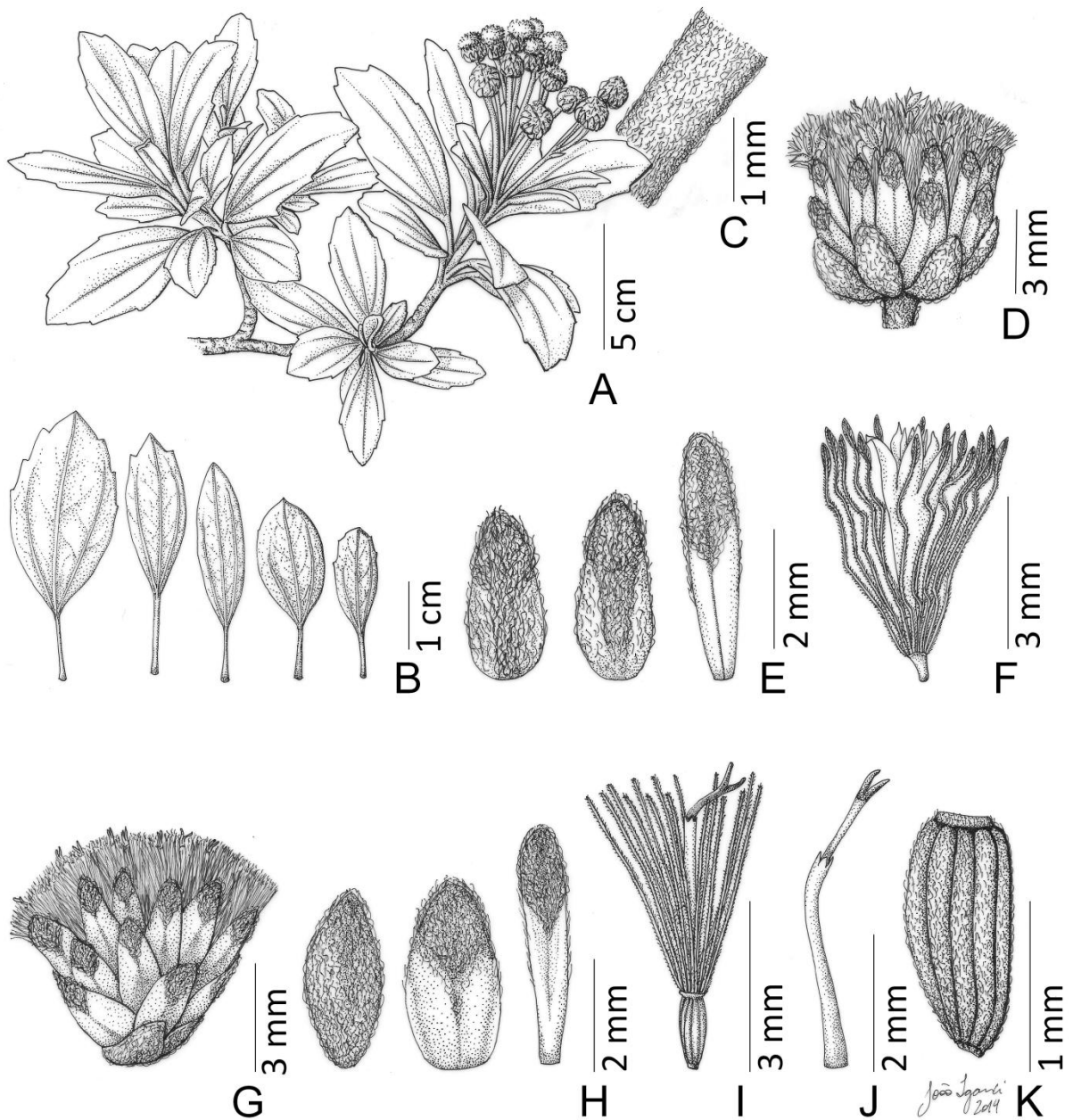


**Figure 5.** *Baccharis curitybensis*. A. Fertile shoot of pistillate plant. B. Leaves. C. Portion of pilose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsel. A, C, G–K: *Heiden 1971* (SPF). B (from left to right): *Silva 4200* (MBM); *Robim 504* (MBM); *Hatschbach 6474* (MBM); *Barbosa 1672* (MBM); *Heiden 1971* (SPF); *Hatschbach 22813* (MBM); *Silva 4115* (MBM). D–F: *Heiden 1970* (SPF). Illustration by João Iganci.

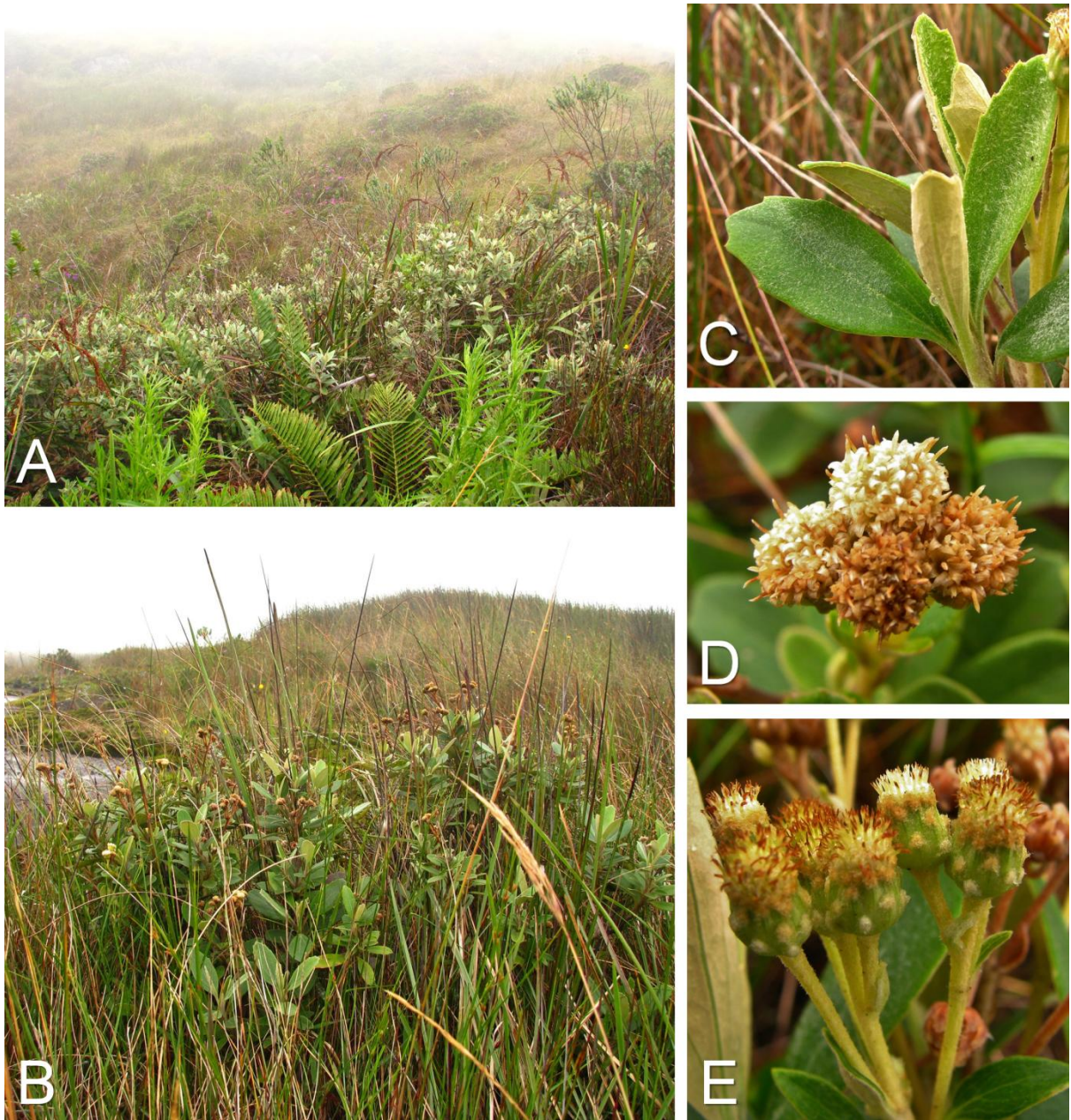


**Figure 6.** *Baccharis curitybensis*. A. Habitat in dry high altitude tropical grasslands at Capivari, Campos do Jordão, São Paulo, Brazil. B. Habit. C. Male capitulescences. D. Female capitulescence. Photos by G. Heiden.

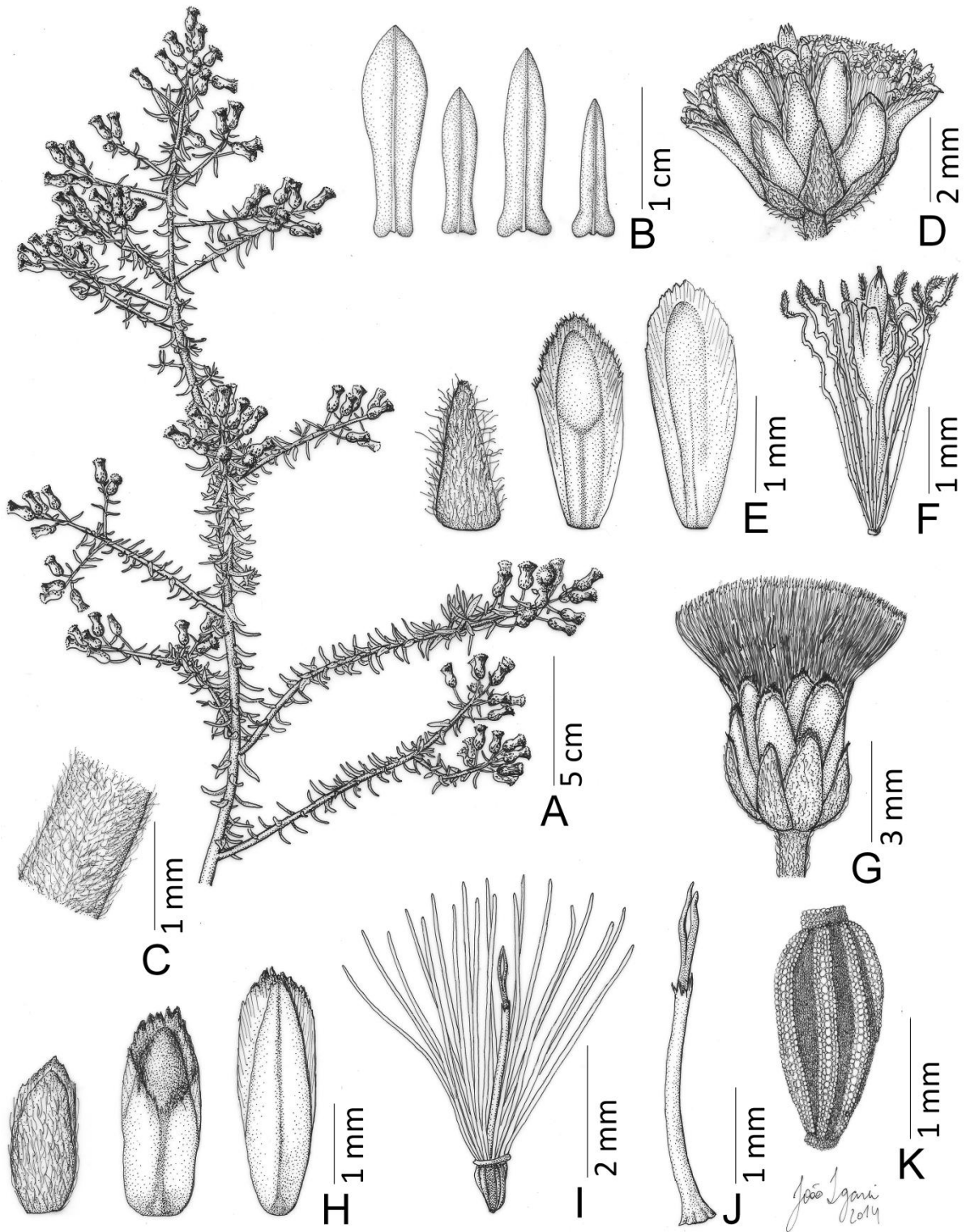




**Figure 7.** *Baccharis nebularis*. A. Fertile shoot of pistillate plant. B. Leaves. C. Portion of tomentose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A, C, G–K: *Heiden 1449* (SPF). B (from left to right): *Roderjan 1510* (MBM); *Hatschbach 6835* (MBM); *Kummrow 2626* (MBM); *Santos 297* (MBM); *Heiden 1449* (SPF). D–F: *Heiden 1450* (SPF). Illustration by João Iganci.



**Figure 8.** *Baccharis nebularis*. A. Habitat in moist high altitude tropical grasslands mixed with cloud forest thickets at Morro dos Perdidos, Serra de Araçatuba, Guaratuba, Paraná, Brazil. B. Habit. C. Leaves. D. Male capitula. E. Female capitula. Photos by G. Heiden.

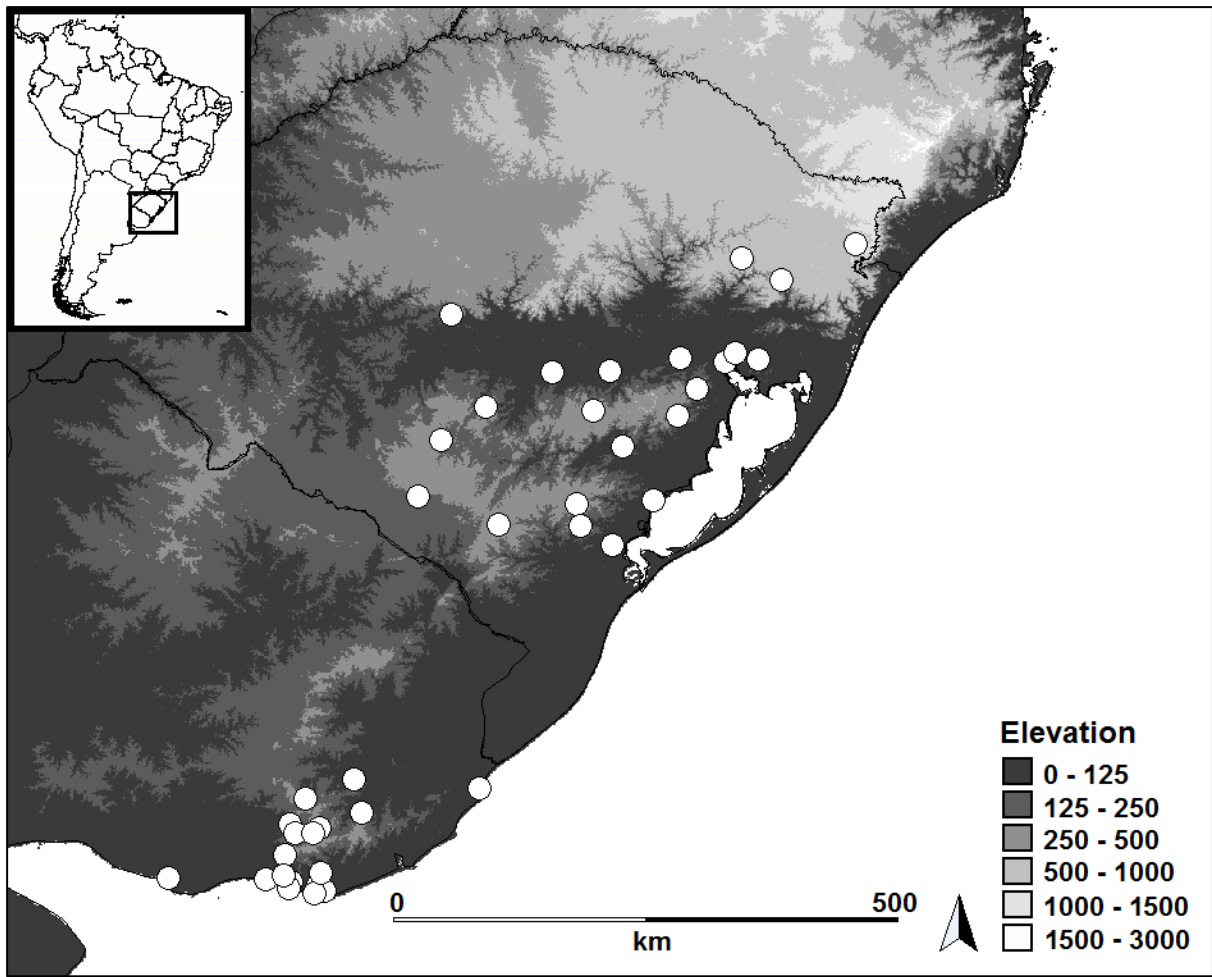


**Figure 9.** *Baccharis patens*. A. Fertile shoot of pistillate plant. B. Leaves. C. Portion of tomentose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A, C, G–K: *Heiden 1395b* (SPF). B (from left to right): *Heiden 1466* (SPF); *Heiden 1463* (SPF); *Heiden 1403* (SPF); *Heiden 1395b* (SPF). D–F: *Heiden 1395a* (SPF). Illustration by João Iganci.



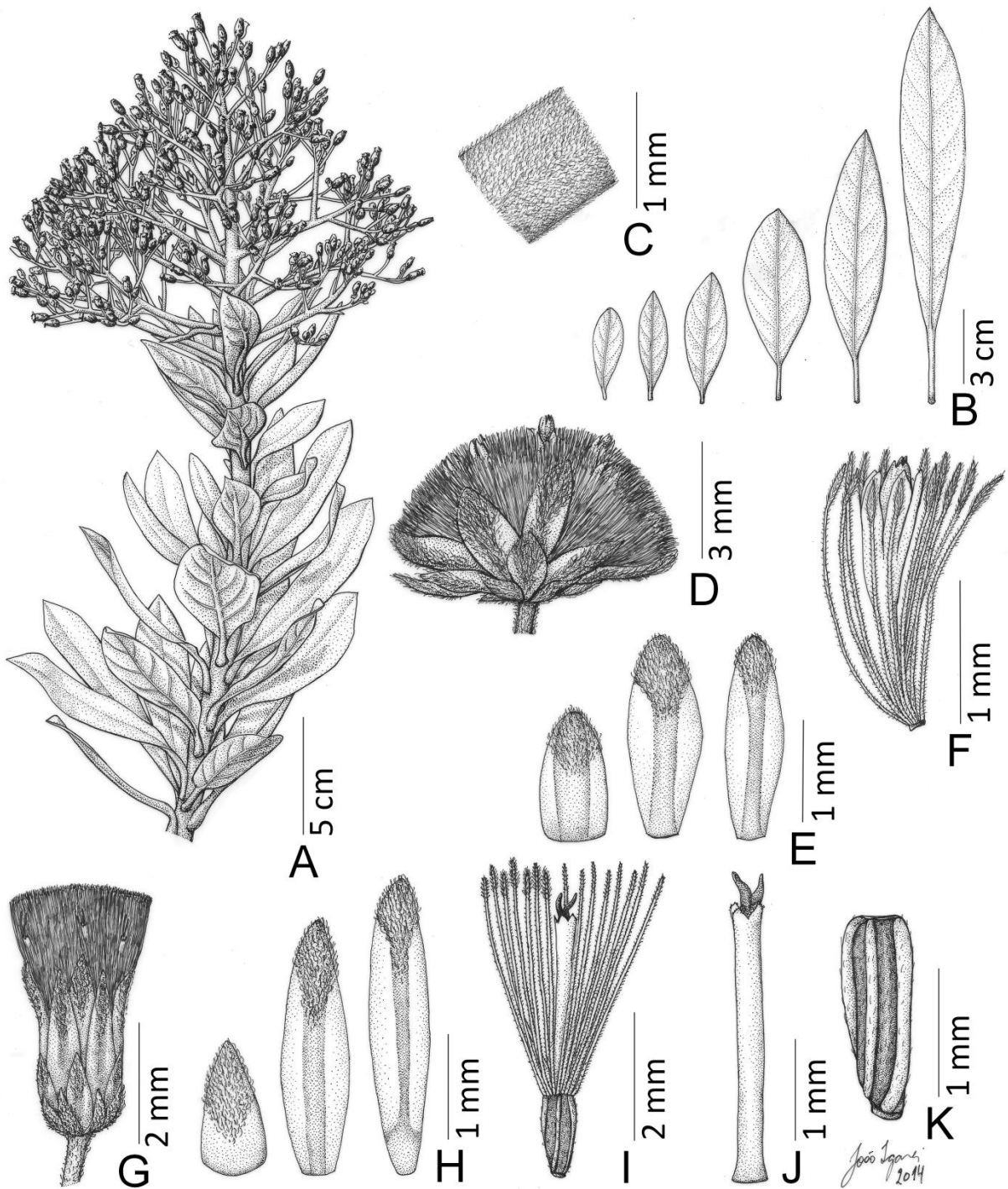


**Figure 10.** *Baccharis patens*. A. Habitat and erect habit with lateral shoots patente in subtropical highland grasslands with Ombrophilous Mixed forests at Itaimbezinho, Parque Nacional de Aparados da Serra, Cambará do Sul, Rio Grande do Sul, Brazil. B. Habitat and procumbent habit in low altitude temperate grasslands on rocky shores at Punta Ballena, Maldonado, Uruguay. C. Male capitulescences. D. Female capitulescences. Photos by G. Heiden.



**Figure 11.** Distribution of *Baccharis patens* (○).





**Figure 12.** *Baccharis lychnophora*. A. Fertile shoot of pistillate plant. B. Leaves. C. Portion of tomentose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A, C, G–K: Saavedra 283 (RB). B (from left to right): Wanderley CFCR4613 (SPF); Simão CFCR11727 (SPF); Forzza 3961 (SPF); Carvalho 34 (SPF); Saavedra 283 (RB); Lima 1334 (RB). D–F: Saavedra 282 (RB). Illustration by João Iganci.





**Figure 13.** *Baccharis lychnophora*. A. Habitat on rocky grasslands (campos rupestres) at Pico do Sol, Catas Altas, Minas Gerais, Brazil. B. Habitat and habit on riverine vegetation along a creek in the rocky grasslands at Pico do Pião, Parque Estadual do Ibitipoca, Lima Duarte, Minas Gerais, Brazil. C. Female capitulescence. Photo A by C.T. Oliveira; photos B and C by R.A.X. Borges.



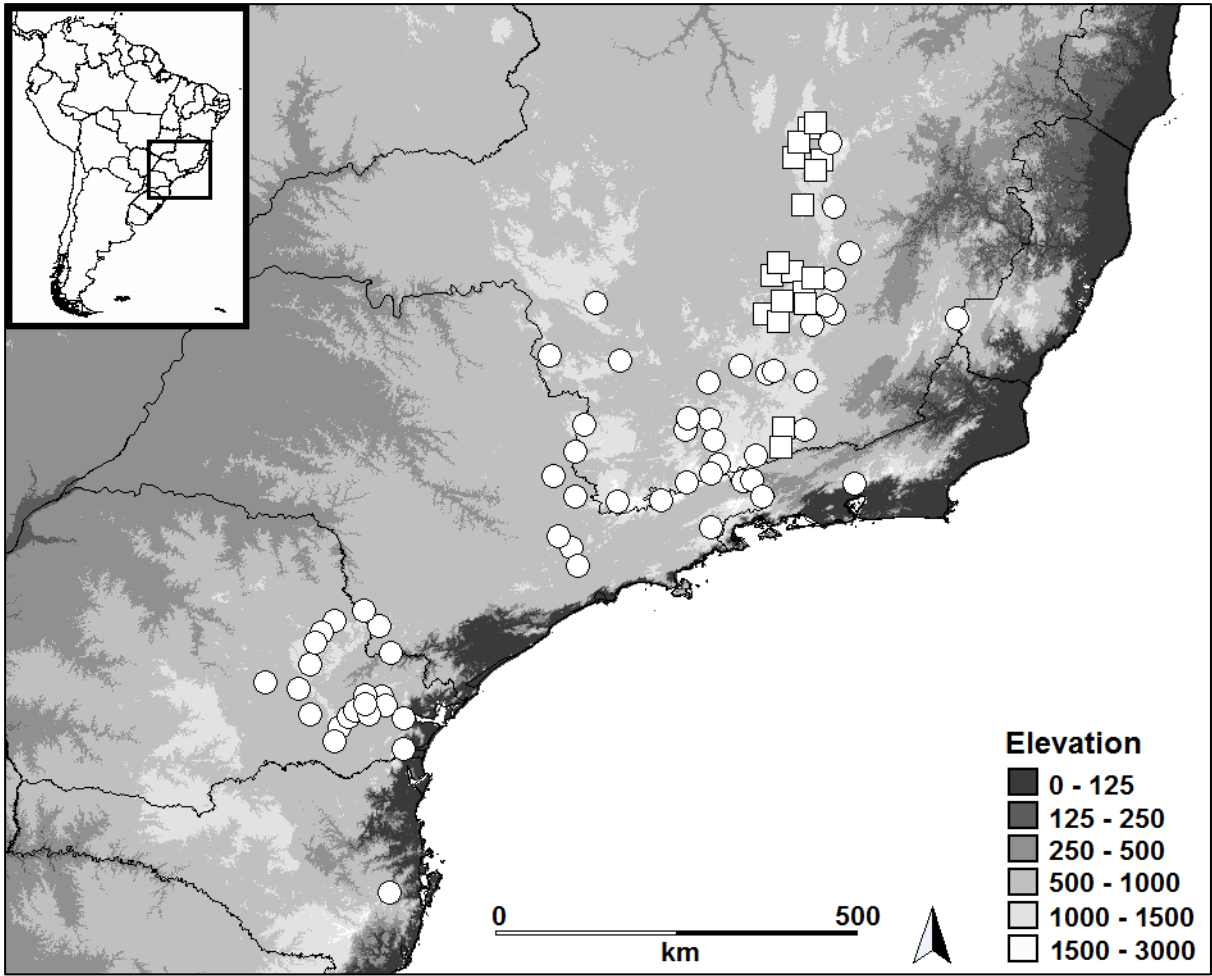
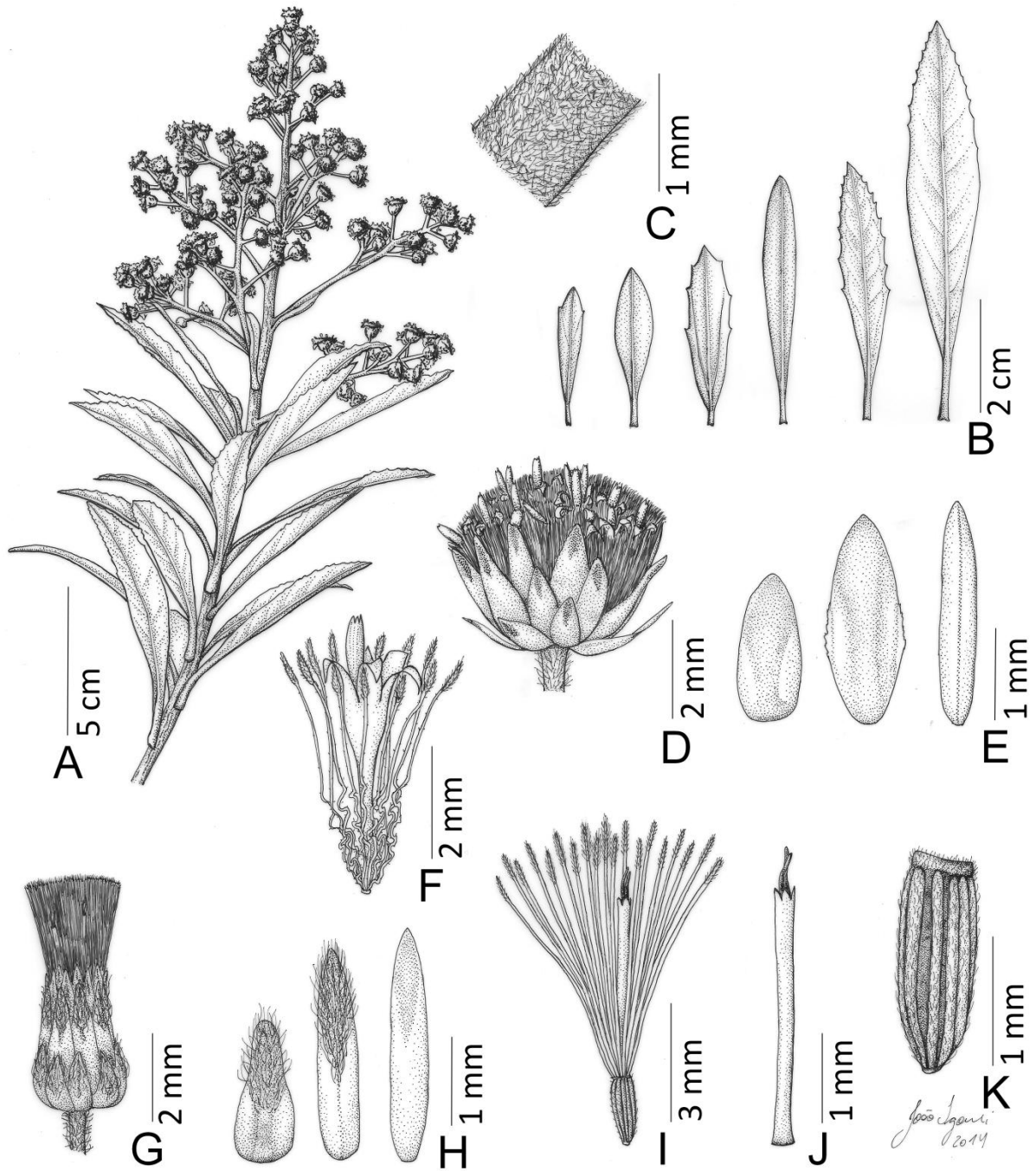
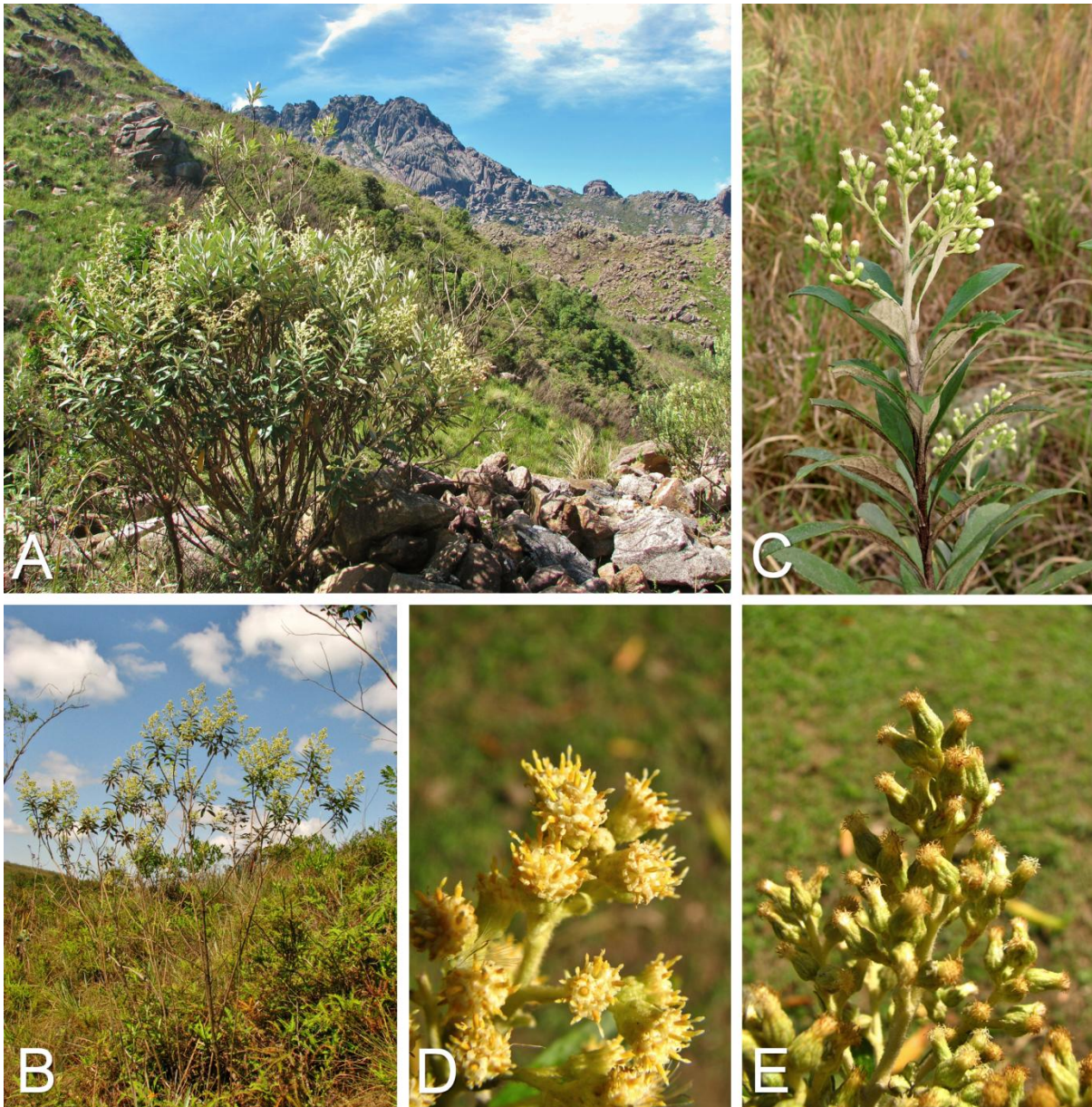


Figure 14. Distribution of *B. lychnophora* (□) and *B. tarchonanthoides* (○).

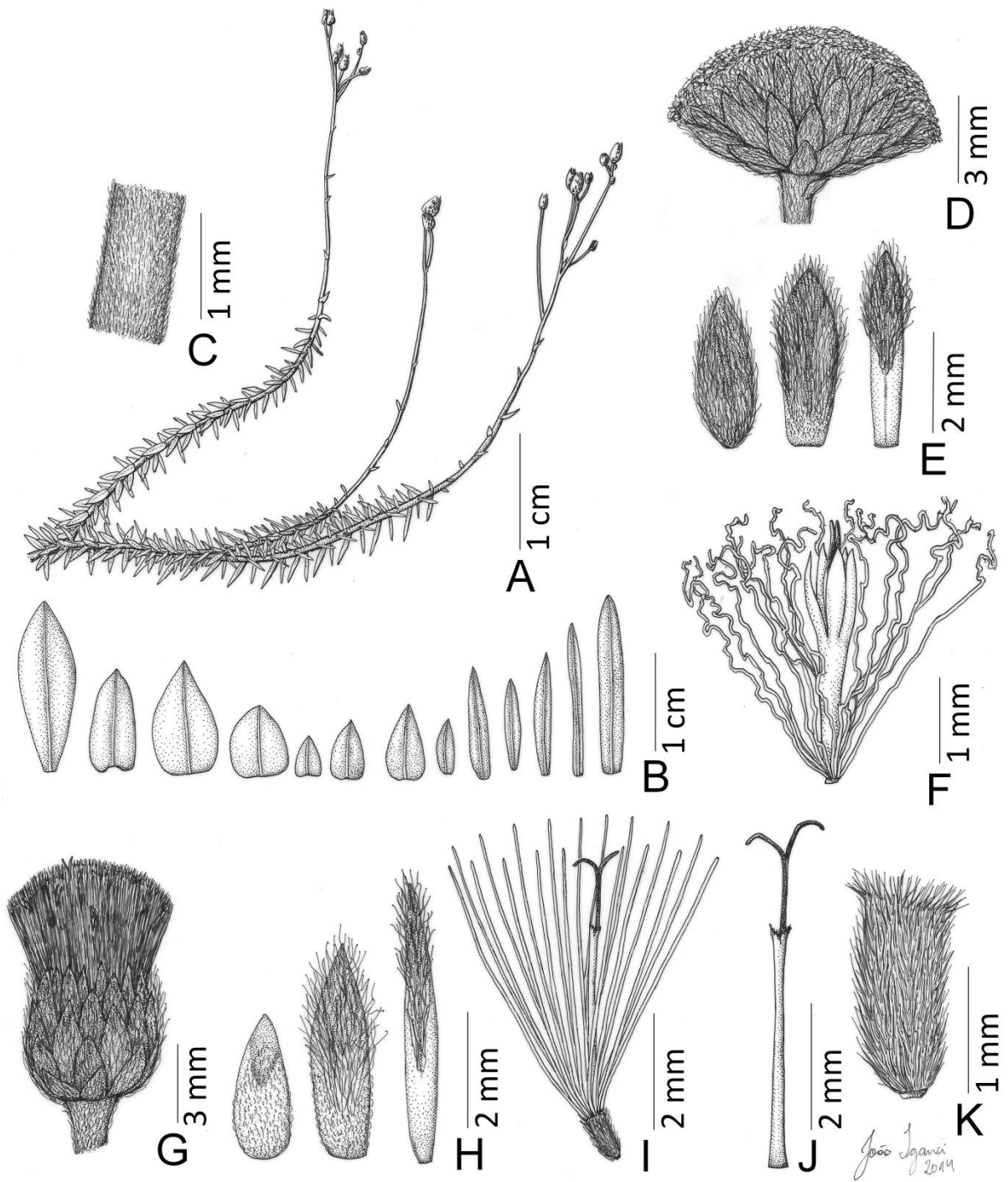


**Figure 15.** *Baccharis tarchonanthoides*. A. Fertile shoot of estaminate plant. B. Leaves. C. Portion of villous peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A, C–F: Heiden 1968 (SPF), G–K: Heiden 1969 (SPF). B (from left to right): Heiden 1969 (SPF); Heiden 1708 (SPF); Heiden 1430 (SPF); Borges 263 (RB); Heiden 812 (SPF); Silva 17 (MBM).. Illustration by João Iganci.

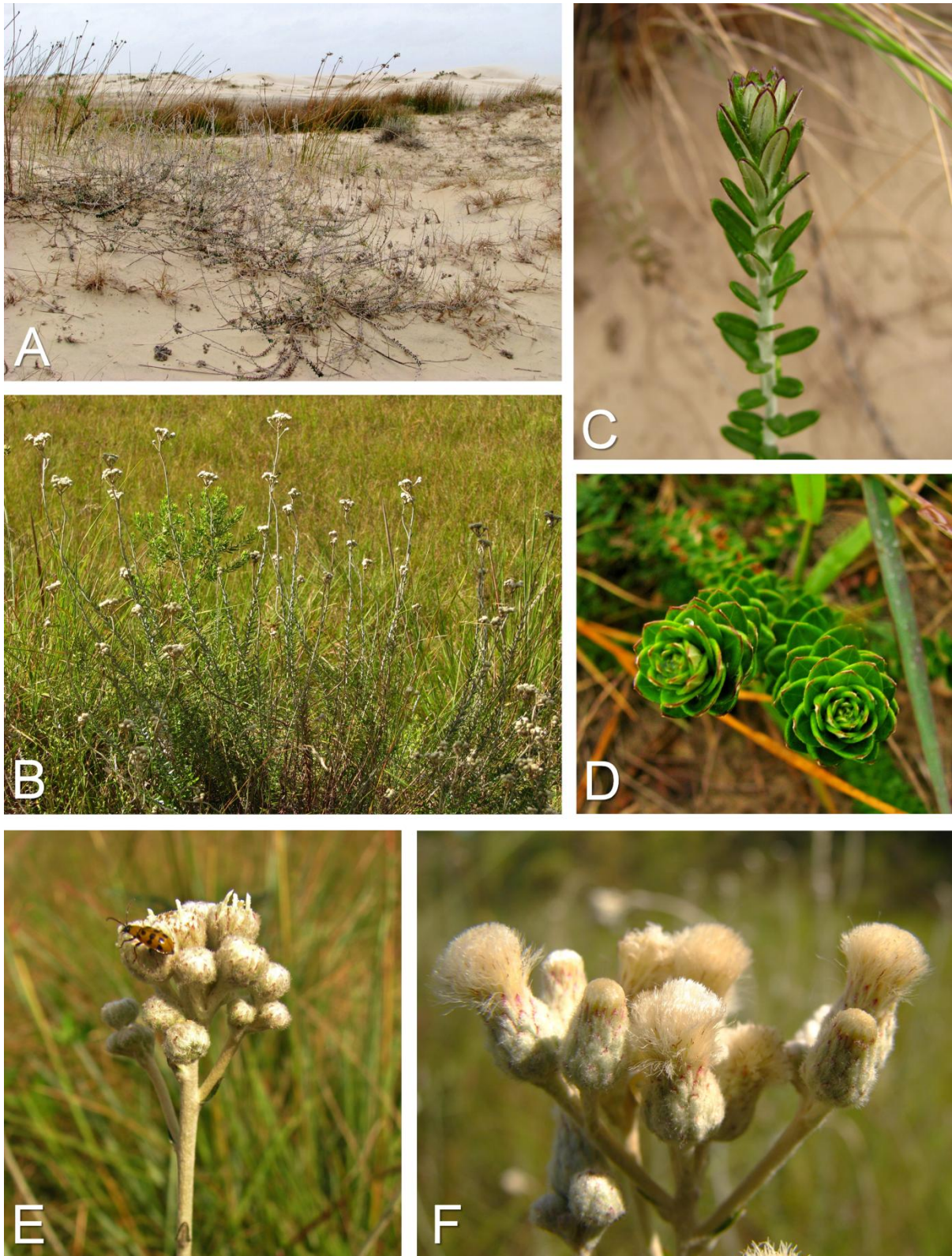


**Figure 16.** *Baccharis tarchonanthoides*. A. Habitat and habit in the high altitude tropical grasslands at Parque Nacional do Itatiaia, Itatiaia, Rio de Janeiro, Brazil. B. Habit in the tropical savannahs at Parque Estadual do Juquery, Franco da Rocha, São Paulo, Brazil. C. Female capitulescence. D. Male capitula. E. Female capitula. Photos by G. Heiden.





**Figure 17.** *Baccharis gnaphalioides*. A. Fertile shoot of pistillate plant. B. Leaves. C. Portion of tomentose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A, C, G–K: *Heiden 1051* (SPF). B (from left to right): *Klein 8801* (FLOR); *Falkenberg 6091* (MBM); *Hatschbach 41007* (MBM); *Heiden 1554* (SPF); *Lindeman s.n.* (ICN20750); *Mauhs s.n.* (PACA94156); *Rambo 46789* (PACA); *Normann 950* (ICN); *Rambo 28923* (PACA); *Heiden 1059* (SPF); *Heiden 1195* (SPF); *Heiden 1250* (SPF); *Krapovickas 3435* (LIL);. D–F: *Heiden 1189* (SPF). Illustration by João Iganci.



**Figure 18.** *Baccharis gnaphalioides*. A. Habitat and decumbent habit in coastal vegetation on sand dunes at Balneário Mostardense, Parque Nacional da Lagoa do Peixe, Mostardas, Rio Grande do Sul, Brazil. B. Habitat and erect habit in temperate lowland grasslands at Cerrito, Rio Grande do Sul, Brazil. C. and D. Shoots. E. Male capitulescence. F. Female capitulescence. Photos by G. Heiden.

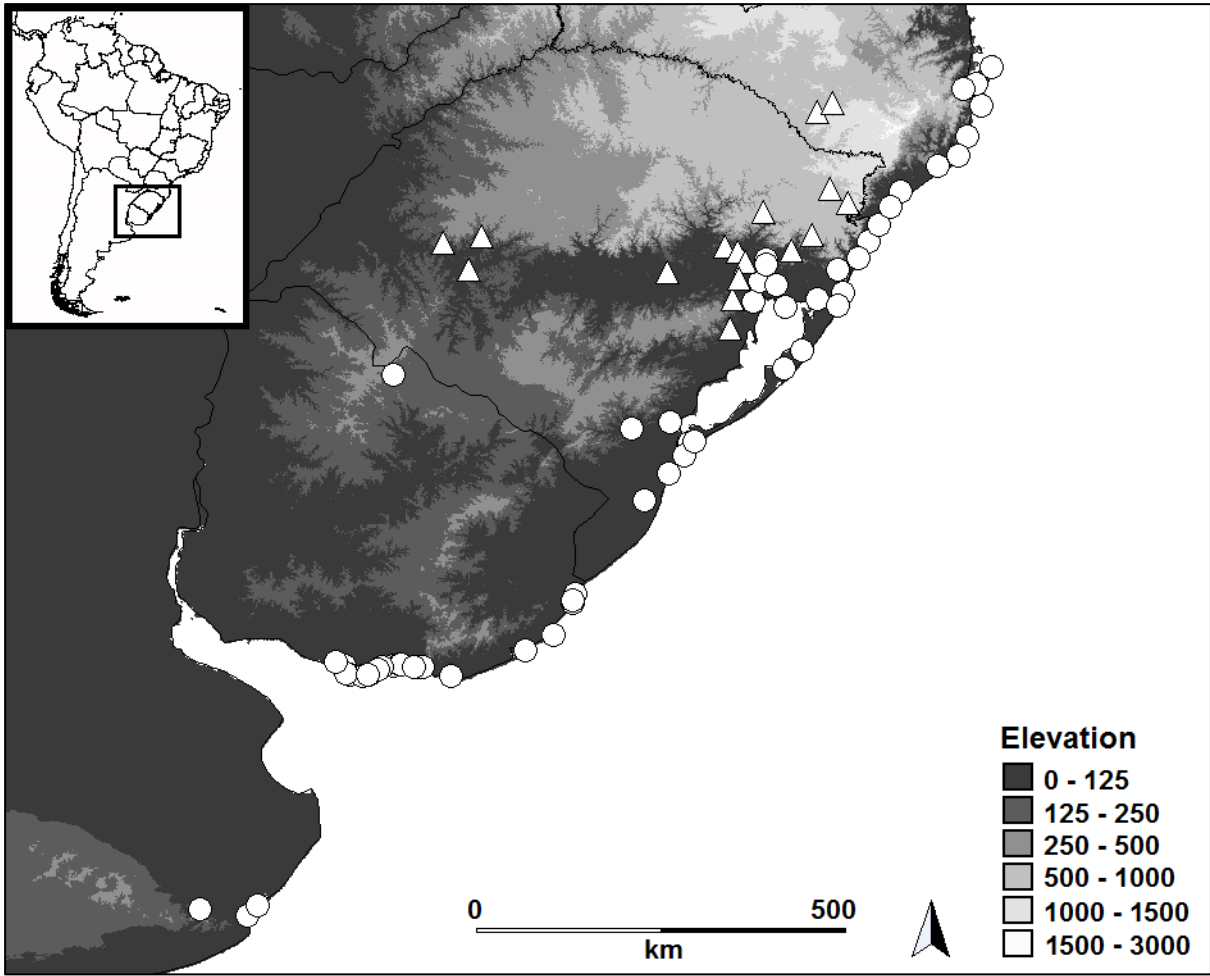
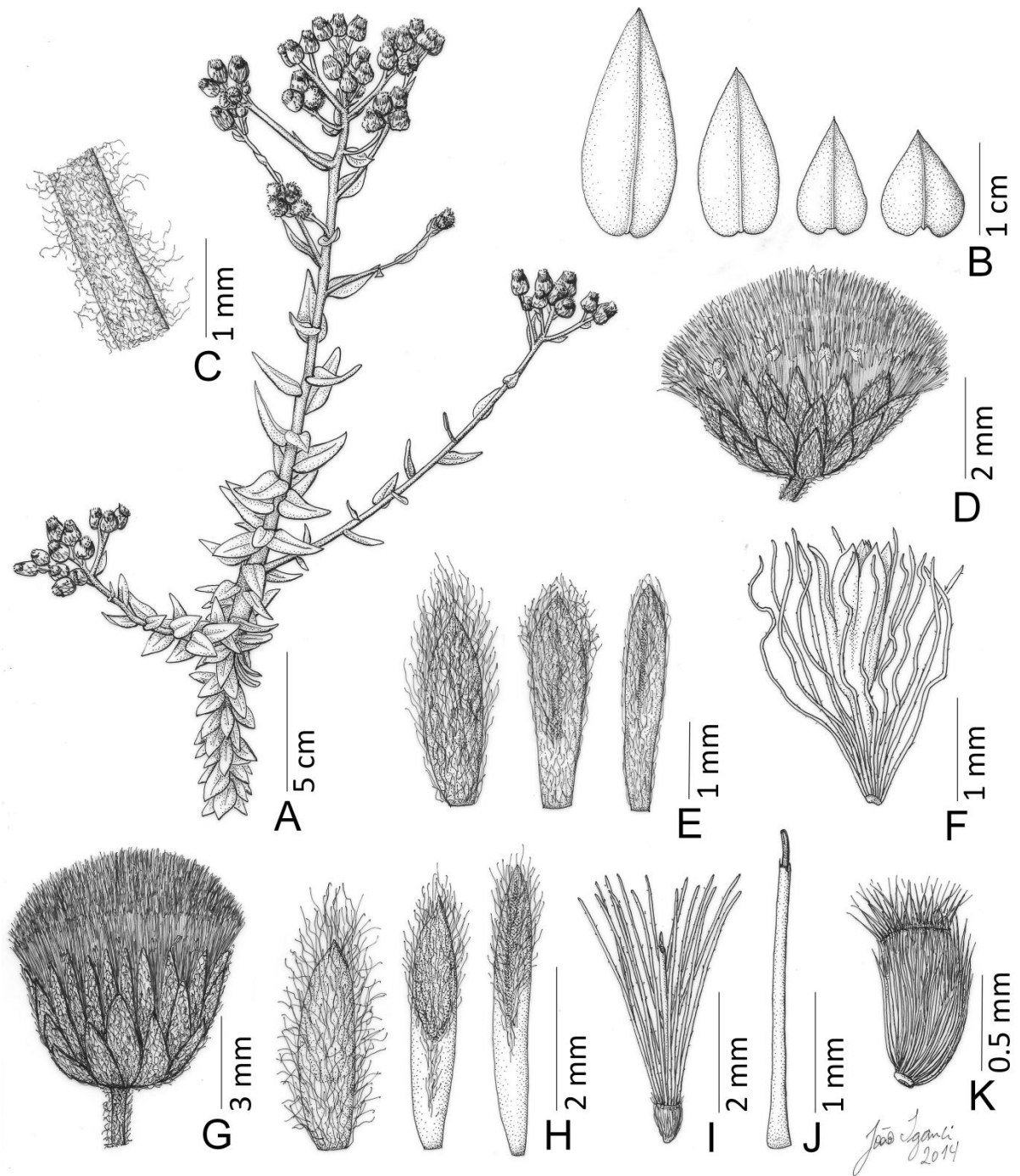


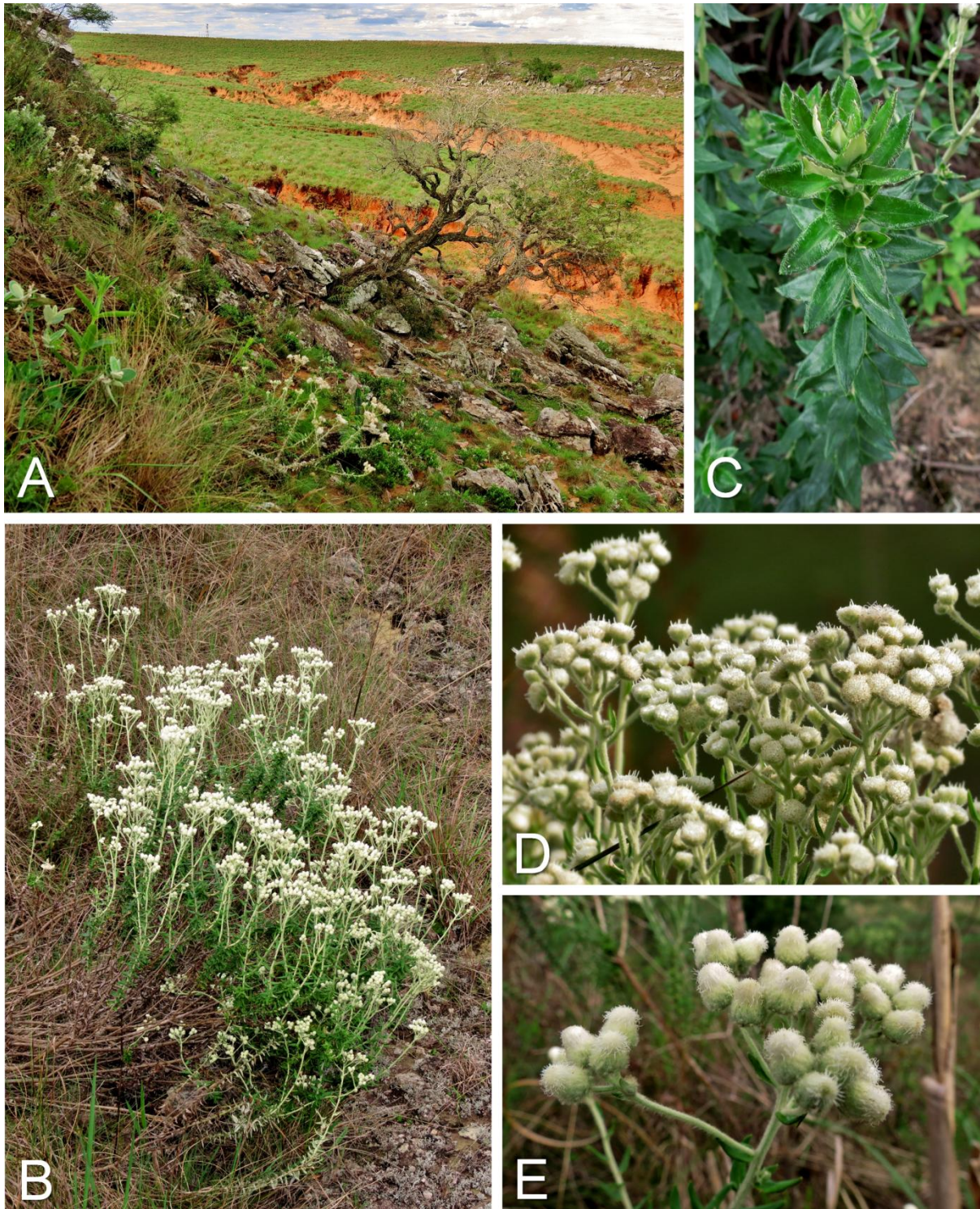
Figure 19. Distribution of *Baccharis gnaphalioides* (○) and *B. leucopappa* (△).





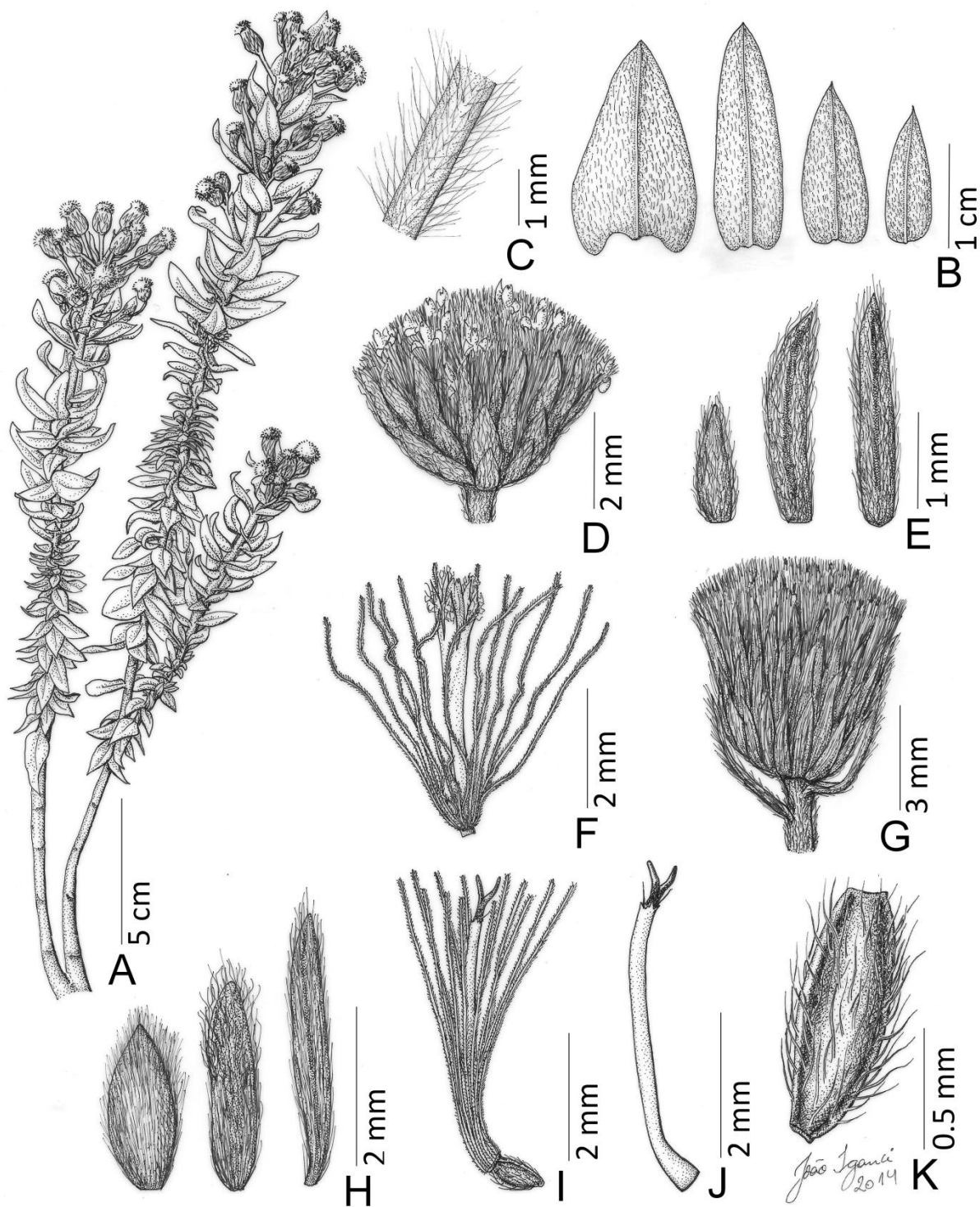
**Figure 20.** *Baccharis leucopappa*. A. Fertile shoot of pistillate plant. B. Leaves. C. Portion of villose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A, C, G–K: Heiden 1975 (SPF). B (from left to right): Heiden 2001 (SPF); Heiden 1975 (SPF); Heiden 2143 (SPF); Rambo 37696 (PACA). D–F: Heiden 1976 (SPF). Illustration by João Iganci.





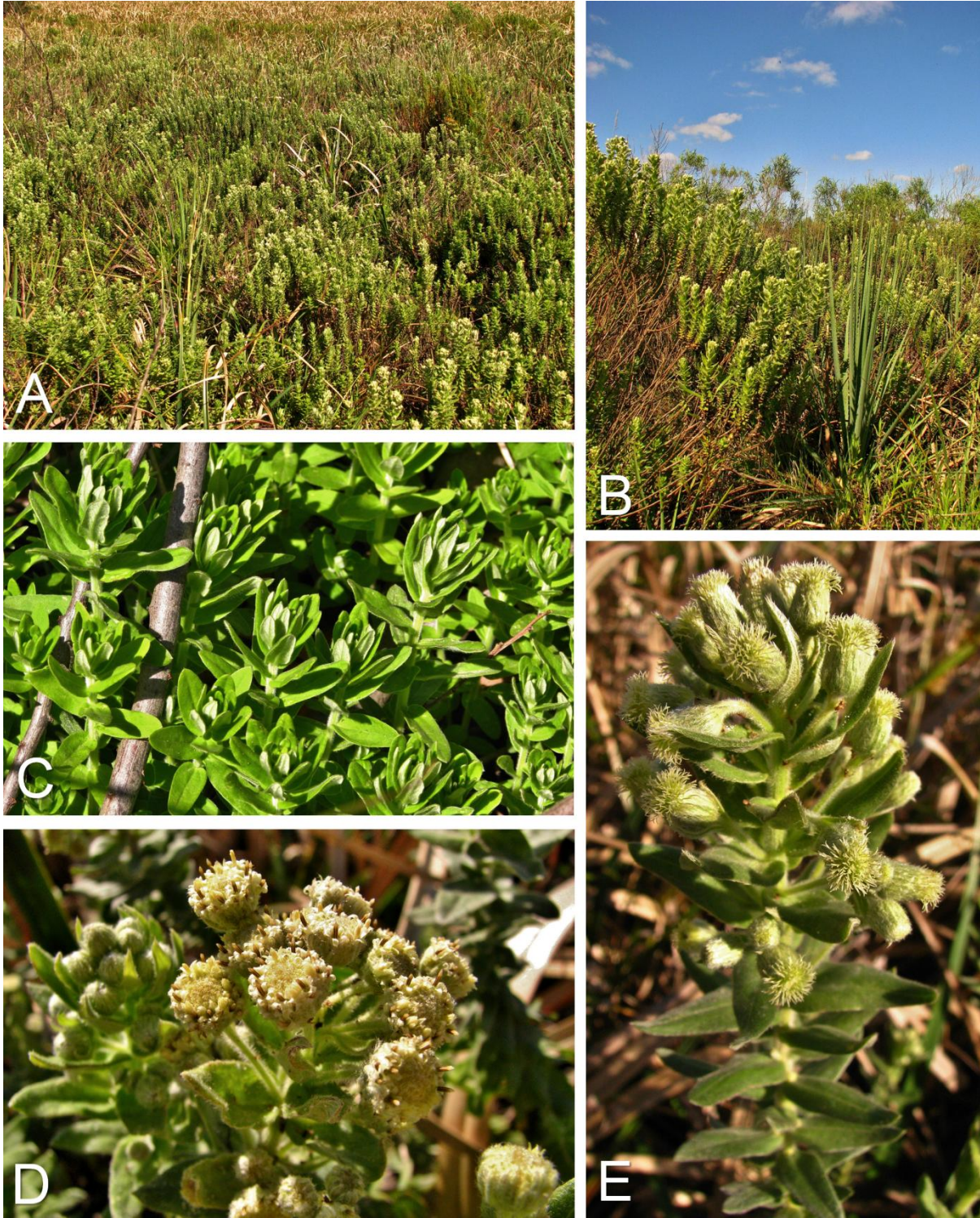
**Figure 21.** *Baccharis leucopappa*. A. Habitat and habit in sandstone and basaltic outcrops in the low altitude temperate grasslands at São Francisco de Assis, Rio Grande do Sul, Brazil. B. Habit. C. Shoot. D. Male capitulescences. E. Female capitulescence. Photos by G. Heiden.



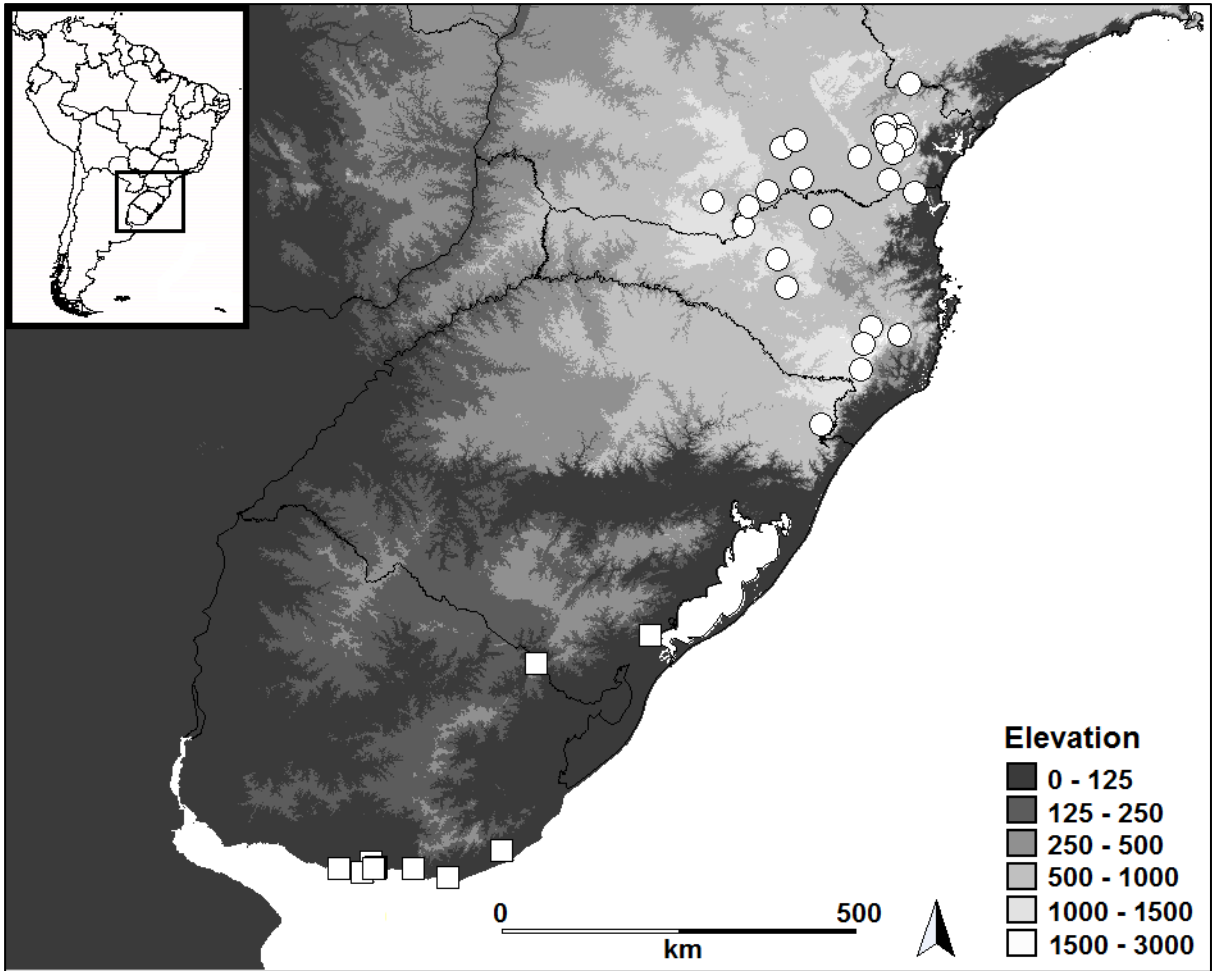


**Figure 22.** *Baccharis gibertii*. A. Fertile shoot of pistillate plant. B. Leaves. C. Portion of villose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsel. A, C, G–K: *Heiden 1760* (SPF). B (from left to right): *Maria 23* (PEL); *Berro 1772* (MVFA); *Heiden 1759* (SPF); *Arechavaleta 4104* (LP). D–F: *Heiden 1759*(SPF). Illustration by João Iganci.



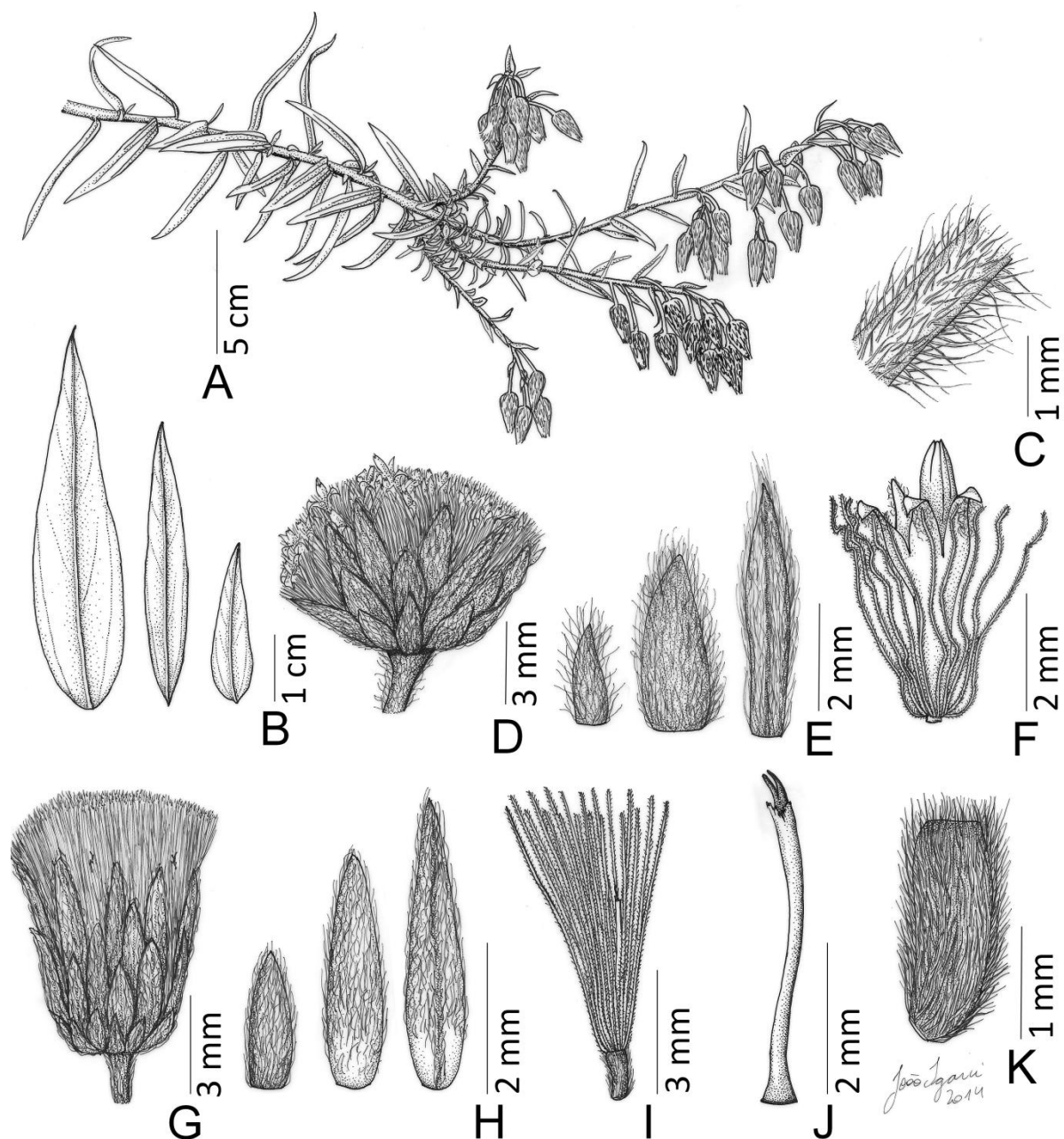


**Figure 23.** *Baccharis gibertii*. A. Habitat on a peat bog in the transitional zone of the temperate lowland grasslands and the maritime coastal vegetations at Balneario El Pinar, Ciudad de la Costa, Canelones, Uruguay. B. Habit. C. Shoots. D. Male capitulescence. E. Female capitulescence. Photos by G. Heiden.

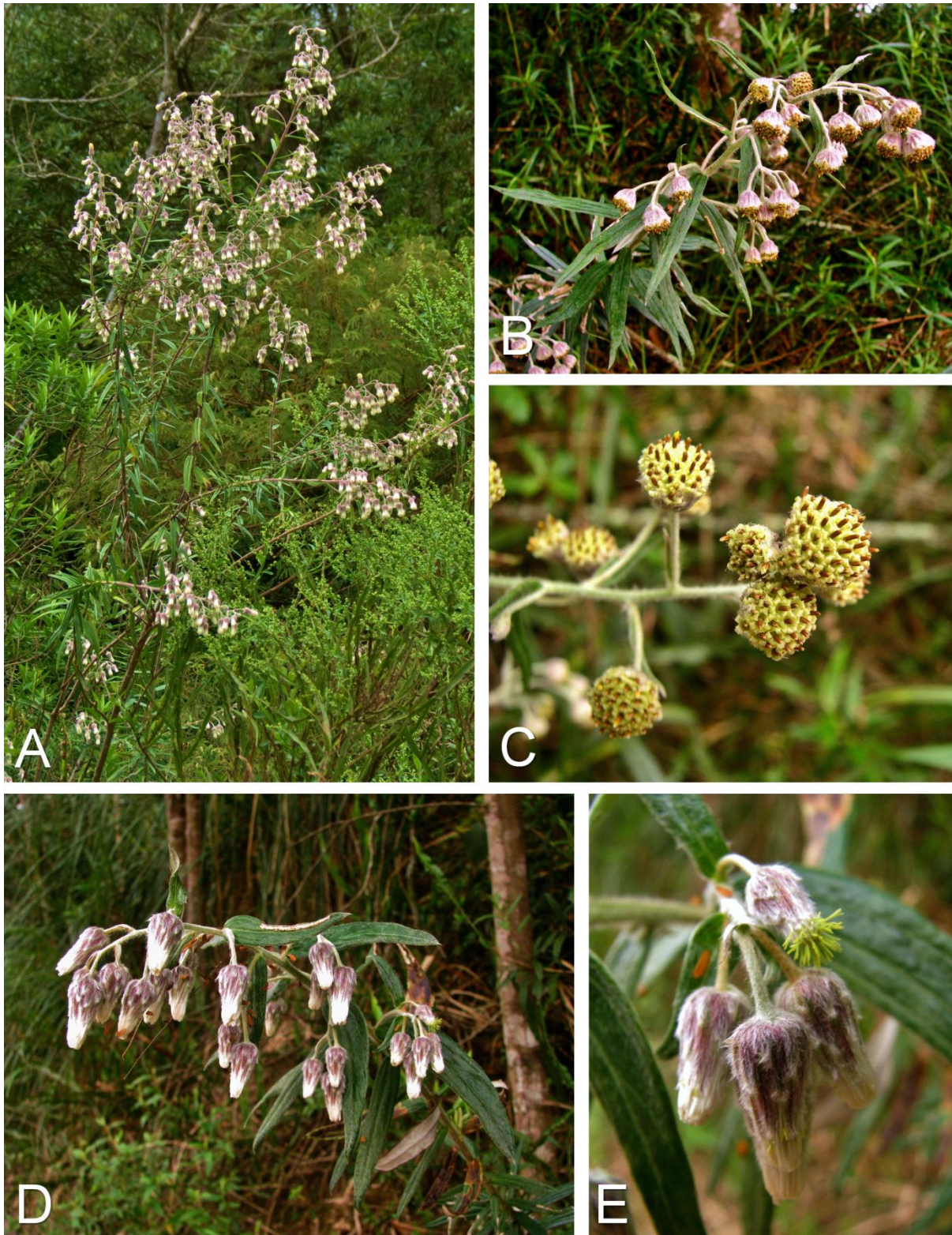


**Figure 24.** Distribution of *Baccharis gibertii* (□) and *B. leucocephala* (○).



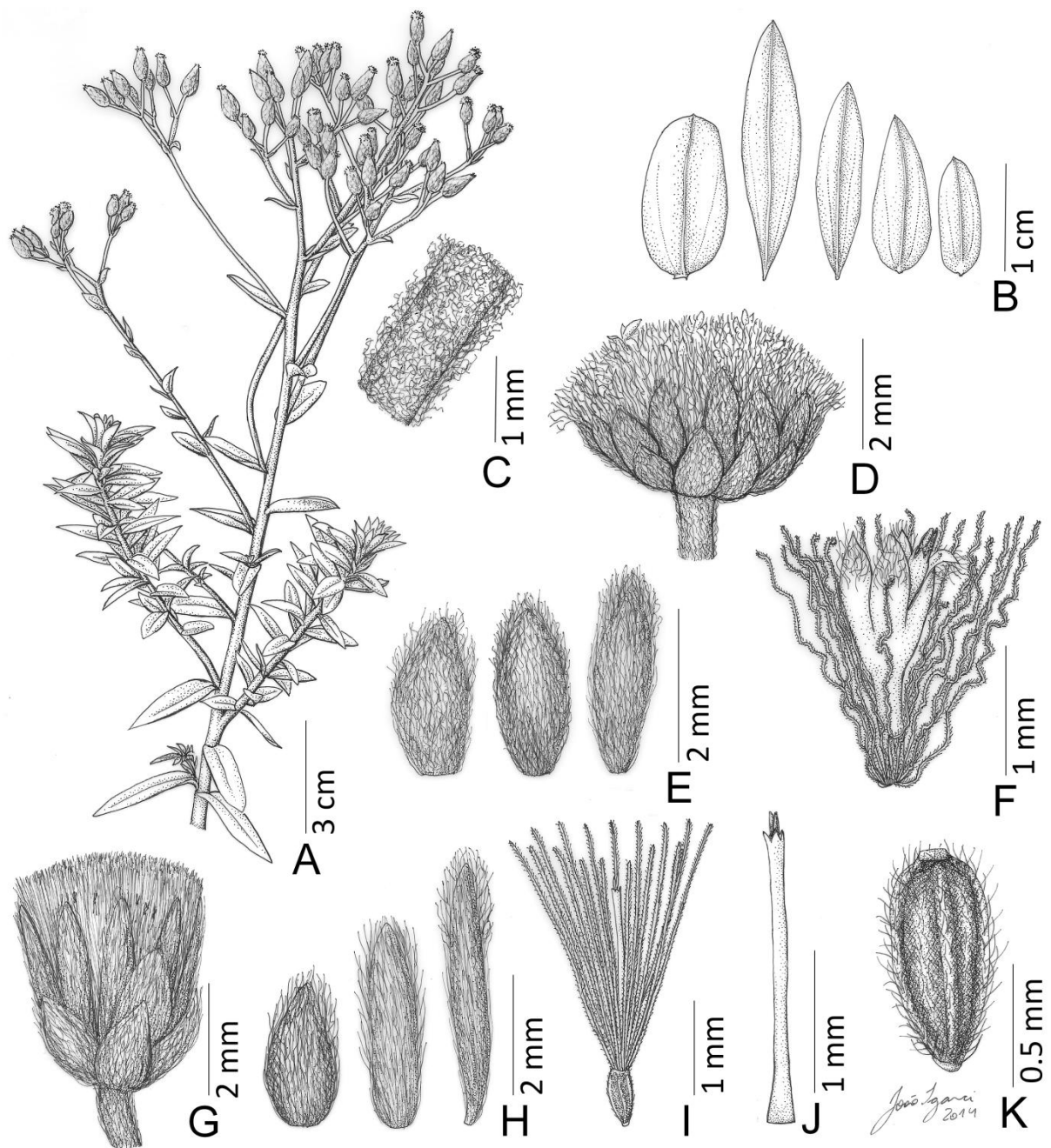


**Figure 25.** *Baccharis leucocephala*. A. Fertile shoot of pistillate plant. B. Leaves. C. Portion of villose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A, C, G–K: *Heiden 1787* (SPF). B (from left to right): *Heiden 1453* (SPF); *Heiden 1787* (MBM); *Rambo 54561* (PACA). D–F: *Heiden 1786* (SPF). Illustration by João Iganci.



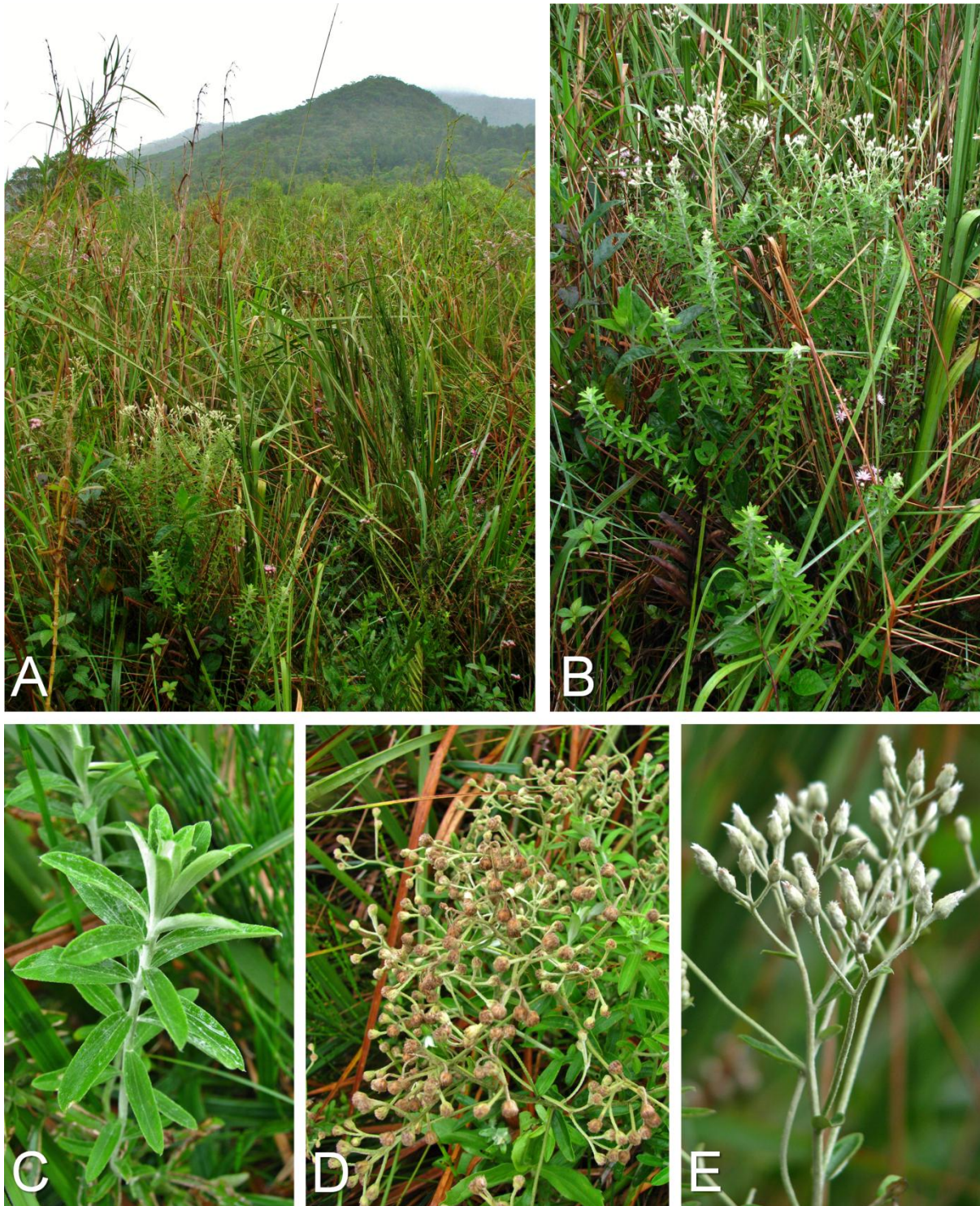
**Figure 26.** *Baccharis leucocephala*. A. Habitat and habit on the forest edges of Ombrophilous Mixed forest at Santa Bárbara, Parque Nacional de São Joaquim, Urubici, Santa Catarina, Brazil. B. Male capitulescence. C. Male capitula. D. Female capitulescence. E. Female capitula. Photos by G. Heiden.



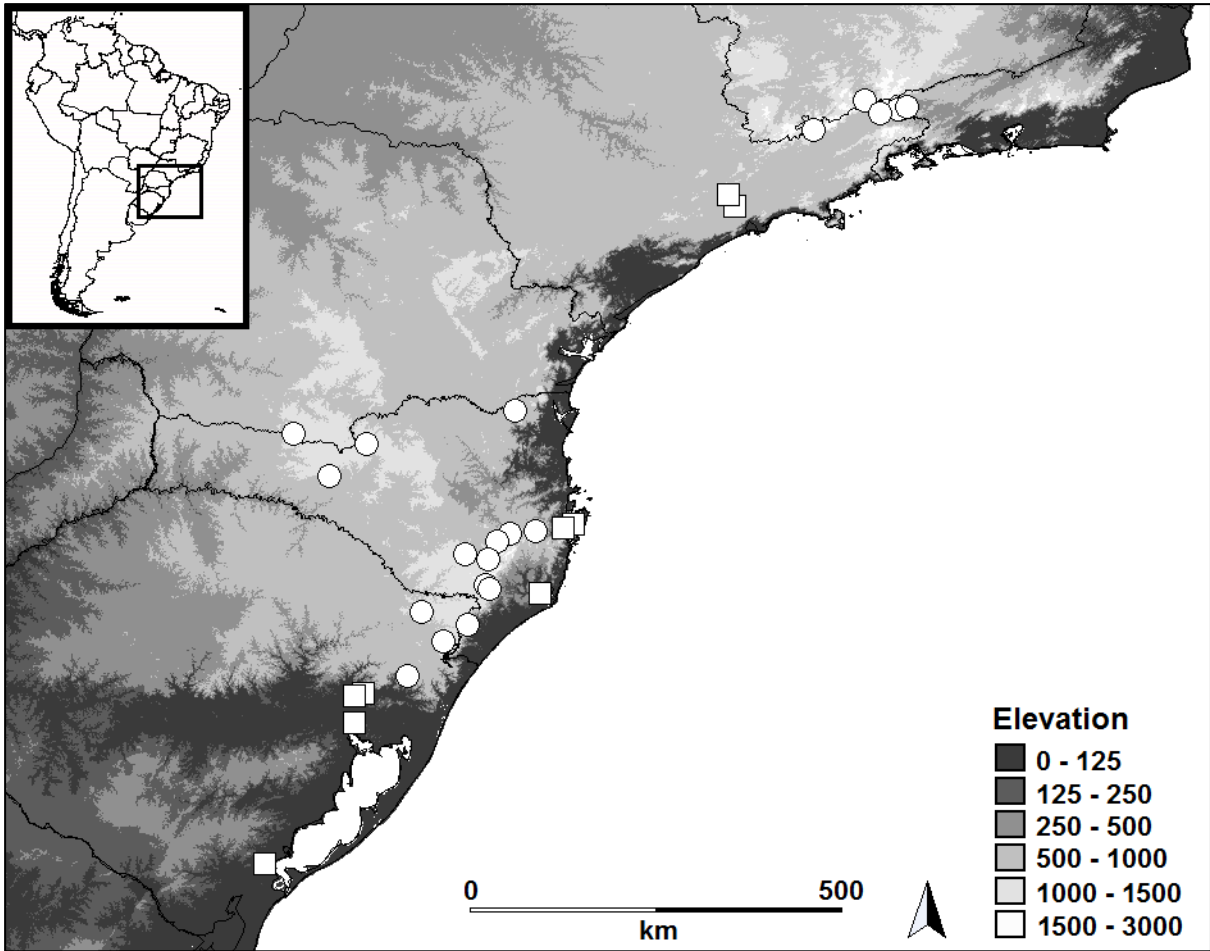


**Figure 27.** *Baccharis uleana*. A. Fertile shoot of pistillate plant. B. Leaves. C. Portion of tomentose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A, C, G–K: *Heiden 1813* (SPF). B (from left to right): *Heiden 1812* (SPF); *Brade 6639* (SP); *Klein 5908* (FLOR); *Rambo 2310* (PACA); *Ule 1510* (F). D–F: *Heiden 1812* (SPF). Illustration by João Iganci.



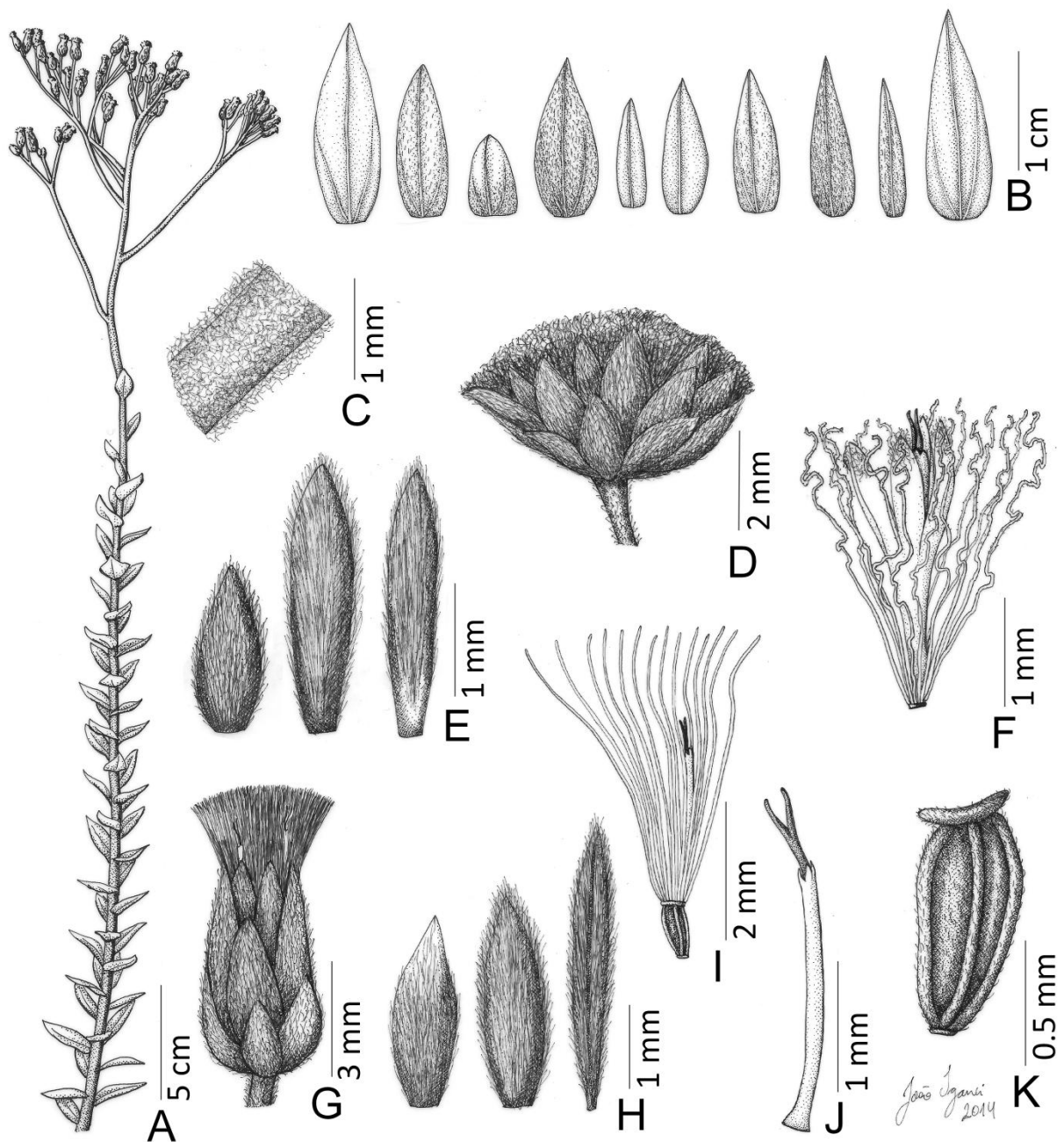


**Figure 28.** *Baccharis uleana*. A. Habitat and habit on acid swamps, in the transitional zone of the coastal scrubs with the lowland Ombrophilous Dense Forest at Massiambú, Palhoça, Santa Catarina, Brazil. B. Habit. C. Shoot. D. Male capitulescence. E. Female capitulescence. Photos by G. Heiden.

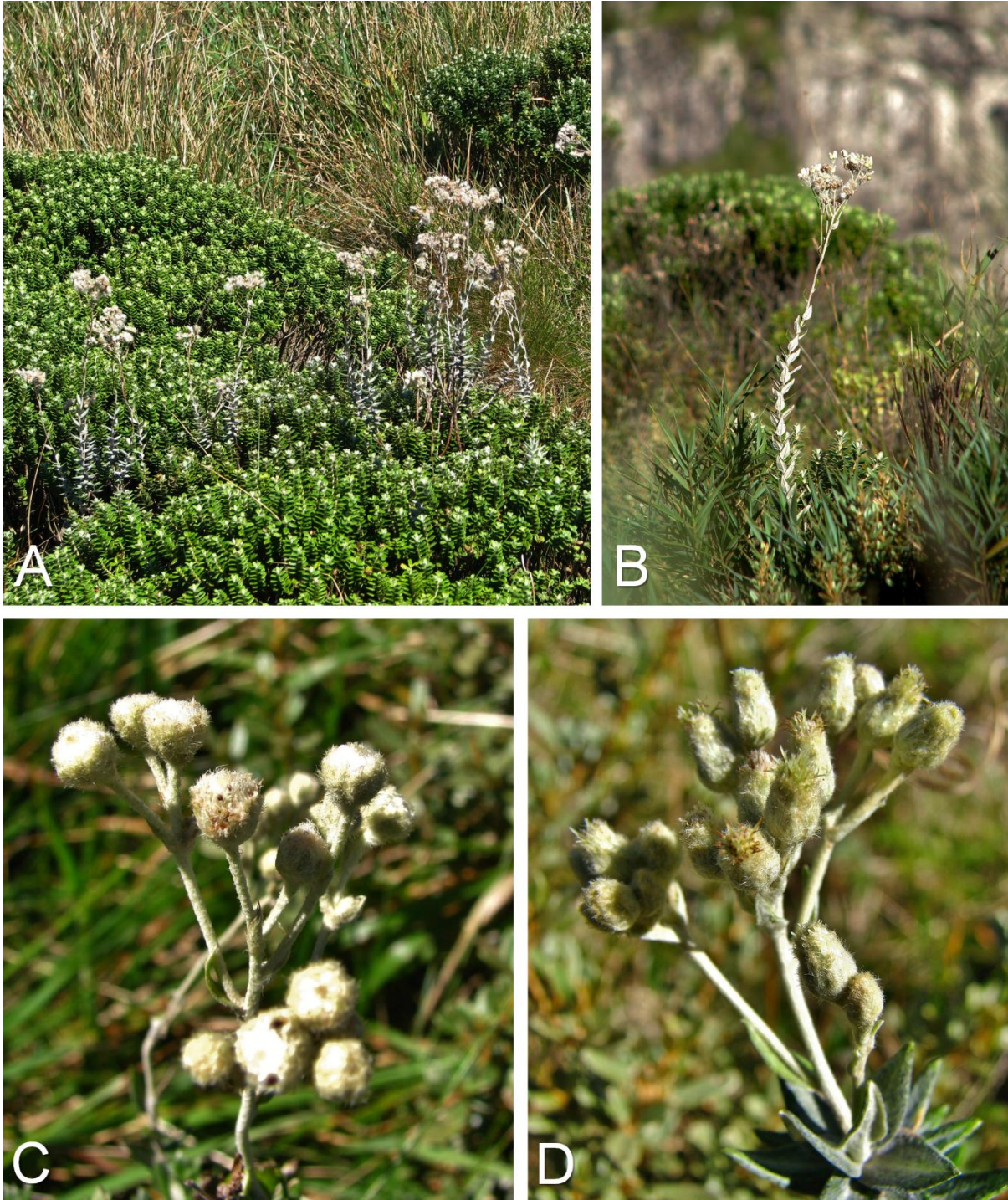


**Figure 29.** Distribution of *Baccharis uleana* (□) and *B. phyllicifolia* (○).



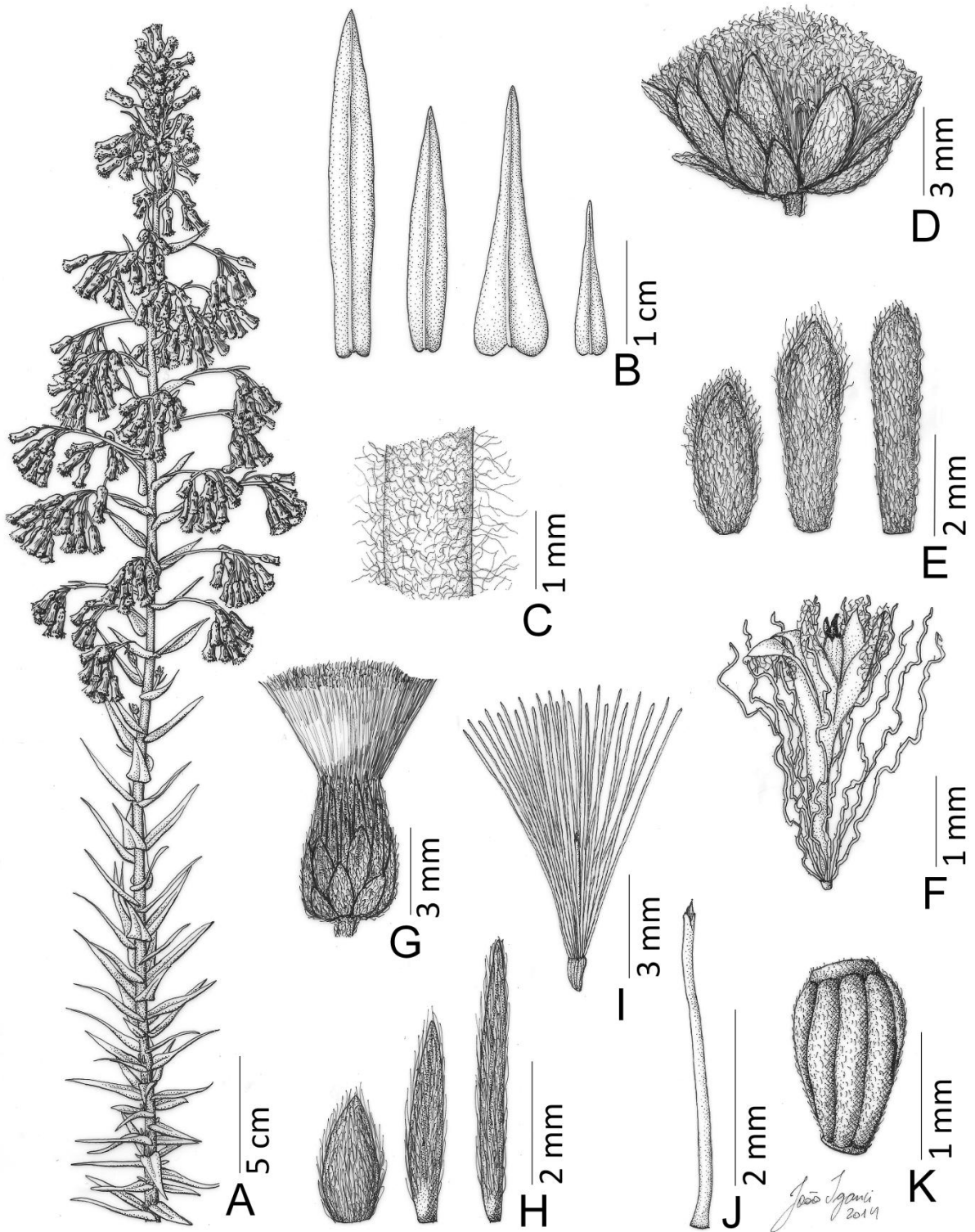


**Figure 30.** *Baccharis phlycifolia*. A. Fertile shoot of pistillate plant. B. Leaves. C. Portion of tomentose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A, C, G–K: *Heiden 1333* (SPF). B (from left to right): *Heiden 999* (RB); *Meireles 2402* (RB); *Heiden 1582* (SPF); *Heiden 1528* (SPF); *Sobral 8815* (ICN); *Sehnem 4244* (PACA); *Heiden 1989* (SPF); *Heiden 1333* (SPF); *Silveira 9178* (HAS); *Schneider 1230* (SPF). D–F: *Heiden 1332* (SPF). Illustration by João Iganci.

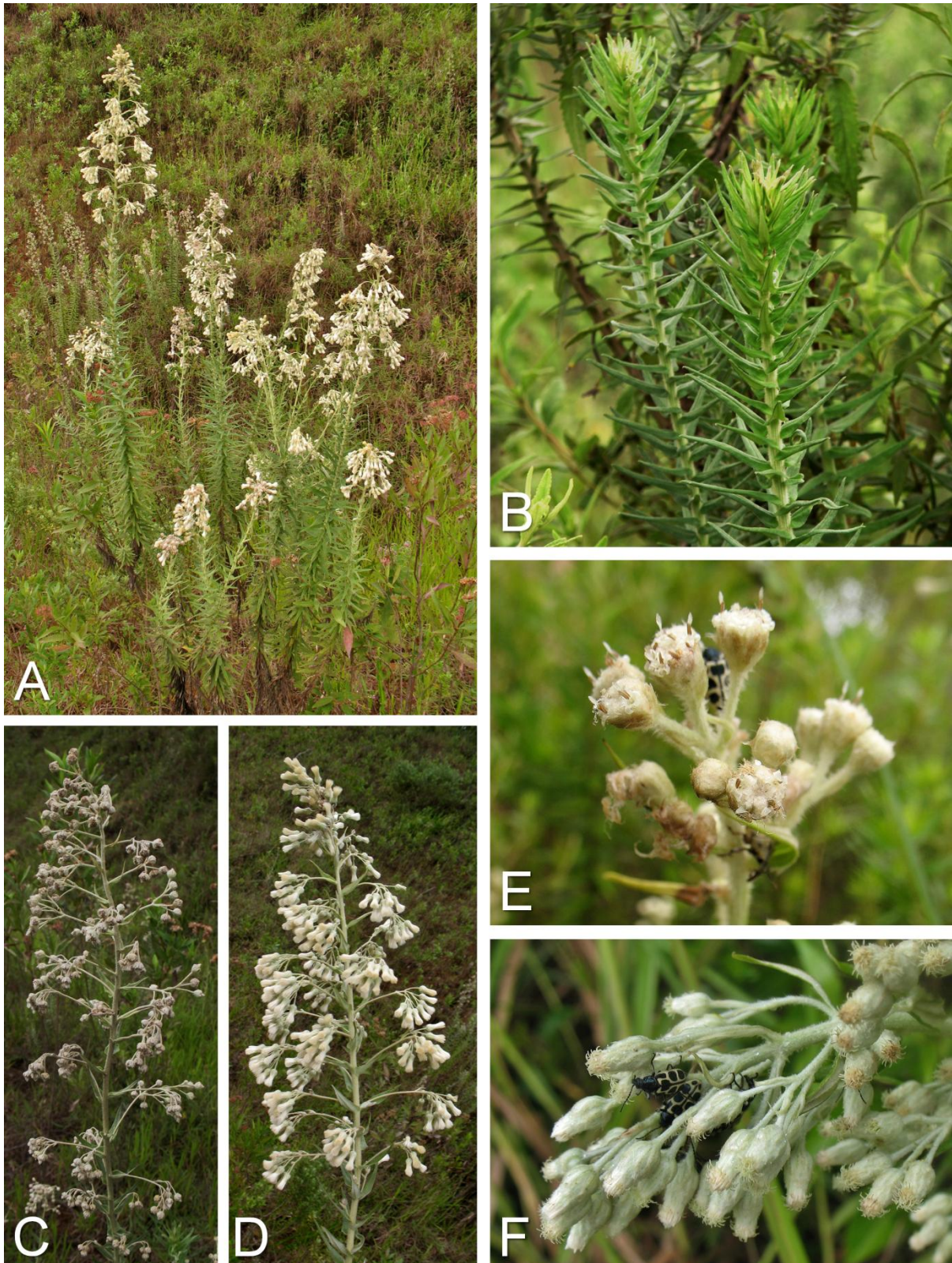


**Figure 31.** *Baccharis phyllicifolia*. A. and B. Habitat and habit on moist highland subtropical grasslands at Morro da Igreja, Parque Nacional de São Joaquim, Urubici, Santa Catarina, Brazil. C. Male capitulescence. D. Female capitulescence. Photos by G. Heiden.





**Figure 32.** *Baccharis helichrysoides*. A. Fertile shoot of pistillate plant. B. Leaves. C. Portion of villose peduncle. D. Male capitulum. E. Phyllaries of male capitulum (outer to inner). F. Male floret. G. Female capitulum. H. Phyllaries of female capitulum (outer to inner). I. Female floret. J. Corolla and style of female floret. K. Cypsela. A, C, G–K: *Heiden 1619* (SPF). B (from left to right): *Brade 14567* (RB); *Heiden 1691* (SPF); *Heiden 1619* (MBM); *Hassler 10240a* (LIL). D–F: *Heiden 1620* (SPF). Illustration by João Iganci.



**Figure 33.** *Baccharis helichrysoides*. A. Habitat on roadside vegetation in an area under influence of the tropical savannahs at Parque Nacional da Serra do Cipó, Jaboticatubas, Minas Gerais, Brazil. B. Shoots. C. Male capitulescence. D. Female capitulescence. E. Male capitula. F. Female capitula. Photos by G. Heiden.



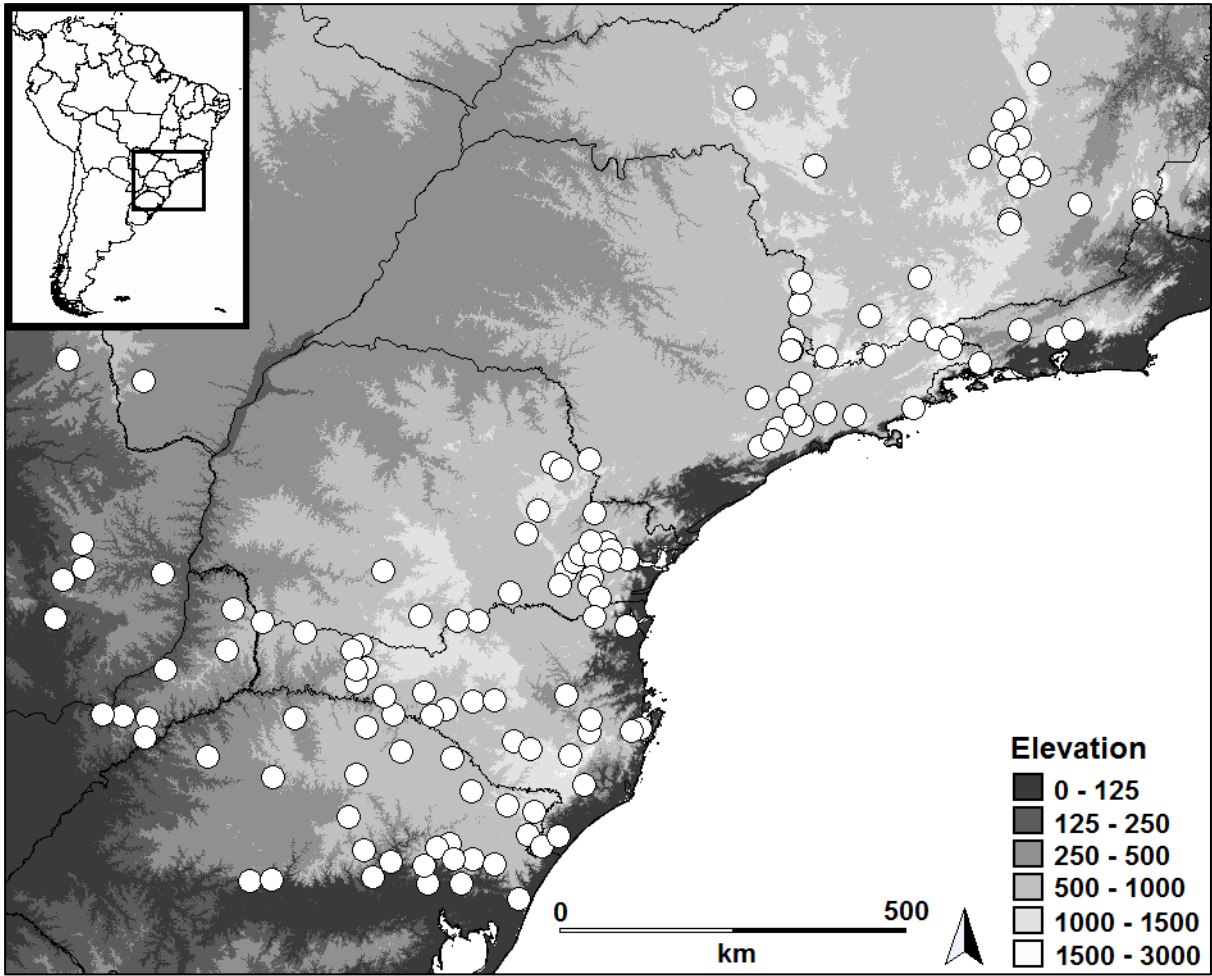


Figure 34. Distribution of *Baccharis helichrysoides* (O).





## CONCLUSIONS



## CONCLUSIONS

The retrieved phylogenetic hypothesis for *Baccharis* based on four molecular regions (ETS, ITS, *trnH-psbA*, *trnL-F*) and Bayesian analyses confirms subtribe Baccharidinae as a monogeneric group, and support a wide definition of *Baccharis s.l.*, monophyletic and including all genera previously segregated from it.

A comprehensive revision of formerly published infrageneric taxa and taxa accepted at species level, allied with the results of the phylogenetic analyses, constitutes the first attempt to move towards a phylogeny-based infrageneric classification of *Baccharis*. Seven main lineages were recovered and treated at subgeneric level, and all the subgenera recognized before had to be recircumscribed in order to be monophyletic groups. Three of these subgenera roughly match previous subgeneric concepts while two of them are synonyms. Two earlier segregated genera and two formerly existing sections were moved to the subgeneric rank. The survey of names published in the ranks of sections and series accounted 68 sections and 13 series. Four new sections had to be described and three new statuses had to be transferred to the rank of section to accommodate taxa not corresponding to any previously described sections, while 22 sections were considered synonyms resulting in the recognition of 47 sections. The list of names accepted at species level totalized 433 taxa that were assigned to the most inclusive infrageneric category possible in the light of the data currently available.

The first attempt to prepare a modern taxonomic revision of a subgenus of *Baccharis* according to a phylogenetic framework and under no geographic constraint was made through the study of *Baccharis* subgen. *Tarchonanthoides*. This subgenus was initially the target of a synopsis disentangling the main nomenclatural and taxonomic problems, with the proposition of a new combination and designation of lectotypes to keep the stability of the names. Secondly, two new combinations were provided to species belonging to the subgenus, but not described originally in *Baccharis*, and finally the recircumscription of *B.* subgen. *Tarchonanthoides* based on phylogenetic grounds was proposed, demanding the synonymization of *Lanugothamnus*, and the exclusion of one section in order to keep the subgenus monophyletic. Other taxonomic changes resulted from the accomplished taxonomic revision as new synonyms were proposed and the application of long term misapplied names was corrected. The taxonomic revision deal with 13 accepted species within the subgenus, which has a history of diversification mainly in open vegetations from southeastern South America in Brazil, Paraguay, Uruguay and Argentina.

Exploratory field work allied to study of herbarium specimens allowed the recognition of eight new species of *Baccharis*, belonging to five of the seven main lineages recognized within the genus. The new species found confirm that much of the biodiversity of the group is still cryptic, and uncover how critical it is to understand the systematics and evolution of the genus.

Since *Baccharis* is monophyletic in its broader sense, it is confirmed that building a strong infrageneric classification scheme is critical to achieve advances in the knowledge of infrageneric and interspecific evolutionary relationships within the genus. The first overall scheme of infrageneric classification for *Baccharis* will allow the taxonomic revision of smaller monophyletic groups. The compilation of accepted names and its positioning within an infrageneric framework of classification will enable recognition of undersampled lineages and taxa of unclear relationships to be target of subsequent investigations.

A more comprehensive tree allowing a completely phylogeny-based classification of *Baccharis* will be achieved after a sampling focusing on the missing type species of already described generic segregates and infrageneric taxa, and on the several species unplaced at subgeneric levels. The current recognition of seven monophyletic lineages at the rank of subgenus and of 47 groups at the rank of section will help to access the taxonomic revision of clades within *Baccharis*, but it is also expected that the number of sections recognized will decrease as the knowledge of the whole group proceeds. The availability of the first big picture phylogeny for this megadiverse Neotropical genus unveils the possibility to investigate hypothesis of evolution of characters, and to explore the biogeographical information hidden within the evolutionary history of the largest genus of tribe Astereae in forthcoming works.

# APPENDICES

## **Eight new species of *Baccharis* (Asteraceae: Astereae)**



## APPENDIX 1

**A new dwarf shrubby species of *Baccharis* subg. *Baccharis*  
(Asteraceae, Astereae) from southeastern Brazil**





**A new dwarf shrubby species of *Baccharis* subgen. *Baccharis* (Asteraceae, Astereae) from southeastern Brazil**

GUSTAVO HEIDEN<sup>1</sup> AND LEONARDO DIAS MEIRELES<sup>2</sup>

<sup>1</sup>Herbário da Embrapa Clima Temperado, Embrapa Clima Temperado, BR 392, Km 78, Caixa Postal 403, 96001-970, Pelotas, RS, Brazil; e-mail: [gustavo.heidem@gmail.com](mailto:gustavo.heidem@gmail.com)

<sup>2</sup>Programa de Pós-Graduação em Biologia Vegetal, Departamento de Biologia Vegetal, Universidade Estadual de Campinas, Caixa Postal 6109, Campinas, São Paulo, 13083-970, Brazil; e-mail: [ldmeireles@yahoo.com.br](mailto:ldmeireles@yahoo.com.br)



**Abstract.** *Baccharis dichotoma*, a new dwarf shrub, small-leaved and few-headed species of high-altitude grasslands from southeastern Brazil, is described, illustrated and assigned to subgenus *Baccharis*.

**Key Words.** Atlantic rainforest biome, campos de altitude, Compositae, conservation, high altitude grasslands, taxonomy.

**Resumo.** *Baccharis dichotoma*, uma nova espécie nanofanerófita, com folhas diminutas e com poucos capítulos, de campos de altitude do sudeste do Brasil, é descrita, ilustrada e posicionada no subgênero *Baccharis*.



*Baccharis* is a neotropical genus comprising about 360 species (Nesom & Robinson, 2006), originally distributed exclusively in the Americas, from southern Canada to southern South America (Fielding, 2001; Giuliano, 2005). The most important centers of species richness are the Andes from Colombia to central Chile and central Argentina and the mountains of southeastern Brazil, Uruguay and eastern Paraguay (Müller, 2006). The tufted indumentum of the leaves and stems, with adjoining basal cells of the trichomes, and the occurrence of dioecy are probably synapomorphic characters of *Baccharis* (Müller, 2006); however, reversions or derived conditions of these characteristics are found.

Since de Candolle (1836), *Baccharis* has never been revised taxonomically as a whole. The last worldwide compilation of accepted scientific names and synonyms was published by Malagarriga (1976). For Brazil, the last revisionary work of the genus was provided by Barroso (1976), comprising 125 species. Later, Oliveira et al. (2006) published a checklist with 146 accepted species.

The genus is represented in Brazil by species common in secondary vegetation and with a wide distribution to narrow and critically endangered endemics from mountain summit. Most *Baccharis* species are concentrated in the central and eastern regions, growing mainly in savannas (*cerrado*) and grasslands (*campos de altitude*, *campos rupestres* and *pampa*). The lack of specimens from undercollected areas of the country is still a constraint for progress of the taxonomy of the genus in Brazil.

The study of Brazilian species of *Baccharis* and the floristic and ecological studies on the upper montane vegetation of Serra Fina, the southernmost portion of the Serra da Mantiqueira range in southeast Brazil, resulted in the discovery of a remarkable dwarf-shrubby, small-leaved and few-headed species of *Baccharis*. This new species is described and illustrated and its affinities are discussed.

***Baccharis dichotoma*** Heiden & L.D.Meireles, **sp. nov.** Type: Brazil. Minas Gerais/São Paulo, Passa Quatro/Queluz, Serra Fina, Pedra da Mina, 2664-2792 m, 22°25'33.7"S, 44°50'31.8"W, 7 June 2007 (fl), ♂, L.D. Meireles 2400 (holotype RB; isotypes BHCB, HECT, JE, NY, UEC). (Fig.1).

Ad *Baccharidem* subg. *Baccharidem* *pertinens*, *B. pumilae* Joch.Müll. similis, sed ramis erectis rufescentibus (non procumbentibus viridibus), foliis obovatis vel spathulatis (non oblanceolatis), capitulis axillaribus subapicalibus (non terminalibus) differt.

Dioecious dwarf shrubs, 0.2–0.5 m tall. Stems erect, shoots with abortive apex, proliferating after flowering from subapical axils in dichotomous branches; young shoots reddish, resinous like leaves, with 5–7 basal and deciduous scale-like leaves; older shoots brownish or blackish, grooved or fissured, with petiole scars, resinous exudates along leaf scars; blackish trichomes emerging from bark grooves. Leaves spirally alternate, crowded at apex of branches, sessile; blades 0.9 – 1.5 cm long, 0.3 – 0.6 cm wide, fleshy, appearing coriaceous in dried material, obovate to spatulate, base cuneate, apex obtuse, margins entire, flat or slightly revolute, resinous, 1-veined; both surfaces appearing glabrous, but covered with small tufts of trichomes and solitary biseriate trichomes, abaxial surface with resinous dots, adaxial surface vernicous, strongly resinous. Capitula 1–2 per shoot apex, axillary, solitary, subapical, peduncles 1.3–3 mm long, with longitudinal slightly spiralled ribs. Male capitula 5–6.2 mm long, involucre 4–4.4 mm long, 3–4.3 mm wide, cylindrical to campanulate; phyllaries 4-5-seriate, outer and median ovate, inner linear to ovate, apex dentate, margins pale-yellow, narrowly scarious; clinanthium flat, glabrous, alveolate; paleae absent. Male florets 25–44; corolla 3–3.3 mm long., apex 5-lobed, tubular, tube 2.2–2.5 mm long, with sparse uniseriate trichomes in lower 2/3, slightly expanded and with several biseriate trichomes in apical 1/3, throat 0–0.2 mm long, cup-shaped, lobes 0.8–1 mm long, apex not revolute; anthers not exceeding corolla; styles 3.3–3.6 mm long., apex appearing rhomboidal by sweeping hairs of unequal size, slightly divided into connivent branches; sterile ovaries 0.7–1 mm long, light brown, nearly obconical, narrowed in proximal extremity, with 6–8 longitudinal ribs, sparse uniseriate trichomes near base and dense near apex; pappus 4–4.5 mm long, white, uniseriate, bristle apex dilated, with erect, shortly protruding cell ends. Female capitula integrally preserved not examined, involucre 3.7-5.2 mm long, 4.8–6.8mm wide, campanulate; phyllaries like those of male capitulum; clinanthium slightly convex, glabrous, alveolate, paleae absent. Female florets filiform; corollas 2.7–3.1 mm long, with 5 apical teeth, with sparse trichomes throughout length; styles 3–3.9 mm long., branches ca. 0.2 mm long. Cypselae 1.9–2.2 mm

long, 0.5–0.7 mm wide, light brown, cylindrical, narrowed at base, with 8–10 strong longitudinal ribs, without papillae, glabrous; pappus 3–3.6 mm long, white, slightly shorter than style, multiseriate, bristle apex dilated, with erect, shortly protruding cell ends, deciduous, not accrescent at maturity.

*Distribution & ecology.*—Restricted to southeast Brazil, at the limits between the states of Minas Gerais and São Paulo (Fig. 2). It occurs in the atlantic rainforest biome (*Bioma Mata Atlântica*) in tropical high-altitude grasslands (*campos de altitude*), endemic to the highest peaks, above 2660 m, of the Passa Quatro Alkaline Massif, at Serra Fina, part of the southernmost portion of the Serra da Matiqueira Range. It grows in direct sunlight, in sites with shallow soils among bare rock outcrops. During field works carried out along the high altitude grasslands of Serra Fina, only a few specimens have been found. Up to now *B. dichotoma* has not been found at similar altitudes on the nearest peaks of the Serra do Itatiaia, suggesting that the new species is a narrow endemic of the Serra Fina, a non-protected area.

*Conservation status.*—Anthropogenic pressures such as agriculture, accidental fires, camping activities, and tourist visitation in the high-altitude grasslands affect the upper montane vegetation of Serra Fina. Besides, some factors intrinsic to the species such as rarity, especially of mature female individuals, poor reproduction and the very restricted range, categorizes *B. dichotoma* as Critically Endangered: CR B1ab(i, ii, iii, v), 2ab(i, ii, iii, V), C2a(i, ii) following IUCN Categories and Criteria (IUCN, 2001).

*Phenology.*—Flowering and fruiting in June.

*Etymology.*—The epithet refers to the dichotomous branches.

**Additional specimens examined. BRAZIL. MINAS GERAIS/SÃO PAULO: Passa Quatro/Queluz,** Serra Fina, Pedra da Mina (Alto), 22°25'33.7"S, 44°50'31.8"W, 2664-2792 m, 7 June 2006, ♀, *Meireles* 2395 (BHCB, HECT-fragment, UEC), 7 June 2006, ♂, *Meireles et al.* 2412 (RB, UEC), Campo de Nifelina, 22 June 2007, ♂, *Meireles et al.* 3190 (BHCB, RB, UEC).

*Baccharis dichotoma* is assigned to *Baccharis* subg. *Baccharis* based on its male florets with pappus bristles dilated apically and style apex seemingly rhomboidal, bearing sweeping hairs of unequal size, female florets with 5-dentate corolla apex and glabrous cypselae with 8 to 10 ribs and

multiseriate deciduous pappus. *Baccharis dichotoma* differs sharply from all Brazilian species of the genus due to the succulent leaves and shoots terminating in solitary, axillary and subapical capitula, 1 or 2 per branch, with abortive shoot apex, proliferating after flowering from subapical axils in dichotomous branches, as well as the young shoots with scale-like deciduous leaves.

During field work, only one female specimen (*Meireles 2395*) was found. This specimen has the capitula not integrally preserved due its age, since most of the cypselae were still dispersed at time of collection, not allowing providing the number of female florets per capitulum. However, it was possible to describe some female characters from the persistent involucre, phyllaries and floral parts from some few detached florets.

Due the uniqueness of this species, it is not possible to indicate close relationships among the other ca. 150 species of *Baccharis* occurring in Brazilian territory. *Baccharis dichotoma* shares some characteristics with the allopatric *B. pumila* Joch.Müll., from the eastern slope of Serranía Sama at Bolivian Andes (Müller, 2006), such as older shoots brownish, grooved or fissured, leaf blades coriaceous and sessile, seemingly 1-veined, capitula borne solitary, female corolla with 5 obtuse apical teeth and cypselae with 8 to 10 strong ribs. However, according to Müller (2006), *B. pumila* is a procumbent shrub with creeping and rooting branches, green shoots, oblanceolate leaves, capitula solitary at the apices of short shoots and subtended by bracts transitional between phyllaries and reduced leaves, and male flowers with glabrous sterile ovary.

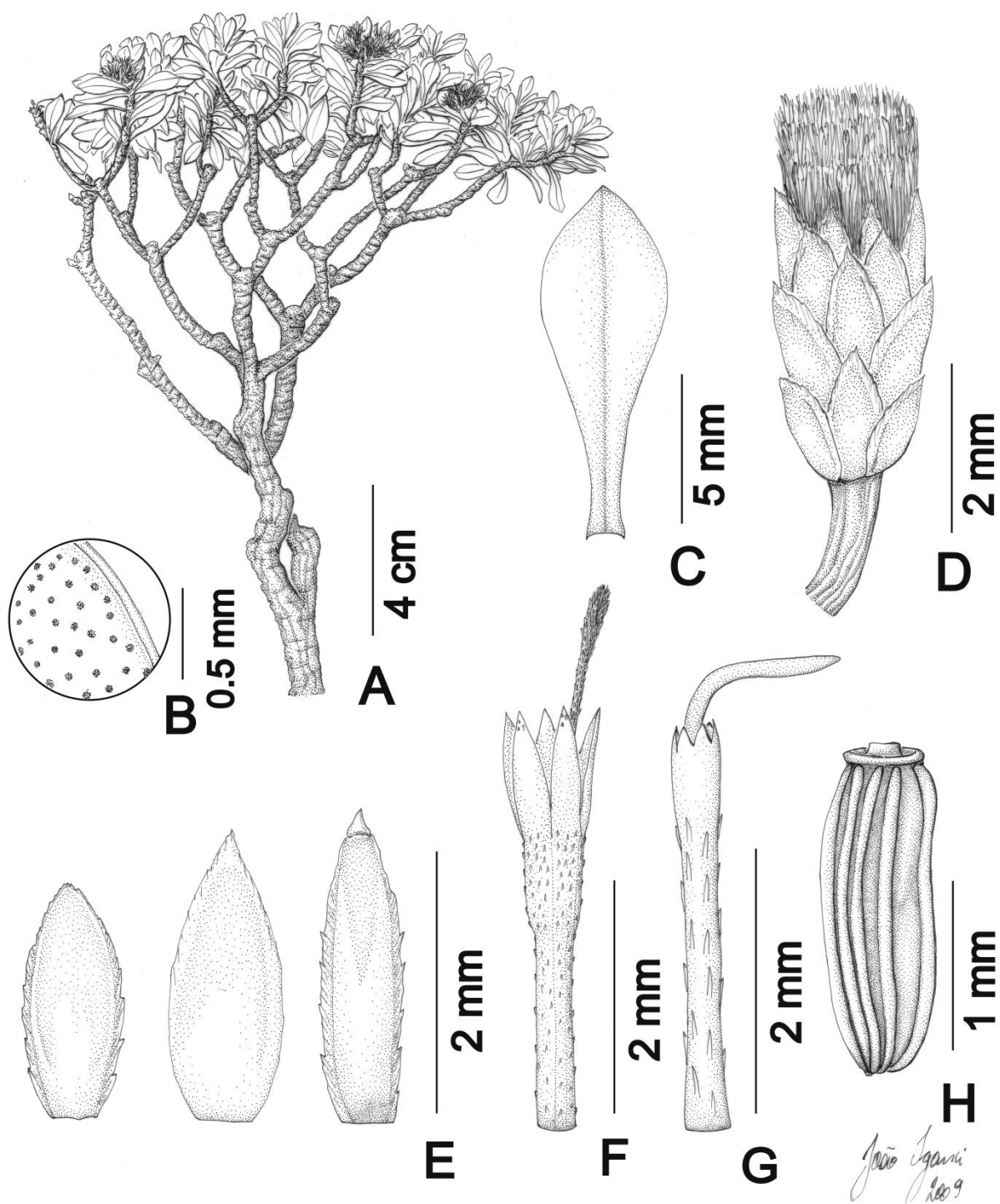
### **Acknowledgments**

The authors thank the curators of the herbaria HECT, RB and UEC for the support, João Iganci for the illustration and Lawrence Kelly, Jochen Müller, the journal latin editor, and an anonymous referee for their contributions on improving the article. The first author acknowledges the PROTAX/CNPq grant and the second author thanks FAPESP for the grant awarded (04/10110-9) and financial support (05/60862-0).

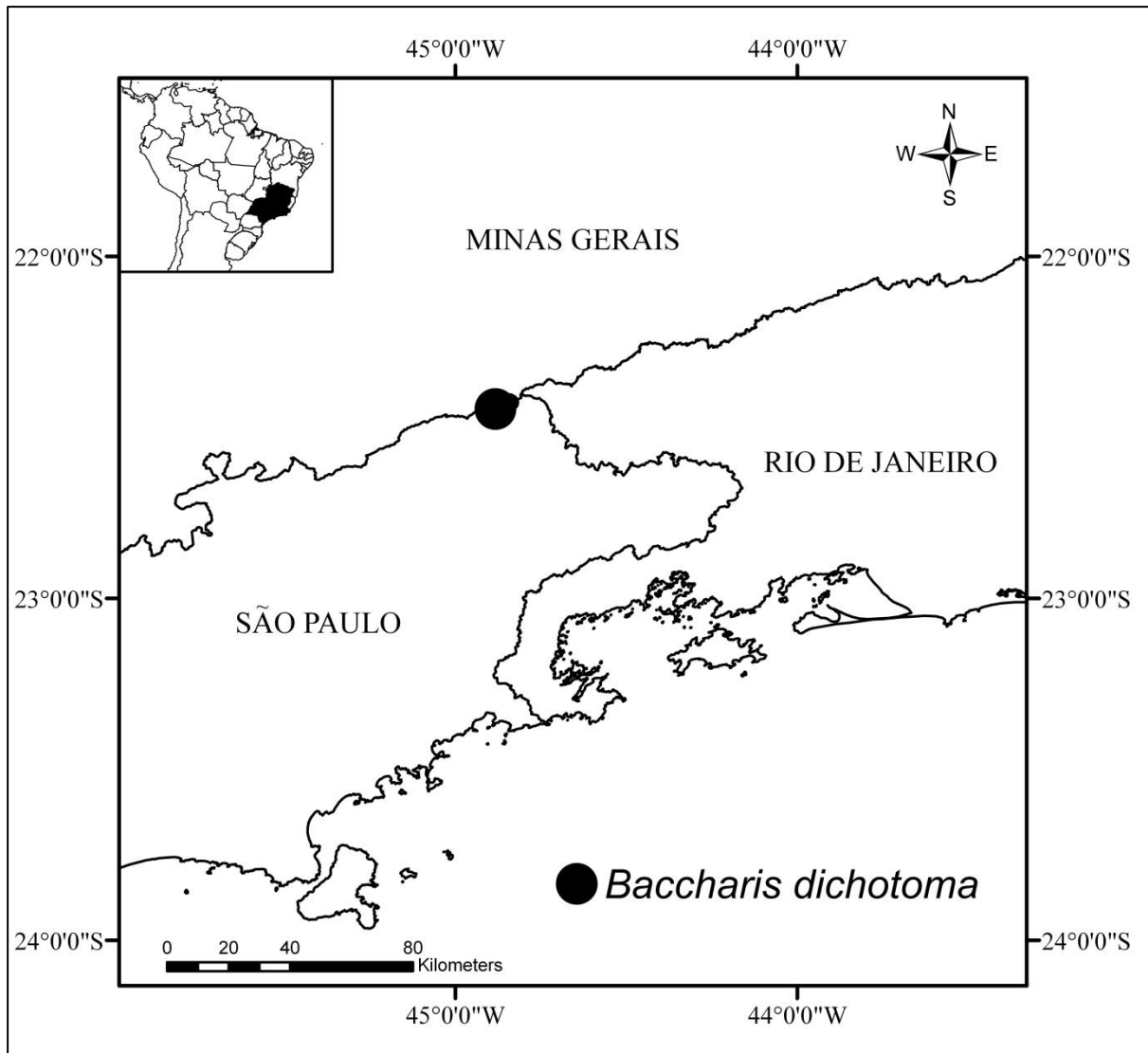


### Literature Cited

- Barroso, G. M.** 1976. Compositae – Subtribo Baccharidinae Hoffman. Estudo das espécies ocorrentes no Brasil. *Rodriguésia* 28: 3–273.
- de Candolle, A. P.** 1836. *Prodromus systematis naturalis regni vegetabilis* 5 – Sistens Calycereas et Compositarum tribus priores. Treuttel & Würtz, Paris.
- Fielding, R. R.** 2001. *Baccharis*: A genus of the Asteraceae new to Canada. *Proceedings of the Nova Scotian Institute of Science* 41: 214–215.
- Giuliano, D. A.** 2005. New infragenera in *Baccharis* (Asteraceae, Astereae). *Novon* 15(4): 534–541.
- IUCN.** 2001. IUCN Red List categories and criteria. Version 3.1. Prepared by the IUCN Species Survival Commission. IUCN, Gland, Switzerland, and Cambridge, United Kingdom.
- Malagarriga Heras, R. P.** [May-August 1976] 1977. Nomenclator Baccharidinarum omnium. *Memoria de la Sociedad de Ciencias Naturales La Salle* 37: 129–224.
- Müller, J.** 2006. Systematics of *Baccharis* (Compositae-Astereae) in Bolivia, including an overview of the genus. *Systematic Botany Monographs* 76: 1–341.
- Nesom, G. L. & H. Robinson.** [2006] 2007. XV. Tribe Astereae Cass. Vol. 8, pp. 284–342. In: Kadereit, J. W. & C. Jeffrey, vol. eds., *The families and genera of vascular plants* (K. Kubitzki - series ed.). Flowering plants: Eudicots: Asterales. Springer, Berlin, Heidelberg, New York.
- Oliveira, A. S., L. P. Deble, A. A. Schneider & J. N. C. Marchiori.** 2006. Checklist do gênero *Baccharis* L. para o Brasil (Asteraceae-Astereae). *Balduinia* 9: 17–27.



**FIG. 1.** *Baccharis dichotoma*. **A.** Habit. **B.** Detail of abaxial leaf surface. **C.** Leaf. **D.** Male capitulum. **E.** Phyllaries from male capitulum. **F.** Male floret (sterile ovary and pappus removed). **G.** Female corolla (ovary and pappus removed). **H.** Cypsela (A – F: drawn from *Meireles* 2400; G – H: *Meireles* 2395).



**FIG. 2.** Geographic distribution of *Baccharis dichotoma* Heiden & L.D.Meireles in Southeastern Brazil.



## APPENDIX 2

**A new species of *Baccharis* sect. *Caulopterae* DC. (Asteraceae)  
from the high altitude grasslands of Parque Nacional do Caparaó,  
southeastern Brazil**



**A new species of *Baccharis* sect. *Caulopterae* DC. (Asteraceae) from the high altitude grasslands of Parque Nacional do Caparaó, Southeastern Brazil**

**Gustavo Heiden**

Universidade de São Paulo, Rua do Matão, Travessa 14, 321, São Paulo, SP 05508-090, Brazil.

[gustavo.heiden@gmail.com](mailto:gustavo.heiden@gmail.com)

**Angelo Alberto Schneider**

Universidade Federal do Rio Grande do Sul, Av. Bento Gonçalves, 9500, Porto Alegre, RS 91501-

970, Brazil. [angeloschneider@yahoo.com.br](mailto:angeloschneider@yahoo.com.br)





**Abstract.** *Baccharis hemiptera* G. Heiden & A. A. Schneid., a new species of the high altitude grasslands from Parque Nacional do Caparaó, southeastern Brazil, is described, illustrated and assigned to *Baccharis* subgen. *Molina* (Pers.) Heering sect. *Caulopterae* DC. The new species is close to *B. glaziovii* Baker, from south-eastern and southern Brazil, and *B. subalata* Wedd., from the Bolivian and Peruvian Andes.

**Key-words.** Astereae, Baccharidinae, Compositae, Espírito Santo, Minas Gerais.

**Résumé.** *Baccharis hemiptera* G. Heiden & A. A. Schneid., une nouvelle espèce des prairies de haute altitude du Parc National du Caparaó, Sud-Est du Brésil, est décrite, illustrée et assignée à *Baccharis* subgen. *Molina* (Pers.) Heering sect. *Caulopterae* DC. La nouvelle espèce est comparée à *B. glaziovii* Baker, du Sud-Est et Sud du Brésil, et *B. subalata* Wedd., de la Bolivie et des Andes péruviennes.



## Introduction

*Baccharis* L. is a New World genus comprising approximately 338 species (MÜLLER, 2010), distributed from southern Canada to southern South America (FIELDING, 2001; GIULIANO, 2001). The tufted indumentum of the leaves and stems, with adjoining basal cells of the trichomes, and the occurrence of dioecy are probably synapomorphic characters of *Baccharis* (MÜLLER, 2006).

For Brazil, the last review work of the genus was provided by BARROSO (1976), encompassing 125 species. However, some species occurring in the country were not included in her work and several new taxa were described later. Nowadays, 150 species are recorded to Brazil, most of them concentrated in the central and eastern regions (HEIDEN & SCHNEIDER, 2010), growing mainly in savannas (*cerrado*) and grasslands (*campos de altitude*, *campos rupestres* and *pampas*).

*Baccharis* sect. *Caulopterae* DC. is represented by about 30 species restricted to South America and is characterized mainly by mostly winged stems, epaleaceous clinanthia densely covered with biseriate glandular hairs, generally papillose glabrous achenes, and pappus bristles of female flowers persistent, enlarged basally and fused into a ring (HEIDEN *et al.* 2009; HEIDEN & SCHNEIDER, 2010; MÜLLER, 2006, 2010).

Recent studies of Brazilian species of *Baccharis* sect. *Caulopterae* allowed the recognition of a distinct new species with winged stems, endemic to the Parque Nacional do Caparaó, Southeastern Brazil. This species is described, illustrated and its infrageneric position and affinities are discussed.

*Baccharis hemiptera* G. Heiden & A. A. Schneid., *sp. nov.* **Typus:** BRAZIL. Minas Gerais/Espírito Santo: Parque Nacional do Caparaó, 25.IX.1941, ♂, A. C. Brade 17017 (holotypus: RB; isotypus JE).

*Ad Baccharis* sect. *Caulopterae* DC. *pertinens*, *Baccharis glaziovii* Baker cui maxime proxima, sed ramis novellus et apicalibus 2-alatus (non 3-alatus), alis angustioribus (0.1 – 0.3 cm vs. 0.5 – 1.3 cm) et capitulis in inflorescentiae minoribus (1 – 3.5 longae X 0.8 – 1.9 cm latae vs. 7 – 17 cm longae X 3 – 7.5 cm latae) differt.

**Dioecious** erect shrub 0.5 – 1.5 m tall, resinous; shoots mostly ending in a capitulescence. **Stem** cylindrical, branches 2-winged in the most distal internodes of the shoot and in the recent shoots and 3-winged in the remaining internodes; wings of a single internode strikingly unequal, one wing 0.5 – 1.7 cm long, 0.1 – 0.3 cm wide, plane, mostly measuring the distance between only two nodes in 2-alate shoots, whereas in 3-alate shoots one wing run to the next node, the other wing reduced to a ca 0.1 cm wide rim; well developed wing proximally attenuate, distally rounded; wings of dried specimens without prominent vein reticulum, seemingly glabrous, indumentum tufted, of sparse biseriate trichomes, tufts appearing under magnification as small resinous dots. **Leaves** spirally alternate 1 – 2.9 cm long, 0.3 – 1.1 cm wide, sessile, narrowly elliptic to ovate, base rounded to cordate, apex attenuate to acute, margins entire, revolute; seeming 1-veined, but inconspicuous pinnate-veined; leaf texture papiraceous; indumentum like those of wings. **Panicles** pyramidal, 1 – 3.5

cm long, 0.8 – 1.9 cm wide, composed by racemes or isolated capitula derived from reduced racemes, capitula sessile to pedicellate, pedicels up to 4 mm long, bracts leafy, 0.3 – 0.5 cm long, 0.1 – 0.2 cm wide. **Male capitula** 4 – 5.5 mm long; involucre 3 – 3.5 mm long, 4 – 5 mm wide, cup-shaped; phyllaries in 3 – 4 series, abaxial surface light brown, outer phyllaries broadly-ovate 1 – 1.2 mm long, median ovate 1.2 – 1.5 mm long, inner linear 1.7 – 2 mm long, basis obtuse, apex rounded to attenuate, margins light yellow, narrowly scarious, short-dentate near the apex; clinanthium plane, alveolate, densely covered by biseriate trichomes. **Male flowers** 14 – 20; corolla 2.8 – 3.5 mm long, 5-laciniate, tube 1.8–2.2 mm long, throat 0.3 – 0.4 mm long, cup-shaped, lobes 0.7 – 1 mm long, externally with biseriate trichomes in the distal third of the tube; anthers exceeding the corolla, styles 2.2 – 3.3 mm long, apex entire or slightly divided; pappus 2 – 2.5 mm long, bristles 15 – 20, uniseriate, apex slightly broadened, terminal cell ends shortly protruding. **Female capitula** 3.2 – 4.1 mm long; involucre 3.2 – 3.6 mm long, 2.1 – 2.6 mm wide, cup-shaped; phyllaries in 3 – 4 series, abaxial surface pale yellow to light brown, with a median longitudinal brown stripe, outer and median ovate 1 – 1.5 mm long, inner narrowly ovate-lanceolate 1.7 – 2 mm long, apex short-dentate, margins scarious; clinanthium convex, alveolate, densely covered by biseriate glandular trichomes, the ridges taller than the scar diameter. **Female flowers** 30 – 38; corolla 1.8 – 2.2 mm long, filiform, apex shortly ligulate, 3 – 5-denticulate, glabrous; styles 2.5 – 2.8 mm long, branches linear-lanceolate 0.25 – 0.4 mm long. Immature **cypselae** cylindrical, papillose, 4 – 5-ribbed, glabrous; pappus 2.1 – 2.7 mm long, bristles 20 – 25, uniseriate, basally fused, slightly shorter than the style. Fig. 1.

**SPECIMENS EXAMINED. BRAZIL. Minas Gerais/Espírito Santo:** Parque Nacional do Caparaó, proximidades da Casa Queimada, fl., ♂, 19.X.1999, *Mazine, Sobral & Forster 201* (ESA, ICN); campo de altitude, fl., ♀, 13.IX.2008, *Leoni 7240* (GFJP, RB); Pico da Bandeira, 16.XI.1996, fl., ♂, *Silva 14* (HUFU, ICN); Pico Luiz Inácio, fl., ♂, 21.X.1947, *Moreira 42* (R); Casa Queimada, 2500 m, fl., ♂, 3.IX.1929, *Snethlage s.n.* (R 38302); proximidades da Guarita, 10.IX.1991, fl., ♂, *Brandão 19609* (PAMG); Rancho de Pedra, 2000 m, st., 29.VI.1950, *Santos & Campo s.n.* (R 52192); a 4 km do Pico da Bandeira, 2500 m, bud, 6.VIII.1969, *Souza 5* (ICN, RB).

**DISTRIBUTION, HABITAT AND ECOLOGY.** *Baccharis hemiptera* occurs in Parque Nacional do Caparaó, along the boundary between the states of Espírito Santo and Minas Gerais, Southeast Brazil. It grows in shallow and moist soils at sunny sites in high altitude grasslands above 2000 m. These upper montane grasslands are islands of open vegetation inserted in the Atlantic rainforest biome. The species was found with flowering buds in August and flowers from September to October.

**CONSERVATION STATUS.** *Baccharis hemiptera* is endemic to the highlands of Caparaó, around Pico da Bandeira Mountain, between 2000 to 2600 m. Considering the few collections available, the uniqueness of Caparaó environment (a range of mountains up to 2890 m surrounded by medium-leveled hills and lowlands), and the anthropogenic pressure of livestock and tourism (in surrounding areas and inside of the national park), the new species is considered vulnerable (VU), concerning its status of conservation fide IUCN (2010).

**ETYMOLOGY.** The species is named referring to the development of just one side of each leaf basis between two internodes to form the narrow wings of the branches.

*Baccharis hemiptera* belongs to *B. sect. Caulopterae* DC., within *B. subgenus Molina* (Pers.) Heering, due its winged stems, epaleaceous clinanthia densely covered with biseriate glandular hairs, papillose glabrous cypselae, and the pappus bristles of female flowers enlarged basally and fused into a ring.

The allopatric *B. glaziovii*, occurring northward of the Serra do Itatiaia (southern Minas Gerais and western Rio de Janeiro), southward up to the highlands of north-eastern Rio Grande do Sul, and extending westward to southern Mato Grosso do Sul, north-eastern Argentina (Misiones) and eastern Paraguay (Caaguazú), it is the species most similar to *B. hemiptera* occurring in Brazil. Both are shrubs with winged stems, developed leaves, at least in most of the branches length, and capitula borne in terminal pyramidal panicles. However, *B. glaziovii* is distinguished by the absence of 2-alate branch segments as found in the most distal internodes of the shoots and in recent shoots of *B. hemiptera*, some additional features to distinguish *B. glaziovii* of *B. hemiptera* are the much longer and wider stem wings (1 – 19 cm long and 0.5 – 1.3 cm wide vs. 0.5 – 1.7 cm long and 0.1 – 0.3 cm wide), much larger panicles (7 – 17 cm long and 3 – 7.5 cm wide vs. 1 – 3.5 cm long and 0.8 – 1.9 cm wide), and longer female capitula (4.3 – 5.6 mm vs. 3.2 – 4.1 mm) with phyllaries in 5 – 6 series (vs. 3 – 4 series), longer corollas (2.2 – 3 mm vs. 1.8 – 2.2 mm) and styles (2.7 – 3.3 mm vs. 2.5 – 2.8 mm).

*Baccharis subalata* Wedd. var. *subalata*, from Bolivian and Peruvian Andes, is an allopatric taxon superficially similar to *B. hemiptera*. By the mean of the description and illustration provided by MÜLLER (2006), some characteristics of *B. subalata* var. *subalata* distinguishing it from *B. hemiptera* may be recognized, such as the occurrence of mostly 3(4)-alate branches (vs. presence of 2-alate branches in the most distal internode of the shoots and in recent shoots, mixed with 3-alate branches in the remaining internodes), the leaves reticulum veined (vs. seemingly 1-veined), male flowers with longer pappus (2.8 – 4 mm vs. 2 – 2.5 mm long) and longer throat (1.2 – 1.8 mm long vs. 0.3 – 0.4 mm long), and female flowers with longer corollas (2.2 – 3.7 mm vs. 1.8 – 2.2 mm long).

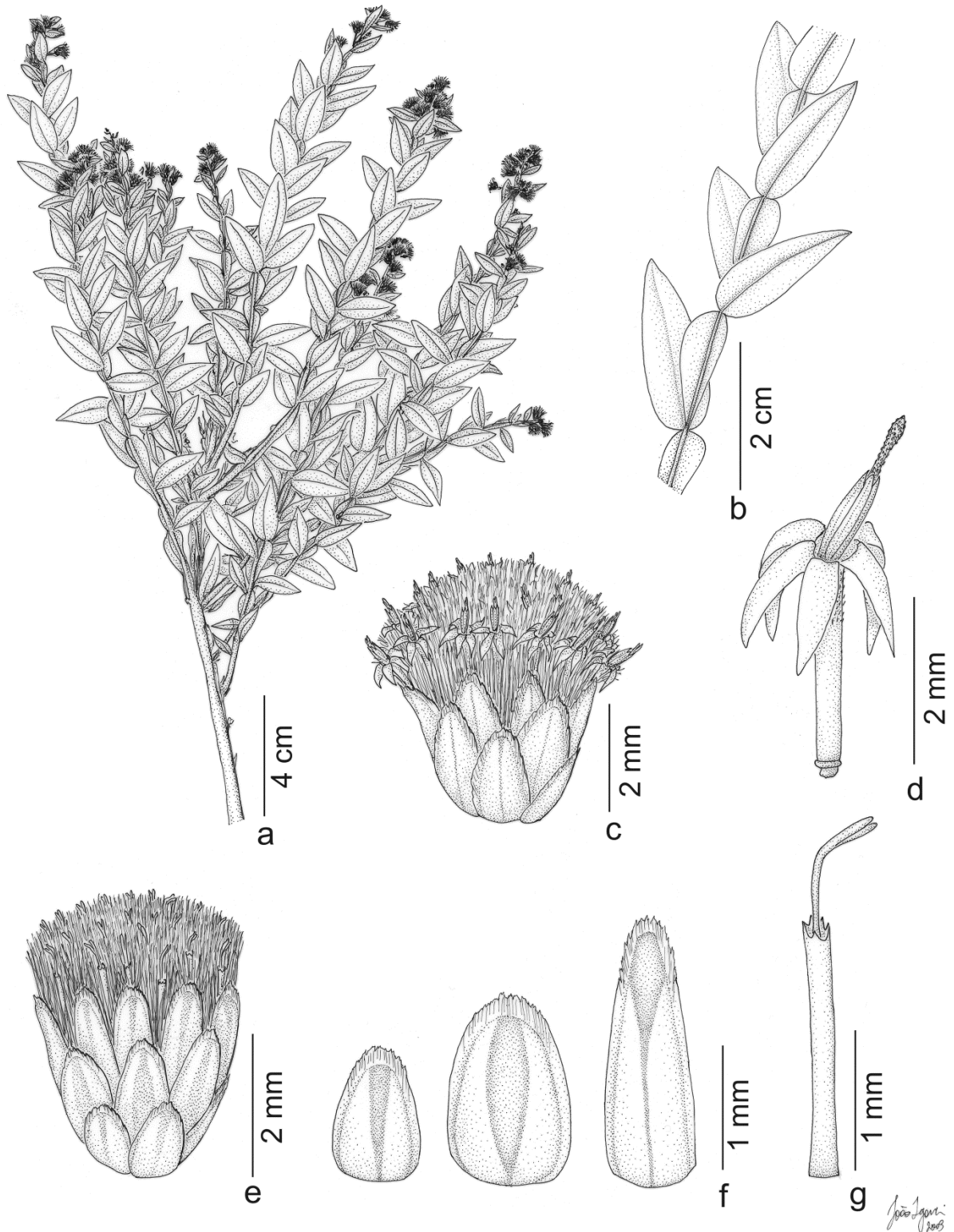
### **Acknowledgements**

The authors acknowledge herbaria ICN, R, RB and SPF for technical support, Benoît Patrice Francis Loueille for translating the *résumé*, and João Iganci for providing the illustration.

### **References**

- BARROSO, G. M. (1976). Compositae. Subtribo Baccharidinae Hoffmann: estudo das espécies ocorrentes no Brasil. *Rodriguésia* 28 (40): 3 – 273.
- FIELDING, R. R. (2001). *Baccharis*: A genus of the Asteraceae new to Canada. *Proc. Nova Scotia Inst. Sci.* 41: 214 – 215.

- GIULIANO, D. A. (2001). Clasificación infragenérica de las especies argentinas de *Baccharis* (Asteraceae, Astereae). *Darwiniana* 39: 131 – 154.
- HEIDEN, G., IGANCI, J.R.V. & MACIAS, L. (2009) *Baccharis* sect. *Caulopterae* no Rio Grande do Sul, Brasil. *Rodriguésia* 60(4):943–983.
- HEIDEN, G. & A. A. SCHNEIDER (2010). *Baccharis*. In: *Lista de Espécies da Flora do Brasil*. Jardim Botânico do Rio de Janeiro. [<http://floradobrasil.jbrj.gov.br/2010/FB005151>].
- IUCN. (2010). Guidelines for Using the IUCN Red List Categories and Criteria. Version 8.1. Prepared by the Standards and Petitions Sub-Committee in March 2010. [<http://intranet.iucn.org/webfiles/doc/SSC/RedList/RedListGuidelines.pdf>].
- MÜLLER, J. (2006). Systematics of *Baccharis* (Compositae-Astereae) in Bolivia, including an overview of the genus. *Syst. Bot. Monogr.* 76: 1 – 341.
- MÜLLER, J. (2010). World checklist of *Baccharis* L. (Compositae-Astereae) [<http://www2.uni-jena.de/biologie/spezbot/herbar/Baccharis.htm>].



**Figure 1.** *Baccharis hemiptera* G. Heiden & A. A. Schneid.: a. Fertile shoot; b. Detail of shoot; c. Male capitulum; d. Male flower (pappus removed); e. Female capitulum; f. Phyllaries of female capitulum (outer to inner); g. Female corolla and style. (a-d drawn from *Brade 17017*, RB; e-g drawn from *Leoni 7240*, RB).





## APPENDIX 3

***Baccharis umbellata* (Asteraceae, Astereae): a new species  
endemic to the highest summits of Paraná, southern Brazil**



***Baccharis umbellata* (Asteraceae, Astereae): a new species endemic to the highest summits of Paraná, Southern Brazil**

GUSTAVO HEIDEN<sup>1</sup> & OSMAR DOS SANTOS RIBAS<sup>2</sup>

<sup>1</sup>*Departamento de Botânica, Instituto de Biociências, Universidade de São Paulo, Rua do Matão, Travessa 14, 321, São Paulo, SP 05508-090, Brazil. gustavo.heidem@gmail.com*

<sup>2</sup>*Museu Botânico Municipal, Herbário MBM, Caixa Postal 1142, Curitiba, PR 80001-970, Brazil. oribas@smma.curitiba.pr.gov.br*



## **Abstract**

*Baccharis umbellata*, a new species of Paraná State, southern Brazil, is described. The new species, belonging to subgen. *Baccharis* sect. *Agglomeratae*, is easily recognized by the pedunculate heads arranged in an umbel-like capitulescence. *Baccharis umbellata* is a narrow endemic of the peaks of the southern range of Serra do Mar. It is morphologically most similar to the allopatric species *B. platypoda*, which mainly inhabits mountain summits in western and eastern South America. Illustrations, a distribution map, habitat information, and a conservation assessment are also provided for the new species.

## **Resumo**

*Baccharis umbellata*, uma nova espécie do estado do Paraná, sul do Brasil, é descrita. A nova espécie pertence ao subgen. *Baccharis* sect. *Agglomeratae* e é facilmente reconhecível pelos capítulos pedunculados, dispostos em uma capitulescência umbeliforme. *Baccharis umbellata* é um endemismo restrito aos picos da porção sul da cadeia da Serra do Mar e é morfologicamente mais similar à espécie alopátrica *B. platypoda*, que vegeta principalmente ao longo dos cumes de montanhas do noroeste e leste da América do Sul. Ilustrações, mapa de distribuição e considerações sobre o habitat e estado de conservação da nova espécie também são fornecidos.

**Key words:** Atlantic rain forest, Compositae, high altitude tropical grasslands



## Introduction

*Baccharis* Linnaeus (1753: 860; Asteraceae: Astereae) is a New World genus broadly characterized by the usually tufted indumentum of the leaves and stems, with trichomes that have adjoining basal cells, and the common occurrence of dioecy (Müller 2006). The genus comprises between 338 (Müller 2010) and 400 species (Bremer 1994). Barroso (1976) provided the most recent treatment of the genus for Brazil, encompassing about 130 species. Currently, 165 species of *Baccharis* are recorded for the country and a total of 83 of these are found in Paraná State (Heiden & Schneider 2012), which is one of the main centres of species diversity of the genus in Brazil.

During a study of herbarium specimens of *Baccharis* in order to update the checklist of the genus in Paraná State, a previously undescribed species of *Baccharis* was found. This species is described in this paper, illustrated and its affinities, systematic position and area of occupancy are discussed.

***Baccharis umbellata* G.Heiden & Ribas, sp. nov.** (Figs. 1 and 2)

*Differs from Baccharis platypoda* DC. in its pedunculate capitula arranged in monomorphic umbel-like capitulescences (versus densely aggregated capitula arranged in dimorphic glomerule-like capitulescences of pedunculate or sessile secondary capitula).

Type:—BRAZIL. Paraná: Antonina, Serra Ibitiraquire, Pico Paraná, 1922 m, fl, ♂, 20 December 1977. Subarbusto 40 cm, capítulo creme. Matinha nebuloso do cume do morro. O.S. Ribas & V.A.O. Dittrich 2183 (holotype MBM!; isotype US!).

*Subshrubs* or shrubs 0.3–1 m tall, erect; shoots terminating in a capitulescence, strongly resinous; bark light brown to stramineous. *Leaves* with petioles 2.3–4.5 mm long, leaf blade coriaceous, 1.5–3.4 cm long, 0.4–2 cm wide, oblong to obovate, apex rounded to obtuse or truncate, base cuneate, margins with 5–12 pairs of smooth to coarse teeth distally, strongly resinous; venation pinnate, semi-craspedodromous, with 6–16 pairs of major lateral veins, midrib prominent on both surfaces; both surfaces with tufts of flagellate hairs and biseriate glandular hairs appearing as small resinous dots. *Capitulescences* of 4–8 capitula, terminal, umbel-like, 1.4–2 cm long, 1.6–4.4 cm wide. *Capitula* pedunculate; peduncles 3.4–9.5 mm long. *Male capitula* 6.9–8.8 mm long; florets 48–60;

involucre 6.5–7.5 mm long, 4.5–7.7 mm wide, oblong to campanulate; clinanthium (receptacle) flat, glabrous; phyllaries in 4–6 series, pale yellow with a slightly darker subapical region, outer phyllaries ovate, median oblong, innermost lanceolate, margin dentate, scarious, apex acute; corolla 4.7–5.4 mm long, tube 3.4–4 mm long, throat 0.3–0.5 mm, lobes 0.7–1.2 mm long; anthers including apical appendages 1–1.6 mm long; style 4.9–6 mm long, apex nearly fully cleft into lanceolate branches with sweeping hairs of unequal size, slightly dilated towards apex; ovary abortive, puberulous with biseriate glandular hairs; pappus uniseriate, 4.5–5 mm long, bristles 16–20, with apically broadened, short-protruding, erect terminal cell apices. *Female capitula* 6.5–8 mm long; florets 10–20; involucre 5.8–7.1 mm long, 3.8–7.9 mm wide, cylindrical to campanulate, narrowed distally; clinanthium (receptacle) slightly convex, glabrous; phyllaries in 5–7 series, pale yellow with a slightly darker subapical region, outer and median oblong, innermost lanceolate to linear-lanceolate, margins dentate, scarious, apex acute; corolla 3–4.2 mm long, filiform, with 5 obtuse apical teeth; style 3.8–6.2 mm long, branches 0.6–0.9 mm long; cypselae 1.9–2.2 mm long, 0.79–1.1 mm wide, brown, glabrous, oblong, slightly narrowed at bases, with 12–16 strong longitudinal ribs; pappus biseriate, 4.5–5.2 mm long, bristles 40–60, apically not broadened, not elongated at cypsela maturity, deciduous.

*Distribution*:—Only known from elevations between 1600–1922 m a.s.l. on the summits of the peaks Camapuã, Paraná, and Tucum along the Serra do Ibitiraquire, which is a portion of the southern range of the Serra do Mar and the natural boundary between the municipalities of Antonina and Campina Grande do Sul, in the east of Paraná State, southern Brazil (Figure 3).

*Habitat*:—*Baccharis umbellata* forms sparse populations along the edge of cloud forests thickets, amongst grasslands, or in rock outcrops within the High Altitude Tropical Grassland biome (Iganci *et al.* 2011). These environments occur in the transitional zone of ombrophilous dense forests and high altitude grasslands of the Atlantic Rainforest Domain.

*Phenology*:—Fertile specimens have been collected all year round.

*Conservation status*:—Because of the limited area of occupancy, small and sparse populations recorded for only three locations, and loss of quality of the high altitude grasslands environment due anthropogenic pressure, the new species is assessed as Endangered: EN B1ab(iii) (IUCN 2011).



*Etymology*:—The specific epithet refers to the pedunculate heads arranged in terminal umbel-like capitulescences.

**Additional specimens examined (paratypes)**:— BRAZIL. Paraná: Antonina, Serra do Mar, Serra Ibitiraquire, Pico Paraná, rampa de pouso da torre, 1800 m, 2 May 1971, fl., fr., ♀, *N. Imaguire 503* (MBM, PACA); subida ao Pico Paraná, 1920 m, 17 August 1996, fl., ♂, *O.S. Ribas, J.M. Silva & E. Barbosa 1469* (MBM). Campina Grande do Sul, Serra Ibitiraquire, Pico Camapuã, 3 February 2000, fl., ♂, *O.S. Ribas, J. Cordeiro & E. Barbosa 3062* (CTES, MBM); 28 November 2000, fr., ♀, *F. Silveira 1* (UPCB); 1600 m, 5 November 2011, fl., ♂, *G. Felitto, B. K. Canestraro, E. D. Lozano & E. Curcio 200* (MBM); 1600 m, 5 November 2011, fl., ♀, *E. D. Lozano, B. K. Canestraro, G. Felitto & E. Curcio 774* (MBM); Serra dos Órgãos, Morro Tucum, 19 November 1999, fl., ♂, *J. Cordeiro, J.M. Cruz & L.A. Ferreira 1646* (MBM); 22 September 2006, fl., ♂, *J.M. Silva, E. Barbosa & F. Marinero 5077* (MBM).

*Baccharis umbellata* belongs to subgenus *Baccharis* because the style apex of male florets bears sweeping hairs of unequal size, the female florets have an apically 5-dentate corolla apex and because of the glabrous and >8-ribbed cypselae with deciduous biseriate pappus. The new species seems to be closely related to the allopatric species *B. platypoda* De Candolle (1836: 409), which mainly inhabits mountain summits across western (Bolivia and Peru) and eastern South America (Brazilian States of Bahia, Espírito Santo, Minas Gerais, Rio de Janeiro, and São Paulo), sharing the same leaf shape and texture, margin dentition and pattern of venation, however being easily differentiated by the pedunculate capitula arranged in umbel-like capitulescences (vs. sessile capitula forming densely congested capitulescences). Apart from the arrangement of capitula, *B. umbellata* can be distinguished from *B. platypoda* by its height (0.3–1 m vs. 1–3.5 m tall), smaller leaf blades (1.51–3.41 × 0.43–2 cm vs. 4–15 × 2–6 cm), dentate (vs. long-fimbriate) phyllary margins, more florets per male (48–60 vs. 10–30) and female capitulum (10–20 vs. 8–10) and wider male involucre (4.5–7.7 mm vs. 2.5–4.5 mm).

The section *Agglomeratae* Giuliano (2005: 535) was mainly circumscribed on the basis of the presence of dimorphic capitulescences in male (axillary pedunculate glomerules of sessile capitula or pedunculate secondary capitula) and female plants (terminal sessile globose capitulescence) and comprises *B. platypoda* DC. (eastern Brazilian populations) and *B. condensata* Rusby (1920: 148; Bolivian and Peruvian populations of *B. platypoda*, fide Müller 2006: 132). Despite the absence of dimorphic congested capitulescences in *B. umbellata*, which is characterized by the presence of umbel-like capitulescences of lax capitula in both male and female plants, its characteristics of habit, leaves and characters of florets and cypselae shows the new species' unequivocal relationship to *B. platypoda*, supporting its inclusion in section *Agglomeratae*.

### **Acknowledgements**

GH acknowledges FAPESP (processes 2010/00519-8 and 2011/18385-0), IAPT Research Grants in Plant Systematics 2010, and the Smithsonian Institution's 2011 Cuatrecasas Fellowship Award for the financial support. The authors are also grateful to the staff of the herbaria CTES, MBM, PACA, UPCB, and US for loaning the specimens for study, to João Iganci for preparing the illustration, to Bianca Kalinowski Canestraro and Eduardo Lozano for sending pictures of *Baccharis umbellata* in its habitat, and to two anonymous referees for their valuable comments.

### **References**

- Barroso, G.M. (1976) Subtribo Baccharidinae Hoffman. Estudo das espécies ocorrentes no Brasil. *Rodriguésia* 28(40): 1–281.
- Bremer, K. (1994) *Asteraceae: Cladistics & Classification*. Portland: Timber. 752 pp.
- Candolle, A.P. de. (1836) *Prodromus systematis naturalis regni vegetabilis*, vol. 5. Paris: Treuttel & Würtz.
- Giuliano, D.A. (2005) New infragenera in *Baccharis* (Asteraceae, Astereae). *Novon* 15(4): 534–541.

Heiden, G. & Schneider, A.A. (2012) *Baccharis*. In: *Lista de Espécies da Flora do Brasil*. Jardim Botânico do Rio de Janeiro. Available from: <http://floradobrasil.jbrj.gov.br/2012/FB005151> (14 February 2012).

Iganci, J.R.V., Heiden, G., Miotto, S.T.S. & Pennington, R.T. (2011) Campos de Cima da Serra: the Brazilian Subtropical Highland Grasslands show an unexpected level of plant endemism. *Botanical Journal of the Linnean Society* 167: 378–393.

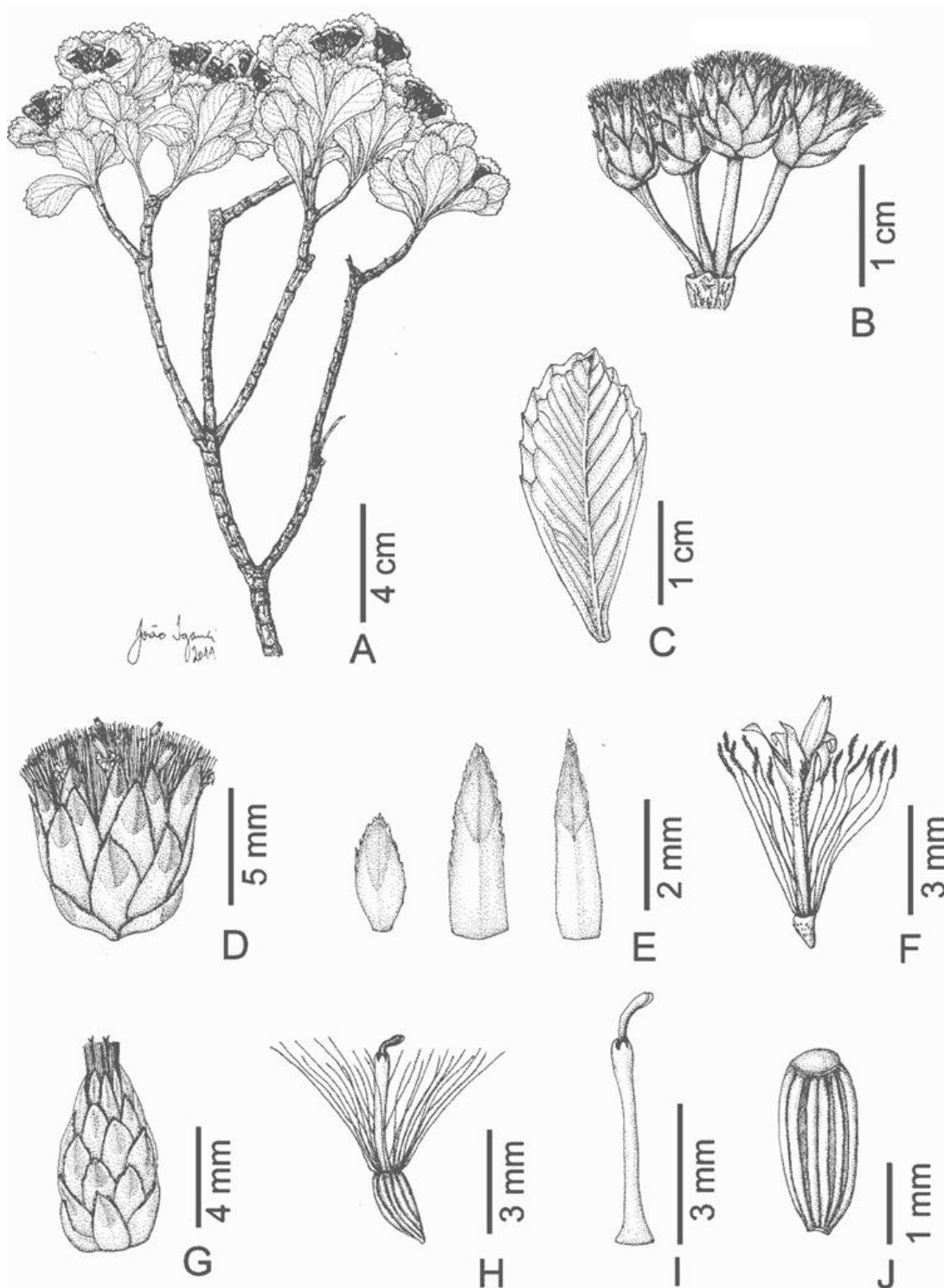
IUCN Standards and Petitions Subcommittee (2011) *Guidelines for using the IUCN Red List Categories and Criteria*. Version 9. Prepared by the Standards and Petitions Subcommittee. Available from: <http://www.iucnredlist.org/documents/RedListGuidelines.pdf> (14 February 2012).

Linnaeus, C. (1753). *Species plantarum*. Vol. 2. Stockholm: L. Salvius.

Müller, J. (2006) Systematics of *Baccharis* (Compositae–Astereae) in Bolivia, including an overview of the genus. *Systematic Botany Monographs* 76: 1–341.

Müller, J. (2010) *World checklist of Baccharis L. (Compositae–Astereae)*. Available from: <http://www2.uni-jena.de/biologie/spezbot/herbar/Baccharis.htm>. (14 February 2012).

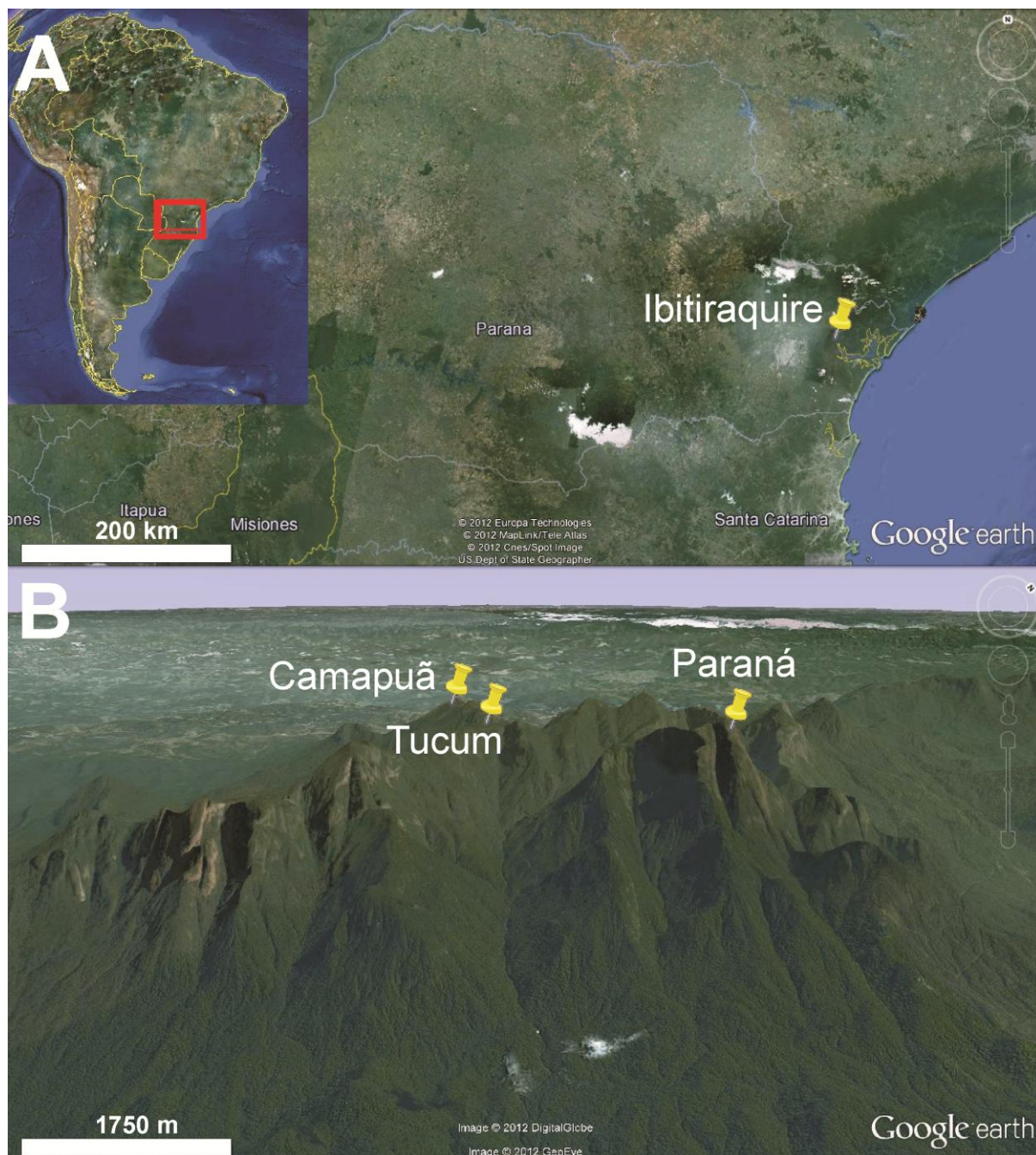
Rusby, H.H. 1920. Descriptions of three hundred new species of South American plants with an index to previously published South American species by the same author. New York: H. H. Rusby. 170 pp.



**FIGURE 1.** *Baccharis umbellata*. **A.** Fertile shoot. **B.** Capitulescence. **C.** Adaxial view of a leaf. **D.** Male capitulum. **E.** Phyllaries of male capitulum (outer to inner). **F.** Male floret. **G.** Female capitulum. **H.** Female floret. **I.** Corolla and style of female floret. **J.** Cypsela (pappus removed). **A–F:** *Ribas & Dittrich 2183* (MBM). **G–J:** *Imaguire 503* (PACA). Illustration by João Iganci.



**FIGURE 2.** Flowering shoot of a male specimen of *Baccharis umbellata* (Felitto *et al.* 200). Photo by B.C. Canestraro.



**FIGURE 3.** Distribution of *Baccharis umbellata*: **A.** Overview map of South America highlighting the position of Paraná State in southern Brazil and the Serra do Ibitiraquire in eastern Paraná. **B.** Three-dimensional map of the Serra do Ibitiraquire plotting the peaks of Camapuã, Tucum and Paraná, where the new species is recorded from.

## APPENDIX 4

***Baccharis napaea* (Asteraceae, Astereae): a new species of subgen.  
*Tarchonanthoides* sect. *Coridifoliae* from the subtropical highlands  
of southern Brazil**





***Baccharis napaea* (Asteraceae, Astereae): a new species of subgen. *Tarchonanthoides* sect. *Coridifoliae* from the subtropical highlands of southern Brazil**

GUSTAVO HEIDEN<sup>1,2</sup> & JOSÉ RUBENS PIRANI<sup>1</sup>

<sup>1</sup>*Departamento de Botânica, Instituto de Biociências, Universidade de São Paulo, Rua do Matão, Travessa 14, 321, São Paulo, SP 05508-090, Brazil.*

<sup>2</sup>*gustavo.heidem@gmail.com*



## **Abstract**

*Baccharis napaea*, a new species belonging to subgen. *Tarchonanthoides* sect. *Coridifoliae* is described and illustrated. The new species is compared to and distinguished from the sympatric species *B. coridifolia*, *B. erigeroides*, and *B. scabrifolia*, and from the allopatric *B. bicolor*. *Baccharis napaea* occurs in open subtropical highland grasslands and the edges and open glades of subtropical mixed forests on the south Brazilian plateau. Additionally, a distribution map and description of habitat and conservation status of the new species are presented.

## **Resumo**

*Baccharis napaea*, uma nova espécie pertencente ao subgen. *Tarchonanthoides* sect. *Coridifoliae* é descrita e ilustrada. A nova espécie é comparada e diferenciada das espécies simpátricas *B. coridifolia*, *B. erigeroides* e *B. scabrifolia*, e da espécie alopátrica *B. bicolor*. *Baccharis napaea* ocorre em campos de altitude subtropicais e na orla e clareiras de florestas ombrófilas mistas subtropicais no planalto sul-brasileiro. Adicionalmente é apresentado um mapa de distribuição e considerações sobre o hábitat e estado de conservação da nova espécie.

**Key words:** Baccharidinae, Compositae, subtropical highland grasslands, subtropical mixed forests



## Introduction

*Baccharis* Linnaeus (1753: 860; Asteraceae: Astereae) is a New World genus that comprises between 338 and 400 species (Bremer 1994, Müller 2010). The genus is characterized broadly by the usually tufted indumentum of the leaves and stems, with fused trichomes that have only a single adjoining basal cell, and the common occurrence of dioecy (Müller 2006). Barroso (1976) provided the most recent treatment of the genus for Brazil, encompassing about 130 species. Currently, in a checklist, 167 species of *Baccharis* are recorded for the country (Heiden & Schneider 2012).

The most recent proposal of a subgeneric classification of *Baccharis* was published by Müller (2006), who thought the subgenera *Baccharis*, *Pteronioides* Heering (1904: 15) and *Tarchonanthoides* Heering (1904: 26) were probably monophyletic, while he considered *Baccharis* subgen. *Molina* (Persoon 1807: 424) Heering (1904: 40) as a possibly paraphyletic assemblage. According to this author, *Baccharis* subgen. *Tarchonanthoides* is the morphologically best circumscribed subgenus of *Baccharis*. This subgenus is characterized by corollas of female florets with five papillose teeth, by male florets with pappus bristles rarely broadened apically and with a style apex nearly fully cleft into lanceolate or ovate branches. This subgenus is found in the southeastern South American grasslands and savannahs, from eastern Brazil and central Bolivia south to central Argentina, with the greatest diversity found in southeastern Brazil (Müller 2006, Heiden 2008). Heiden & Pirani (2012) recently published an updated synopsis for the subgenus, accepting 21 species; during a taxonomic revision and a phylogenetic analysis of *Baccharis* subgen. *Tarchonanthoides* currently underway, we found a previously undescribed species. This species is described and illustrated in this paper, and its affinities, systematic position and area of occurrence are discussed.

### ***Baccharis napaea* G.Heiden, sp. nov.** (Fig. 1)

*Baccharis napaea* G.Heiden is characterized by its tomentose and lanate indumentum of developed shoots and leaves, differing from *B. erigeroides* DC. and *B. coridifolia* DC. which are characterized by glabrescent developed shoots and glabrescent leaves, and from *B. scabrifolia* G.Heiden that is characterized by shoots and leaves with villous and scabrous indumentum.

**Type:**—BRAZIL. Paraná: Palmas, Horizonte, divisa PR/SC, Campos de Água Doce e Palmas, BR 280, próximo às turbinas da Central de Energia Eólica de Palmas, 1303 m, fl., ♀, 8 February 2011, G. Heiden, J.M da Silva & J.M. Vaz 1581 (holotype SPF!; isotypes FLOR!, ICN!, F!, JE!, K!, LP!, MBM!, MVFA!, MO!, PACA!, RB!, SP!, US!, and Herbário da Embrapa Clima Temperado, Pelotas, RS, Brasil!).

*Subshrubs* 1–1.5 m tall, erect; sterile lateral shoots prostrate, fertile shoots ascending, terminating in a capitulescence, greenish to greyish; indumentum tomentose, hairs filiform. *Leaves* 1–4.4 cm long, 0.14–0.28 cm wide, greenish to greyish, sessile; leaf blade chartaceous, linear, plane, apex acute, base attenuate, margins entire, ciliate; leaves 1-nerved, midrib flat on adaxial surface and slightly prominent on abaxial surface, both surfaces with a lanate indumentum (puberulous in very old leaves), filiform hairs and biseriate glandular hairs, tufted indumentum absent. *Capitulescences* paniculate, terminal; panicles conical to ellipsoid, 16–60 cm long, 6–18 cm wide. *Capitula* pedunculate; peduncles 2.2–5.3 mm long. *Male capitula* 2.2–3 mm long; florets 7–12; involucre 1.7–2.8 mm long, 2.6–3 mm wide, cup-shaped; phyllaries in 3 series, greenish, outer and median phyllaries ovate, innermost ones linear-lanceolate, margin broadly scarious, short-dentate, apex obtuse to acute; clinanthium (receptacle) convex, glabrous or with scattered biseriate glandular hairs and uniseriate hairs; corolla 1–2 mm long, tube 0.4–0.9 mm long, throat 0.1–0.3 mm, lobes 0.5–0.7 mm long, biseriate hairs on tube and throat; anthers including apical appendages 0.8–1 mm long; style 0.9–1 mm long, apex nearly fully cleft into broadly lanceolate branches with sweeping hairs of equal size; ovary abortive, puberulous with twin and biseriate glandular hairs; pappus uniseriate, 1.1–2 mm long, bristles 18–24, twisted, apically not broadened, with short-protruding, erecto-patent terminal cell apices. *Female capitula* 4.5–8 mm long; florets 5–10; involucre 4.1–4.8 mm long, 2.2–3.5 mm wide, cylindrical to campanulate, narrowed distally; phyllaries in 4–5 series, greenish, outer and median phyllaries ovate, innermost ones oblanceolate, margins scarious, short dentate, apex obtuse; clinanthium (receptacle) convex to conical, with scattered biseriate glandular hairs; corolla 2–3.1 mm long, filiform, with 5 papillose teeth; style 3.6–4 mm long, branches 0.4–0.8 mm long; cypselae 1.9–2.4 mm long, 0.7–1 mm wide, stramineous to light brown, covered with biseriate glandular hairs and

twin hairs, cylindrical, slightly narrowed at base, 5–6 longitudinal ribs; pappus multiseriate, 2.6–4.3 mm long at cypsela maturity, persistent; bristles 80–140, connate basally, not broadened apically.

**Distribution & habitat:**—*Baccharis napaea* occurs in the highlands of the south Brazilian plateau (Planalto Sul-Brasileiro, also known as Planalto Meridional), in elevations between 750 and 1300 m a.s.l., in the states of Paraná, Santa Catarina, and Rio Grande do Sul, in southernmost Brazil (Fig. 2). It forms sparse populations, mainly across open grasslands within the subtropical highland grassland biome and along the edges or in open glades of *Araucaria angustifolia* (Bertol.) Kuntze forest thickets, in the contact zone with the subtropical mixed forest biome (Iganci *et al.* 2011). These environments occur in the transitional zone of high elevation grasslands and ombrophilous mixed forests of the Atlantic Rainforest Domain.

**Phenology:**—*Baccharis napaea* flowers from February to March and specimens setting fruits were collected from April to June.

**Conservation status:**—Despite many efforts during the years of 2010 and 2011 looking for populations of *B. napaea* in most of the known localities of occurrence of this species in southern Brazil, none of them were found except for a new record at the border of the municipalities of Água Doce (Santa Catarina) and Palmas (Paraná). The new species is well represented in herbaria; however, only three of these records were registered in the last 10 years (considering the authors' records to the neighboring places of Paraná and Santa Catarina Border as one record). Since a wider former distribution of the species seems likely, we suspect that its area has been reduced in recent years due to the conversion of native grasslands into extensive fields of soybean, corn, and wheat, as well as by the great increase of pine plantations, and the invasion of pine seedlings into the native environments across the southern Brazilian highland grasslands in the last years. Because of the continuing decline of the area of the native grasslands, the loss of habitat quality and the effects of *Pinus* invasion of the native vegetation the new species is assessed as Vulnerable: VU A2ce (IUCN 2011).**Etymology:**—The specific epithet (a noun in singular in apposition) refers to the Napaea, the nymphs of valleys in Greek mythology, and the homonymous floristic province of Martius, referring to the alternate and intermittent distribution of grasslands and forests in this region.

**Additional specimens examined (paratypes):**—BRAZIL. Paraná: Curitiba, fl., ♂, 25 February 1907, *P. Dusén* 3862 (R, US); fl. & fr., ♂ & fl. ♂, 16 March 1909, *P. Dusén* 7905 (NY); fl., ♀, 24 February 1912, *P. Dusén* 13867 (E, SI); fl., ♀ & ♂, *P. Dusén* 13867 (LIL, MO); 900 m, fl., ♀, 12 March 1914, *P. Dusén* 14593 (MO, NY, US); Pinheirinho, 950 m, fl., ♂, 21 March 1962, *G. Hatschbach* 8906 (MBM, RB). Palmas, Horizonte, divisa PR/SC, Campos de Água Doce e Palmas, BR 280, próximo às turbinas da Central de Energia Eólica de Palmas, 51.672°W, 26.565°S, 1303 m, fl., ♂, 8 February 2011, *G. Heiden, J.M da Silva & J.M. Vaz* 1580 (ICN, JE, K, LP, MBM, RB, SPF). Piraquara, Pinhais, 907 m, fl., ♂, 18 February 1959, *G. Hatschbach* 5502 (HBR, LIL, MBM); fl., ♂, *G. Hatschbach* 5503 (LIL, MBM). Rio Negro, Campo do Tenente, fl. & fr., ♀, 1 April 1951, *G. Hatschbach* 2176 (MBM, SI); fr., ♀, 29 June 1960, *G. Hatschbach* 7044 (MBM). Rio Grande do Sul: Bom Jesus, rodovia Bom Jesus-São Joaquim, rio Pelotas, fl. & fr., ♀, 11 March 2005, *G. Hatschbach, E. Barbosa & E.F. Costa* 79047 (CTES, MBM). Vacaria, descida para o vale do rio Pelotas, fl., ♂, 11 January 1978, *J. Mattos* 18319 (HAS). Santa Catarina: Água Doce, Horizonte, divisa PR/SC, Campos de Água Doce e Palmas, BR 280, próximo às turbinas da Usina de Energia Eólica de Água Doce, 51.616°W, 26.589°S, 1316 m, bud, 11 January 2011, *G. Heiden & J.R.V. Iganci* 1486 (FLOR, ICN, LP, MBM, RB, SPF). Capão Alto, Fazenda Pai Querê, 50.618°W, 28.354°S, fr., ♀, 28 June 2009, *R. Trevisan s.n.* (ICN 164765). Curitiba, fl., ♂, March 1877, *F. Müller* 68 (R); Monte Alegre, fl., ♂, 25 February 1960, *J. Mattos* 7653 (HAS). Mafra, 750 km, bud, 26 January 1953, *R. Reitz* 5283 (HBR); 4 km northwest of Mafra on the road to Barracas (20 km), 800—850 m, fl., ♀, 13 March 1957, *L.B. Smith & R.M. Klein* 12082 (HBR, NY, R, RB, US); fl., ♂, 13 March 1957, *L.B. Smith & R.M. Klein* 12083 (HBR, NY, R, RB). Três Barras, fl., ♂, 26 February 1948, *A. Mattos & L. Labouriau s.n.* (NY 782036, RB 63243).

*Baccharis napaea* is placed in subgenus *Tarchonantheoides* because of the following combination of features: a conspicuous indumentum of filiform hairs and the lack of tufted indumentum, appearing as small resinous dots, typical of most *Baccharis* species of other subgenera; the cup-shaped involucre of male capitula, contrasting with the cylindrical to campanulate involucre of the female capitula; apically not broadened pappus bristles of male florets; and the corollas of female florets with five papillose teeth. The new species is also assigned to the section *Coridifoliae* Giuliano (2011) because



of its sessile and 1-nervate leaves and the multiseriate and persistent pappus of female flowers, accrescent in cypsela maturity.

Most of the specimens of *B. napaea* found in herbaria were determined as *B. puberula* Candolle (1836: 401) or *B. erigeroides* DC. var. *dusenii* Heering (1910: 23); both names are synonyms of the sympatric *B. erigeroides* Candolle (1836: 418), which is endemic to Brazil and occurs north to central Goiás state and south to northeastern Rio Grande do Sul state (Heiden & Schneider 2012) in tropical savannahs (*cerrado*) and subtropical highland grasslands (*campos de cima da serra*). *Baccharis napaea* can be distinguished from *B. erigeroides* by its height (1–1.5 m vs. 0.3–0.7 m tall); the tomentose and lanate indumentum of shoots and leaves (vs. caducous filiform hairs found in leaves of young shoots that later become glabrescent); linear leaf blades (vs. narrow elliptic to narrow oblanceolate leaf blades) that are mostly smaller ( $1.1\text{--}4.4 \times 0.14\text{--}0.28$  cm vs.  $4\text{--}5 \times 0.3\text{--}0.7$  cm), shorter peduncles (2.2–5.3 mm vs. 6–31 mm long), smaller male capitula ( $2.2\text{--}3 \times 2.6\text{--}3$  mm vs.  $3\text{--}5 \times 4.5\text{--}6.7$  mm) with fewer florets (7–12 vs. 12–20), and fewer-flowered female capitula (5–10 vs. 12–22), with female florets with shorter pappus bristles (2.6–4 vs. 5.6–6.9 mm long).

Due to the similar habit, sessile linear 1-nerved leaves and broad paniculate capitulescences, *B. napaea* superficially resembles the widespread and sympatric *B. coridifolia* Candolle (1836: 422), which occurs in grasslands, pastures and disturbed areas from lowlands to highlands across central Argentina, north to central Bolivia and south-eastern Brazil (Müller 2006, Heiden & Schneider 2012). Despite this similarity, *B. napaea* can be differentiated by the persistent tomentose and lanate indumentum of filiform hairs present in the developed shoots and leaves respectively (vs. caducous filiform hairs found on leaves of very young shoots that later become glabrescent), fewer-flowered male capitula (7–12 vs. 15–30), shorter corolla of female florets (2–3.1 mm vs. 3.2–4.5 mm long), and shorter pappus of mature cypselae (2.6–4 vs. 5.2–7.2 mm long).

*Baccharis scabrifolia* Heiden (2008: 6), an endemic highland species of the south Brazilian plateau (Santa Catarina and Rio Grande do Sul) where it is restricted to peat bogs and swampy grasslands, is another sympatric species similar to *B. napaea*. Both species can be separated by the tomentose and lanate indumentum of shoots and leaves of *B. napaea* (vs. villous and scabrous indumentum of shoots and leaves of *B. scabrifolia*); not revolute, ciliate leaf margins and attenuate leaf bases (vs. revolute,

not ciliate leaf margins and obtuse to subcordate leaf bases); fewer-flowered male capitula (7–12 vs. 12–16); and longer female capitula (4.5–8 vs. 2.5–3 mm long), female florets corollas (2–3.1 vs. 1.3–1.5 mm long), cypselae (1.9–2.4 mm vs. 1–1.2 mm long) and pappus (2.6–4 mm vs. 1.8–2.2 mm long).

With respect to its morphology, *B. napaea* seems to be related to the allopatric Bolivian *B. bicolor* (Müller 2006: 276) G. Heiden (in Heiden & Pirani 2012: 45), from which it can be distinguished by its paniculate capitulescences (vs. partial capitulescences mostly racemose), few-flowered male capitula (7–12 vs. 18–30), shorter corolla of female florets (2–3.1 mm vs. 3.7–4.5 mm long), and shorter pappus of mature cypselae (2.6–4.3 vs. 5.3–6.5 mm long).

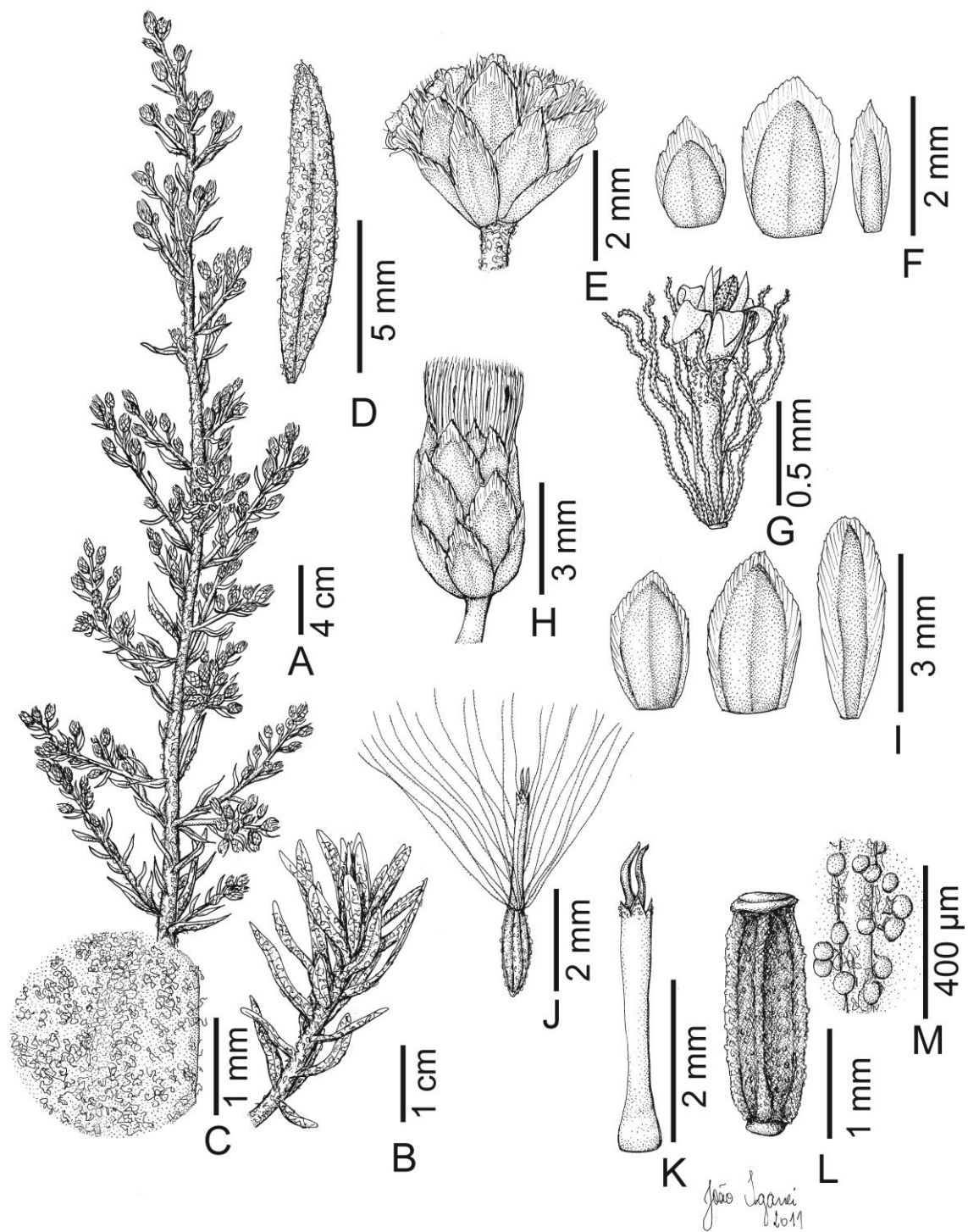
### **Acknowledgements**

The authors acknowledge FAPESP (processes 2010/00519-8 and 2011/18385-0), IAPT Research Grants in Plant Systematics 2010, and the Smithsonian Institution's 2011 Cuatrecasas Fellowship Award for the financial support. We are also grateful to Jochen Müller and John Pruski for the helpful comments on the manuscript and to the staff of the herbaria consulted (CTES, F, FLOR, HAS, HBR, ICN, JE, K, LIL, LP, MBM, MO, MVFA, NY, PACA, R, RB, SI, SP, SPF, US) for offering support and loaning the specimens for study, to João Iganci for preparing the illustration and helping during fieldwork in Southern Brazil, and to the staff of Museu Botânico Municipal de Curitiba, especially Clarisse Bolfe Poliquesi, Joel Morais da Silva, Joel Vaz, and Osmar dos Santos Ribas, for assistance during fieldwork in Paraná State.

### **References**

- Barroso, G.M. (1976) Subtribo Baccharidinae Hoffmann. Estudo das espécies ocorrentes no Brasil. *Rodriguésia* 28(40): 1–281.
- Bremer, K. (1994) *Asteraceae: Cladistics & Classification*. Timber Press, Portland, 752 pp.
- Candolle, A.P. de (1836) *Prodromus systematis naturalis regni vegetabilis* 5. Treuttel & Würtz, Paris, 706 pp.

- Giuliano, D.A. (2011) Nuevas secciones en *Baccharis* (Asteraceae, Astereae) de América Del Sur. *Annals of the Missouri Botanical Garden* 98: 331–347.
- Heering, W. (1904) Die *Baccharis*-Arten des Hamburgers Herbars. *Jahrbuch der Hamburgischen Wissenschaftlichen Anstalten* 21: 1–45.
- Heiden, G. (2008) A new species of *Baccharis* subgen. *Tarchonanthoides* Heering (Asteraceae-Astereae) from Rio Grande do Sul, Brasil. *Bradea* 13: 5–9.
- Heiden, G. & Pirani, J.R. (2012) A synopsis and notes for *Baccharis* subgen. *Tarchonanthoides* (Asteraceae: Astereae). *Phytotaxa* 60: 41–49.
- Heiden, G. & Schneider, A.A. (2012) *Baccharis*. In: Forzza, R.C. (ed.) *Lista de Espécies da Flora do Brasil*. Jardim Botânico do Rio de Janeiro. Available from: <http://floradobrasil.jbrj.gov.br/2012/FB005151> (accessed 22 March 2012).
- Iganci, J.R.V., Heiden, G., Miotto, S.T.S. & Pennington, R.T. (2011) Campos de Cima da Serra: the Brazilian Subtropical Highland Grasslands show an unexpected level of plant endemism. *Botanical Journal of the Linnean Society* 167: 378–393.
- IUCN (2011) *Guidelines for using the IUCN Red List Categories and Criteria*. Version 9. Prepared by the Standards and Petitions Subcommittee. Available from: <http://www.iucnredlist.org/documents/RedListGuidelines.pdf> (accessed 22 March 2012).
- Linnaeus, C. (1753). *Species plantarum*. L. Salvius, Stockholm, 1200 pp.
- Müller, J. (2006) Systematics of *Baccharis* (Compositae–Astereae) in Bolivia, including an overview of the genus. *Systematic Botany Monographs* 76: 1–341.
- Müller, J. (2010) *World checklist of Baccharis L. (Compositae–Astereae)*. Available from: <http://www2.uni-jena.de/biologie/spezbot/herbar/Baccharis.htm> (accessed 22 March 2012).
- Persoon, C.H. (1807). *Synopsis plantarum* 2. J.G. Cotta, Tübingen, 656 pp.



**FIGURE 1.** *Baccharis napaea*. **A.** Fertile shoot of pistillate plant, apical portion with capitulescence. **B.** Vegetative shoot. **C.** Stem indumentum. **D.** Leaf. **E.** Male capitulum. **F.** Phyllaries of male capitulum (outer to inner). **G.** Male floret. **H.** Female capitulum. **I.** Phyllaries of female capitulum (outer to inner). **J.** Female floret. **K.** Corolla and style of female floret. **L.** Cypsela (pappus removed). **M.** Enlarged detail of L. **A–D, H–K:** *Heiden et al. 1581* (SPF). **E–G:** *Heiden et al. 1580* (SPF). **L–M:** *Hatschbach 7044* (MBM). Illustration by João Iganci.

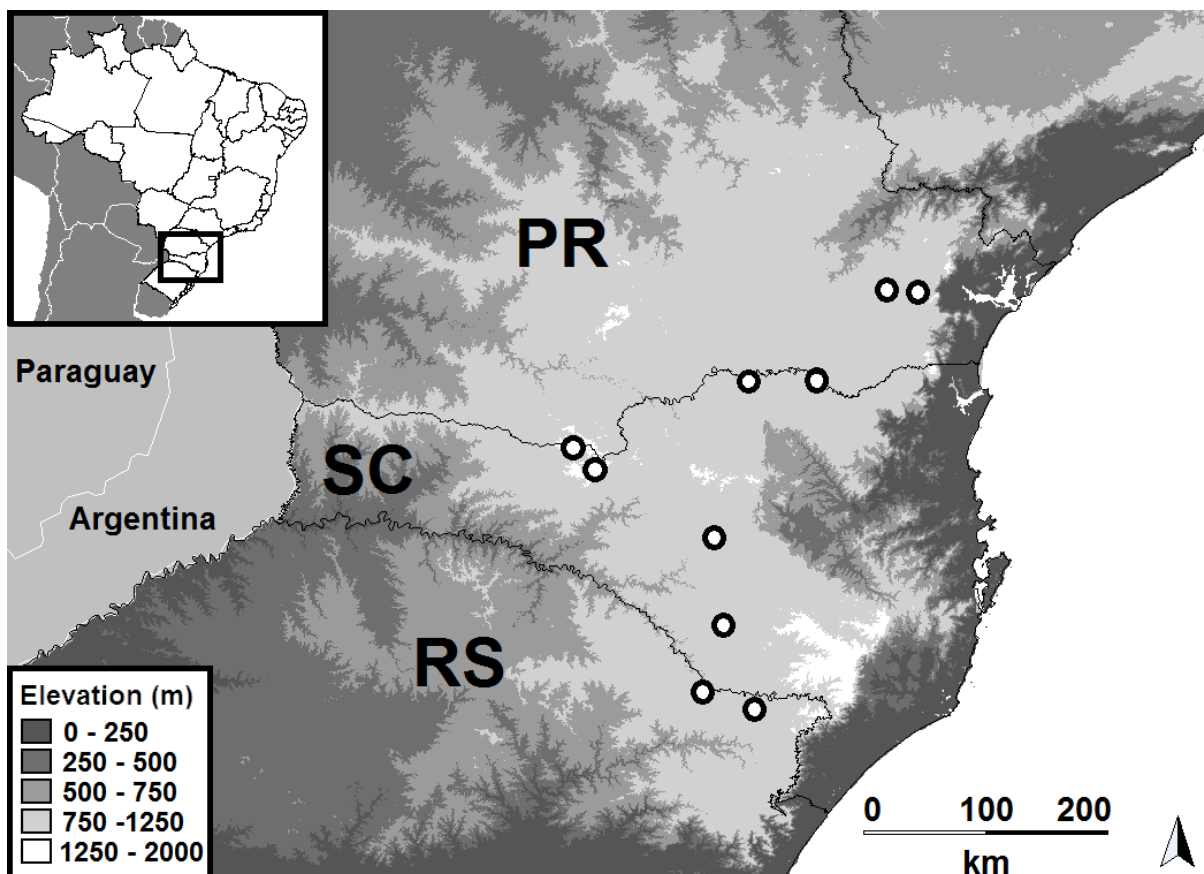


FIGURE 2. Distribution of *Baccharis napaea* in southern Brazil.



## APPENDIX 5

***Baccharis magnifica* (Asteraceae, Astereae): a striking new species  
endemic to the summits of Serra do Caparaó, southeastern Brazil**





***Baccharis magnifica* (Asteraceae, Astereae): a striking new species endemic to the summits of  
Serra do Caparaó, southeastern Brazil**

GUSTAVO HEIDEN<sup>1</sup>, LÚCIO DE SOUZA LEONI<sup>2</sup> & JIMI NAOKI NAKAJIMA<sup>3</sup>

<sup>1</sup> *Departamento de Botânica, Instituto de Biociências, Universidade de São Paulo, Rua do Matão, Travessa 14, 321, São Paulo, SP 05508-090, Brazil. [gustavo.heidem@gmail.com](mailto:gustavo.heidem@gmail.com)*

<sup>2</sup> *Herbário "Guido Pabst" - GFJP, Faculdade Redentor, Itaperuna, RJ 28300-000, Brazil. [lucioleoni@ig.com.br](mailto:lucioleoni@ig.com.br)*

<sup>3</sup> *Instituto de Biologia, Universidade Federal de Uberlândia, Caixa Postal 593, Uberlândia, MG 38400-902, Brazil. [nakajima@ufu.br](mailto:nakajima@ufu.br)*



## **Abstract**

*Baccharis magnifica*, a new species endemic to the summits of the Serra do Caparaó along the border between Espírito Santo and Minas Gerais, southeastern Brazil, is described. The new species is easily recognized by its shrubby habit, showy green and slightly wine-tinged, long-petiolate leaves with ciliate margins and corymbiform capitulescences. It is morphologically most similar to the allopatric *B. macrophylla*, which inhabits the mountain summits of the southerly Serra da Mantiqueira range. Illustrations, a distribution map, habitat information, and a conservation assessment are also provided for the new species.

## **Resumo**

*Baccharis magnifica*, uma nova espécie endêmica dos picos da Serra do Caparaó, ao longo da divisa dos estados do Espírito Santo e Minas Gerais, Sudeste do Brasil, é descrita. A nova espécie é facilmente reconhecível pelo hábito arbustivo, folhagem vistosa verde e levemente vinácea, folhas com pecíolos longos e margens ciliadas e capitulescências corimbiformes. Morfologicamente, assemelha-se à espécie alopátrica *B. macrophylla*, que habita os cumes das montanhas da Serra da Mantiqueira meridional. Ilustrações, mapa de distribuição, informações sobre o habitat e estado de conservação são fornecidos para a nova espécie.

**Key words:** Atlantic rain forest, Compositae, high altitude tropical grasslands



## Introduction

*Baccharis* Linnaeus (1753: 860; Asteraceae: Astereae) comprises between 354 (Müller 2013) and 400 New World species (Bremer 1994) and is broadly characterized by the usually tufted indumentum of the leaves and shoots and the common occurrence of dioecy (Müller 2006). Currently, 175 species of *Baccharis* are recorded for Brazil, with 27 species found in Espírito Santo and 95 species in Minas Gerais states (Heiden & Schneider 2013).

Ongoing taxonomic studies of *Baccharis*, with extensive study of herbaria specimens and fieldwork across the main centers of species diversity for the genus in Brazil, have allowed the recognition of a remarkable undescribed species of *Baccharis* from the summits of Serra do Caparaó. The Serra do Caparaó mountain range is the highest and northernmost of the tropical high altitude grasslands area (campos de altitude) in Brazil (Safford 1999a, 1999b). It is located in the Parque Nacional do Caparaó, which encompasses the highest mountain of eastern South America (Pico da Bandeira) and its surroundings. The new species found in this area is described below, is illustrated and its affinities, systematic position and geographic distribution are discussed.

***Baccharis magnifica*** G.Heiden, Leoni & J.N.Nakaj., *sp. nov.* (Figs. 1 and 2)

*Differs from Baccharis macrophylla* Dusén by its long-petiolate leaves with entire, flat and ciliate margins (versus short petiolate leaves with revolute, non-ciliate and 1-5 dentate margins).

Type:—BRAZIL. Minas Gerais: Alto Caparaó, Parque Nacional do Caparaó, córrego José Pedro (divisa MG/ES), [20°25'11"S, 41°48'41"W, 2350 m], 20 February 2000, fl., ♀, V.C. Souza, J.P. Souza, W. Forster & F.F. Mazine 23530 (holotype ESA!; isotype GFJP!).

*Shrubs* 1.3–1.8 m tall, erect; shoots terminating in a capitulescence, concomitantly originating dichotomous branching from neighboring nodes; bark brown, scars of leaves prominent and stramineous. *Leaves* green and slightly wine-tinged with petioles wine, 1.7–3 cm long, leaf blade cartaceous, 3.7–7.3 cm long, 1.7–3.7 cm wide, oblong to ovate, apex acute to obtuse, apiculate, base rounded, margins wine, entire, flat, ciliate, resinous, venation wine, pinnate, brochidodromous, with 8–16 pairs of major lateral veins, midrib flat or slightly sunken on adaxial surface, prominent on abaxial surface, both surfaces with tufts of glandular hairs appearing as small resinous dots. *Female*

*capitulescence* a corymbiform panicle of 5–7 racemes each bearing 5–21 capitula, terminal, 5–6 cm long, 4.4–8.3 cm diam. *Capitula* pedunculate; peduncles 4–8.5 mm long. *Female capitula* 3.7–4.3 mm long; florets 18–26; involucre 3.5–4.1 mm long, 2.5–5.5 mm wide, cylindrical to campanulate; clinanthium (receptacle) convex, paleate, glabrous, paleae linear-lanceolate; phyllaries 3–4-seriate, light brown, outer linear-ovate, median and innermost lanceolate to linear-lanceolate, margins scarious, apex acute. Corollas 1.3–1.6 mm long, short-rayed, sometimes with 2–3 apical teeth; style 1.6–1.8 mm long, branches 0.15–0.3 mm long. Cypselae 0.9–1.3 mm long, 0.3–0.5 mm wide, light brown, glabrous, narrowly obconical, laterally compressed, carpodium annular, small, 4–5 longitudinal ribs; pappus uniseriate, 1.3–1.6 mm long, bristles 16–20, apically not broadened, not elongated at cypselae maturity. *Male capitula* not seen.

*Distribution*:—Only known from localities at elevations between 2,350–2,834 m a.s.l. along the córrego José Pedro and on the summits of the Pico da Bandeira and Pico do Cristal alongside the Serra do Caparaó range. The creek and the peaks are the natural boundary between the states of Espírito Santo and Minas Gerais, southeastern Brazil (Figure 3).

*Habitat*:—*Baccharis magnifica* forms sparse populations, along the escarpments (Figure 2) of the highest summits of the Serra do Caparaó, on bare rock outcrops or in riverine vegetation within the sky islands environments of the high altitude tropical grassland biome (Figure 4). This biome has a wider distribution, presenting an archipelago-like pattern across the Serra do Mar and Serra da Mantiqueira ranges of mountains, within the Atlantic Rainforest Domain (Safford 1999a, b).

*Phenology*:—Flowering specimens have been collected in February, while inflorescences with mature cypselae can be found up to September.

*Conservation status*:—Because of the limited area of occupancy, the uniqueness of Caparaó habitat (a range of mountains up to 2,892 m surrounded by medium-elevation hills and lowlands), the very low population size with records of distribution from only three locations that are close to each other, and the decline of quality of the high altitude grasslands environment due to anthropogenic pressure as accidental fires and tourism on the summits take place, the new species is assessed as Endangered: EN B1ab(iii) (IUCN 2011).

**Etymology:**—*The specific epithet refers to the size of the leaves and to the striking and overall aspect of the plant.*

**Additional specimens examined (paratypes):**—BRAZIL. Espírito Santo, Ibitirama, Parque Nacional do Caparaó, Pico da Bandeira, escarpas, S 20°26'4", W 41°47'49", 2834 m, 1 October 2012, st., *G. Heiden, C.T. Oliveira, M. Bünger & V.L. Rezende 1955* (BHCB, RB, SPF). Minas Gerais: Alto Caparaó, Parque Nacional do Caparaó, Pico do Cristal, [20°26'37"S, 41°48'42"W, 2769 m], 24 September 1941, fr., ♀, *A.C. Brade 17005* (RB); 12 February 1996, fl., ♀, *L.S. Leoni 3195* (CARAN).

**Discussion:**—Unfortunately, no staminate specimens were available to provide the characters of the male plants of the new species. *Baccharis magnifica* appears to be related to *Baccharis* sect. *Oblongifoliae* Candolle (1836: 416), where the morphologically similar *B. macrophylla* is placed due to the combination of paleate clinanthium, flat paleae, few-ribbed cypselae and the pappus not elongated at cypsela maturity, although both species differ by short-rayed (vs. 5-dentate) female corollas. However, due to the lack of male specimens, which bear characters important for infrageneric placement, such as the shape of the style apex and length of the sweeping hairs, any attempt to place the new species in an infrageneric framework would be pointless.

In habit, expanded leaves, terminal capitulescence, paleate clinanthium of female capitula and short-rayed female corollas, *Baccharis magnifica* resembles the allopatric *B. macrophylla* Dusén (1903: 14), endemic to the southerly Serra da Mantiqueira in the border area of Minas Gerais, Rio de Janeiro and São Paulo states and only known for the Serra do Itatiaia (MG/RJ border) and Serra Fina (MG/SP border). The new species can be distinguished by its longer petioles (1.7–3 cm long), chartaceous leaf blades with rounded base and entire, flat and ciliate leaf margins, smaller female capitula (3.7–4.3 mm long), and smaller female corollas (1.3–1.6 mm long) and styles (1.6–1.8 mm long), whereas *B. macrophylla* presents shorter petioles (0.3–0.9 cm long), coriaceous leaf blades with attenuate base and revolute, non-ciliate margins with 1–5 subapical teeth in the upper 1/3, larger female capitula (5–6 mm long), and longer female corollas (2–2.6 mm long) and styles (2.5–3.5 mm long).

## Acknowledgements

GH acknowledges grants from FAPESP (2010/00519-8, 2011/18385-0 and 2012/17911-3), and JNN acknowledges CNPq/Reflora (563541/2010-5) and CAPES (BEX 9611/12-6) for the financial support. The authors are also grateful to the staff of the herbaria CARAN, ESA, GFJP, HUFU, RB, and SPF, for loans and for technical support for this study; to the two anonymous referees for the invaluable comments; to João Iganci for preparing the illustration; to Caetano Troncoso Oliveira, Mariana Büniger and Vanessa Leite Rezende for help with fieldwork; and to Waldomiro de Paula Lopes and the Parque Nacional do Caparaó staff for logistic support.

## References

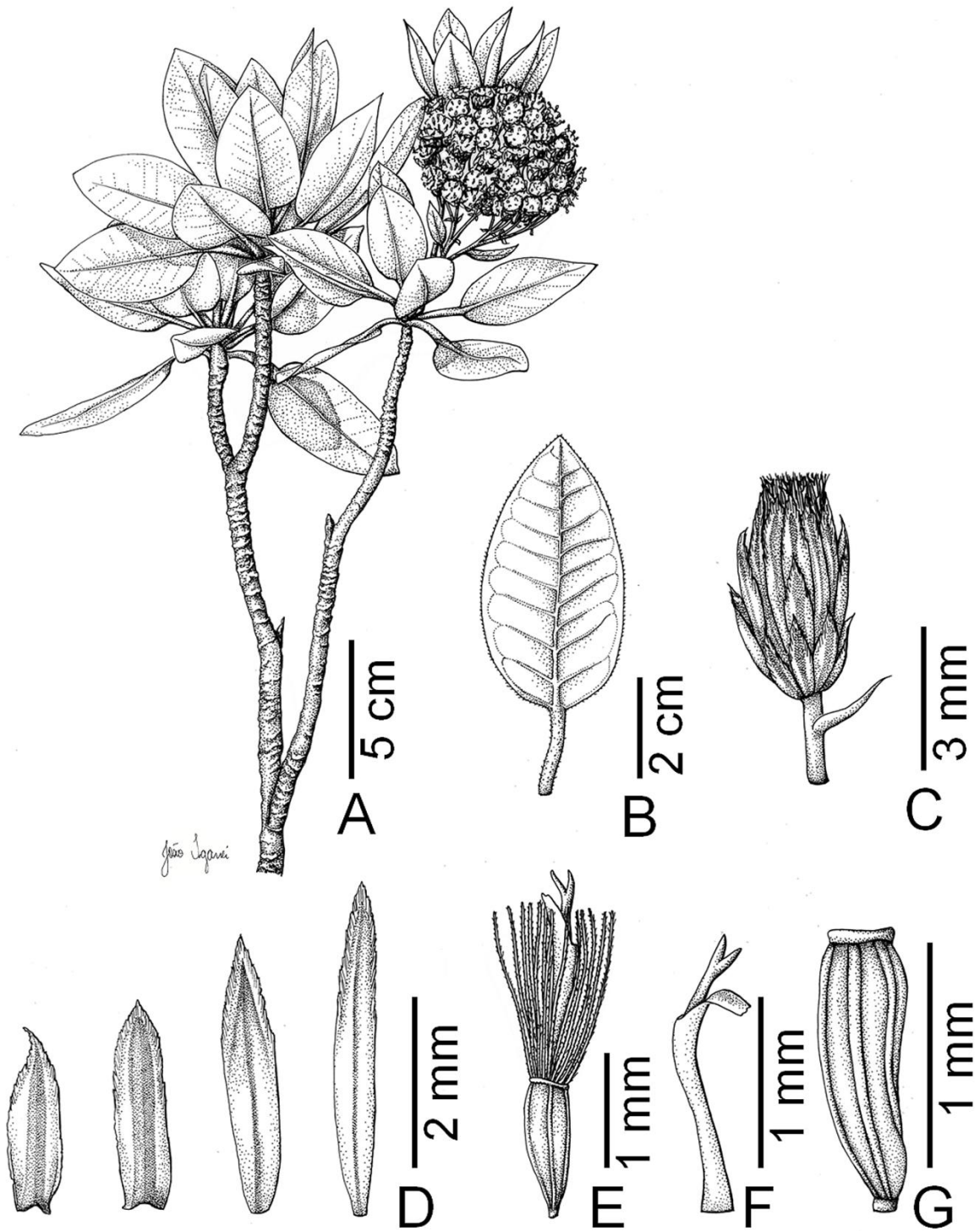
- Bremer, K. (1994) *Asteraceae: Cladistics & Classification*. Timber Press, Portland, 752 pp.
- Candolle, A.P. de (1836) *Prodromus systematis naturalis regni vegetabilis* 5. Treuttel & Würtz, Paris, 706 pp.
- Dusén, P.K.H. (1905) Sur la flore de la Serra do Itatiaya au Brésil. *Archivos do Museu Nacional do Rio de Janeiro* 13: 1 – 119.
- Heiden, G. & Schneider, A.A. (2013) *Baccharis*. In: *Lista de Espécies da Flora do Brasil*. Jardim Botânico do Rio de Janeiro. Available from: <http://floradobrasil.jbrj.gov.br/jabot/floradobrasil/FB5151> (accessed 20 November 2013).
- IUCN Standards and Petitions Subcommittee (2011) *Guidelines for using the IUCN Red List Categories and Criteria*. Version 9. Prepared by the Standards and Petitions Subcommittee. Available from: <http://www.iucnredlist.org/documents/RedListGuidelines.pdf> (accessed 20 November 2013).
- Linnaeus, C. (1753). *Species plantarum*. L. Salvius, Stockholm, 1200 pp.
- Müller, J. (2006) Systematics of *Baccharis* (Compositae–Astereae) in Bolivia, including an overview of the genus. *Systematic Botany Monographs* 76: 1–341.



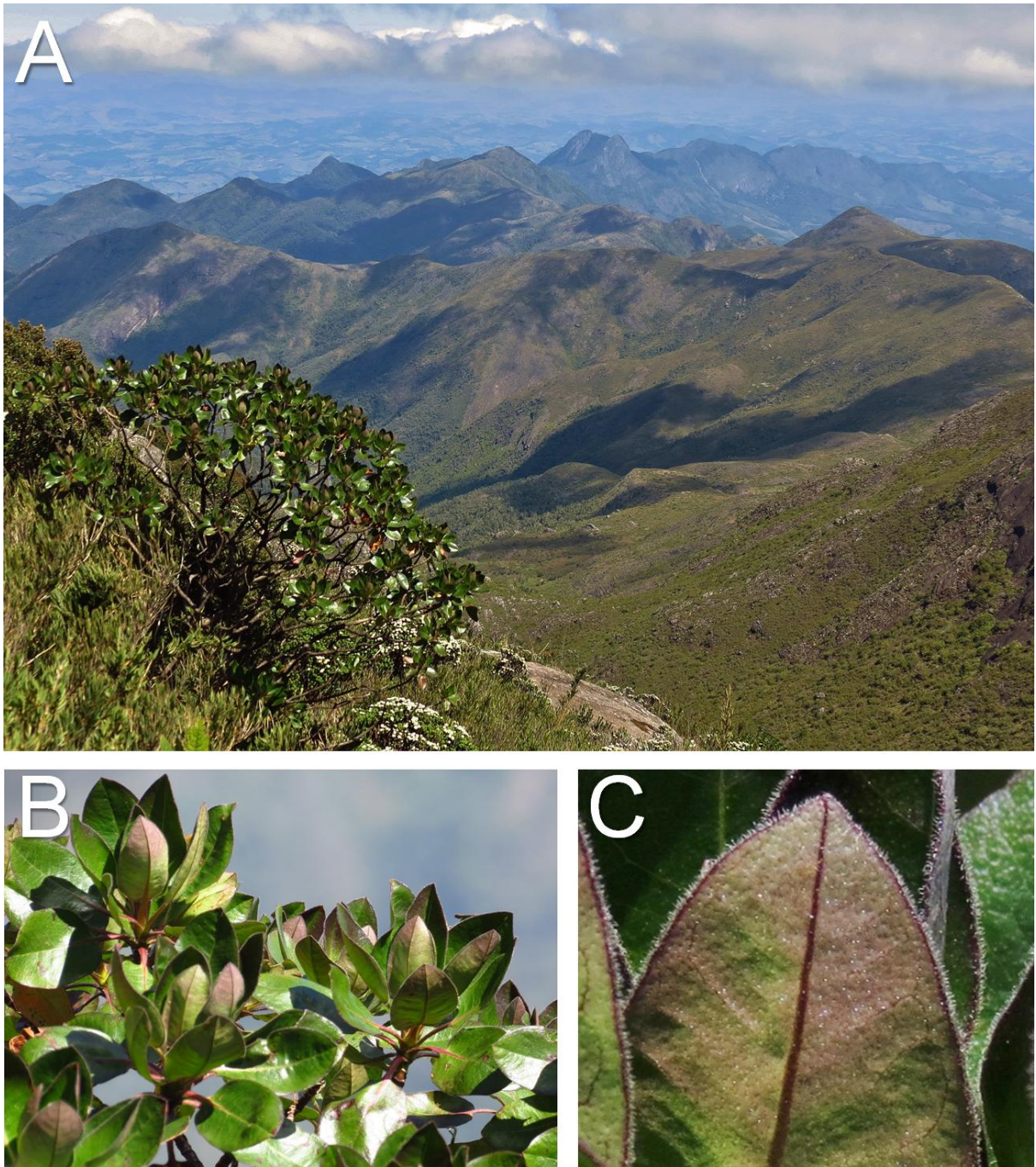
Müller, J. (2013) *World checklist of Baccharis L. (Compositae–Astereae)*. Available from:  
<http://www.spezbot.uni-jena.de/wp-content/uploads/2013/09/World-checklist-of-Baccharis-L..pdf>.  
(accessed 10 February 2014).

Safford, H.D. (1999). Brazilian páramos I. An introduction to the physical environment and vegetation of the campos de altitude. *Journal of Biogeography* 26: 693–712.

Safford, H.D. (1999b). Brazilian páramos II. Macro- and mesoclimate of the campos de altitude and affinities with high mountain climates of the tropical Andes and Costa Rica. *Journal of Biogeography* 26: 713–73.

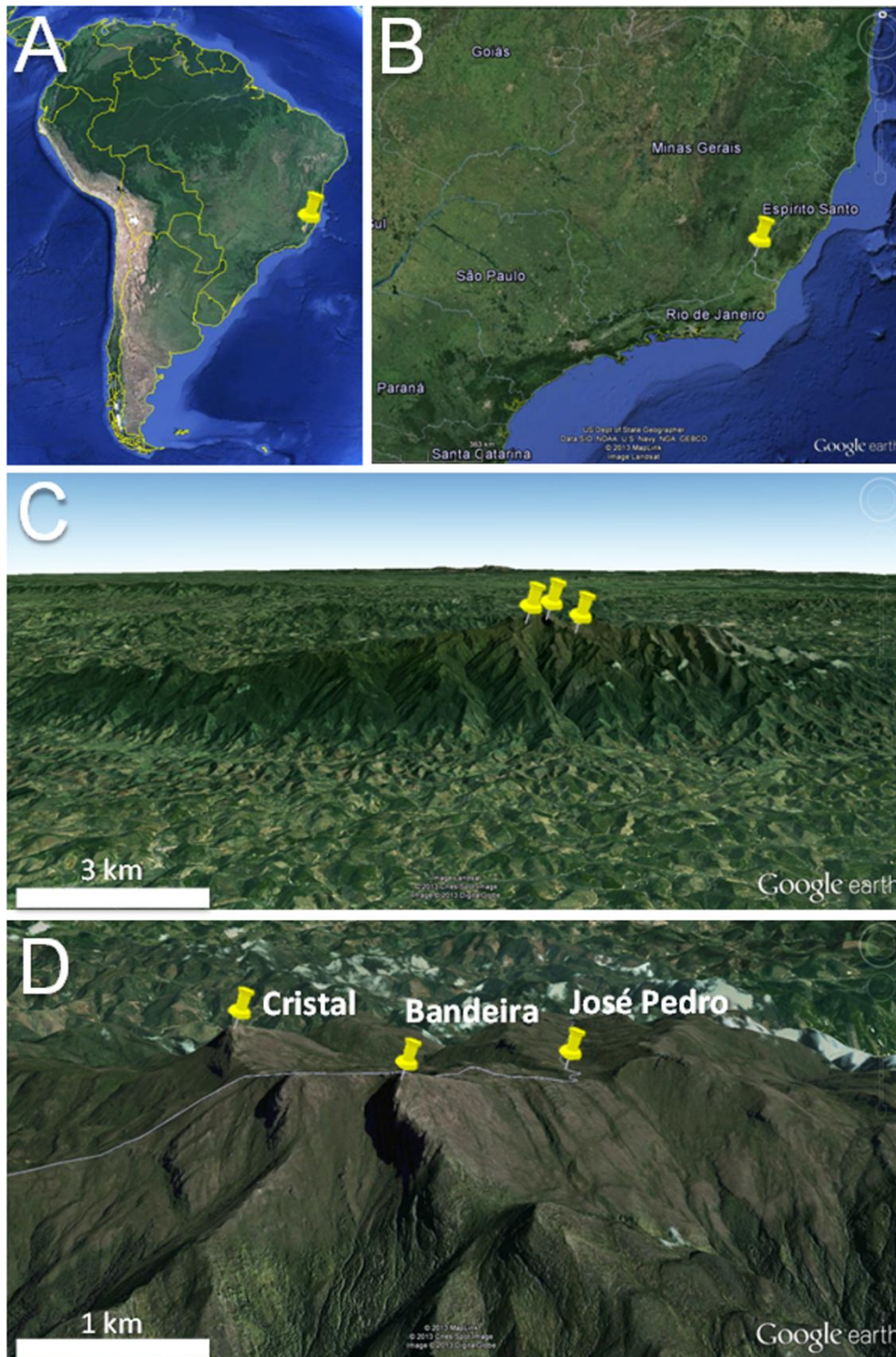


**FIGURE 1.** *Baccharis magnifica*. **A.** Fertile shoot. **B.** Leaf, abaxial view. **C.** Female capitulum. **D.** Phyllaries of female capitulum (outer to inner) and palea. **E.** Female floret. **F.** Corolla and style of female floret. **G.** Cypsela (pappus removed). **A–F:** Souza et al. 23530 (ESA). **G:** Brade 17005 (RB). Illustration by João Iganci.

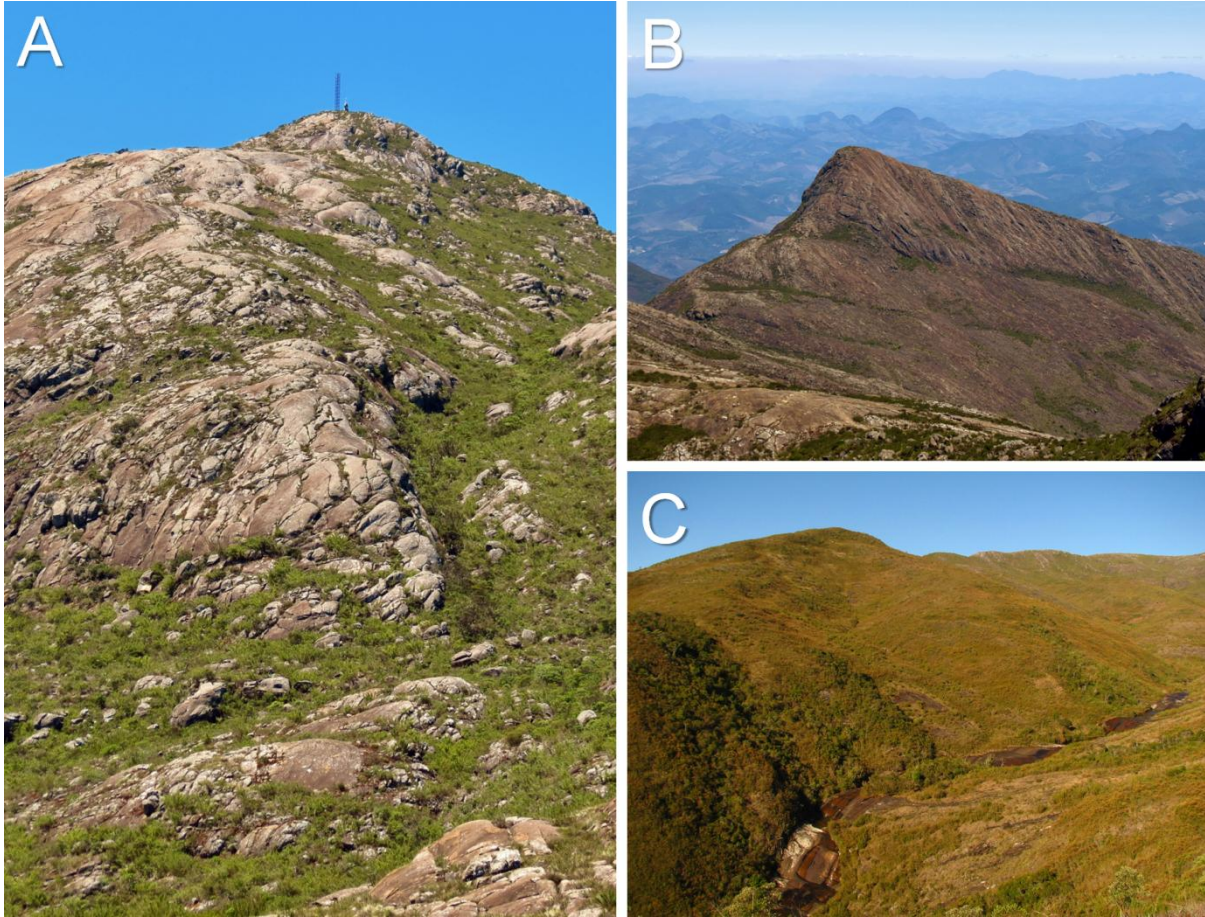


**FIGURE 2.** *Baccharis magnifica*: **A.** Habit and habitat in the escarpments of Bandeira peak. **B.** Vegetative branches depicting the showy green and slightly wine-tinged foliage. **C.** Resinous dots and ciliate margins of the leaf, visible to the naked eye.





**FIGURE 3.** Distribution of *Baccharis magnifica*: **A.** Overview of South America. **B.** Southeastern Brazil and the Caparaó pinpointed. **C.** and **D.** Three dimensional maps depicting the Serra do Caparaó and plotting the Pico do Cristal, Pico da Bandeira and the córrego José Pedro, while the thin white line in D is the boundary between Espírito Santo (front) and Minas Gerais (behind).



**FIGURE 4.** Habitats of *Baccharis magnifica* in the Parque Nacional do Caparaó: **A.** Pico da Bandeira. **B.** Pico do Cristal. **C.** Córrego José Pedro.



## APPENDIX 6

**Two new species of *Baccharis* subgen. *Baccharis* (Asteraceae, Astereae) with single-flowered female capitula from the Serra do Cipó, Minas Gerais, Brazil**





**Two new species of *Baccharis* subgen. *Baccharis* (Asteraceae, Astereae) with single-flowered female capitula from the Serra do Cipó, Minas Gerais, Brazil**

GUSTAVO HEIDEN<sup>1,2</sup> & JOSÉ RUBENS PIRANI<sup>1</sup>

<sup>1</sup>*Departamento de Botânica, Instituto de Biociências, Universidade de São Paulo, Rua do Matão, Travessa 14, 321, São Paulo, SP 05508-090, Brazil.*

<sup>2</sup>*gustavo.heidem@gmail.com*



**Abstract.** Two new endemic species of *Baccharis* subgen. *Baccharis* from the Serra do Cipó, Southeastern Brazil, are described. *Baccharis obdeltata* is morphologically similar to the allopatric obdeltate-leaved *B. truncata*, but is distinguished from it by its leaves with 3[–5]-dentate apex, fewer-flowered sessile capitula, the male capitula bearing 5–7 florets and the female capitula a solitary floret. *Baccharis simplex* resembles the sympatric *B. concinna*, from which can be differentiated by its oval to oblong leaves, with obtuse base and rounded to obtuse apex, and shorter female capitula, florets and cypselae. Illustrations, distribution map, habitat and conservation assessments are also provided for the new species.

**Resumo.** Duas novas espécies de *Baccharis* subgen. *Baccharis* endêmicas da Serra do Cipó, Sudeste do Brasil, são descritas. *Baccharis obdeltata* é morfologicamente similar a espécie alopatrica de folhas obdeltadas *B. truncata*, sendo distinta pelas folhas com ápice 3[–5]-dentado e capítulos femininos sésseis e com menos flores, o masculino portando 5–7 flores e o feminino uma única flor. *Baccharis simplex* se assemelha à *B. concinna*, espécie simpátrica com capítulos femininos também unifloros, da qual pode ser diferenciada pelas folhas ovais a oblongas, base obtusa e ápice arredondado ou obtuso com dentes suaves e capítulo feminino, flores e cipselas menores. Ilustrações, mapa de distribuição, considerações sobre habitat e conservação são também fornecidos para as novas espécies.

**Key Words.** Baccharidinae, Campos rupestres, Compositae, Espinhaço.



## Introduction

The Serra do Cipó, a section of the Cadeia do Espinhaço, is recognized as a center of species richness and endemism in Southeastern Brazil (Giulietti et al. 1997, Echternacht *et al.* 2011). A revision of herbarium specimens and field work are being conducted by the authors aiming at the completion of the tribe Astereae treatment for the Flora of the Serra do Cipó project. Current records for this area include 26 species of *Baccharis* Linnaeus (1753: 860; Asteraceae: Astereae), a New World genus broadly characterized by the tufted indumentum of the leaves and stems, with adjoining basal cells of the trichomes, and the common occurrence of dioecy (Müller 2006). Two of the species recorded from the Serra do Cipó were recently collected by the authors and recognized as new to the science. These species are described, illustrated and their affinities and areas of occurrence are discussed, below.

## New species

*Baccharis obdeltata* G.Heiden, *spec. nov.* (Figures 1 and 2).

*Differs from Baccharis truncata* Gardner by its leaves with 3[–5]-dentate apex (*vs. truncate*), less-flowered sessile capitula (*vs. pedunculate*), the male bearing 5–7 florets (*vs. 10–16*) and the female single-flowered (*vs. 3–7*).

Type:—BRAZIL. Minas Gerais: Santana do Riacho, Serra do Cipó, Lapinha da Serra, trilha para o Pico do Breu, trilha secundária adjacente à encosta, 19°6'27"S, 43°40'20"W, 1281 m, 16 June 2010, fl., fr., ♀, G. Heiden, L.M. Borges, C.M. Siniscalchi & G. Müller 1385 (holotype SPF!; isotypes JE!, K!, RB!, Herbário da Embrapa Clima Temperado, Pelotas, RS, Brasil!).

*Shrubs* 0.3–0.7 m tall, erect, and strongly resinous; bark light brown. *Leaves* with petioles 1.2–2 mm long, leaf blade coriaceous, 4.2–10 mm long, 3.5–8 mm wide, strongly resinous, obdeltate, apex 3[–5]-dentate, base cuneate, margin entire or rarely with 2 teeth, venation pinnate, craspedodromous, with 1–2 pairs of major lateral veins, midrib prominent on abaxial surface, glandular-punctate on both surfaces. *Capitula* solitary, in leaf axils of younger shoots. *Male capitula* sessile, 2.6–2.9 mm long; florets 5–7; involucre 2.2–2.5 mm long, 1–1.7 mm diam., campanulate; phyllaries 3-seriate, outermost phyllaries ovate, median narrow elliptic, innermost lanceolate, stramineous, margins slightly dentate,

scarious, apices acute; clinanthium flat, glabrous; corolla 1.4–1.6 mm long, tube 0.9–1.1 mm long, throat 0.1–0.2 , lobes 0.4–0.5 mm long; style 1.4–1.7 mm long, apex slightly cleft, distally dilated; ovary abortive, glabrous; pappus uniseriate, 1–1.4 mm long, bristles 14–16, apically broadened, short-protruding, erect terminal cell ends. *Female capitula* sessile, 3.1–3.3 mm long; involucre 3.1–3.4 mm long, 0.8–1 mm diam., cylindrical, narrowed at distal end; phyllaries 3–4 series, stramineous, outer and median ovate, innermost linear-lanceolate, margins slightly dentate, scarious, apices acute; clinanthium slightly convex, glabrous; florets 1; corolla 0.6–0.85 mm long, filiform, with 5 obtuse apical teeth; style 0.85–0.95 mm long, branches 0.2–0.25 mm long; *cypselae* 1.1–1.4 mm long, 0.3–0.4 mm diam., brown, glabrous, oblong, slightly narrowed at bases, with 12–14 strong longitudinal ribs, *pappus* biseriate, 0.65–0.8 mm long, bristles 40–60, apically not broadened, not elongated at cypselae maturity, deciduous.

*Distribution*:—Known only from elevations between 1110–1414 m along the trail from Lapinha da Serra to Pico do Breu and in the private reserve of Brumas do Espinhaço (Figure 3) within the Serra do Cipó range, a portion of the Cadeia do Espinhaço, the later extending from central Bahia to Southern Minas Gerais states (Giulietti et al. 1997).

*Habitat*:—*Baccharis obdeltata* forms dense populations along steep quartz outcrops in the rocky grasslands (*campos rupestres*) vegetation.

*Phenology*:— Fertile specimens, flowering and setting fruit, have been collected between May and June.

*Conservation status*:—Because of the limited extent of occurrence, known populations recorded at only three locations, and increasing loss of quality of the *campos rupestres* ecosystem due to anthropogenic pressure (Burman 1991, Giulietti et al. 1997), the new species is assessed as Vulnerable: VU B1ab(iii) (IUCN 2011).

*Etymology*:—*The specific epithet refers to the unusual obdeltate leaf shape.*

**Additional specimens examined (paratypes):**– BRAZIL. Minas Gerais: Santana do Riacho, RPPN Brumas do Espinhaço, Brumoso, 1414 m, 12 July 2012, fl., ♂, *M.G.C. Fernandes, F.M. Fernandes & C.A. Ferreira Júnior 1648* (BHZB, SPF); Serra do Cipó, Lapinha da Serra, trilha para o Pico do Breu, trilha secundária adjacente à encosta, 19°6'27"S, 43°40'20"W, 1281 m, 16 June 2010, fl., ♂, *G. Heiden, L.M. Borges, C.M. Siniscalchi & G. Müller 1386* (BHCB, RB, SPF); subida para o falso Morro do Breu, subida em zigue-zague no primeiro trecho da trilha, 19°6'58.8"S, 43°40'10.7"W, 1110 m, 23 May 2011, fl., fr., ♀, *C.M. Siniscalchi, C.R.M. Siniscalchi & R. Siniscalchi 225* (BHCB, RB, SPF); fl. ♂, *C.M. Siniscalchi, C.R.M. Siniscalchi & R. Siniscalchi 226* (BHCB, RB, SPF); vertente na encosta da montanha, 19°6'29.9"S, 43°40'12.8"W, 1217 m, fl., fr., ♀, *C.M. Siniscalchi, C.R.M. Siniscalchi & R. Siniscalchi 227* (JE, SPF); ♂, *C.M. Siniscalchi, C.R.M. Siniscalchi & R. Siniscalchi 228* (JE, SPF); 19°6'26.1"S, 43°40'16.1"W, 1,256 m, ♀ *C.M. Siniscalchi, C.R.M. Siniscalchi & R. Siniscalchi 231* (K, NY, SPF); ♂, *C.M. Siniscalchi, C.R.M. Siniscalchi & R. Siniscalchi 232* (K, NY, SPF).

*Baccharis obdeltata* belongs to subgenus *Baccharis* on the basis of the style apex of its male florets bearing sweeping hairs of unequal size, female florets with 5-dentate corolla apex and glabrous >8-costate cypselae with deciduous biseriate pappus. The new species superficially resembles the allopatric *B. truncata* Gardner (1848: 82), occurring in the Espinhaço range from the northerly Chapada Diamantina south to the Serra do Ouro Branco range in ironstone vegetation (*canga*), but not recorded till to now from the Serra do Cipó. Both species are characterized by the obdeltate leaves with cuneate basis. However, *B. obdeltata* can be distinguished by the smaller leaves (4.2–10 mm long and 3.5–8 mm wide) with 3[–5]-dentate apex, sessile male capitula bearing fewer florets (5–7) and single-flowered sessile female capitula, while *B. truncata* has larger leaves (1–2 cm long and 0.8–1 cm wide) with truncate apex, pedunculate male capitula bearing more florets (10–16) and pedunculate female capitula bearing 3–7 florets.

***Baccharis simplex*** G.Heiden, *spec. nov.* (Figures 4 and 5).

*Differs from Baccharis concinna* G.M.Barroso by its oval to oblong leaves with obtuse base and rounded to obtuse apex with smooth teeth (vs. obovate to lanceolate leaves, attenuate base and rounded apex) and shorter female capitula (3.5–4.1 mm long vs. 4.5–5 mm long), florets (1.4–1.5 mm long vs. 2–2.2 mm long) and cypselae (1.5–1.7 mm vs. 2–2.2 mm long).

BRAZIL. Minas Gerais: Jaboticatubas, Serra do Cipó, APA Morro da Pedreira, Rodovia Belo Horizonte – Conceição do Mato Dentro (MG010), km 116, Alto do Palácio, topo das elevações com escarpas voltadas para o vale do Córrego Palácio, 19°15'S, 43°32'W, 1250 m, 17 February 2011, fl., fr., ♀, G. Heiden, J.R. Pirani, C.M. Siniscalchi & M.F. Devecchi 1611 (holotype SPF!; isotypes BHCB!, JE!, RB!, Herbário da Embrapa Clima Temperado, Pelotas, RS, Brasil!).

*Shrubs* 0.3–0.5 m tall, erect; strongly resinous; bark light brown. *Leaves* with petioles 1–2 mm long, leaf blade coriaceous, 6.8–11 mm long, 3–6.6 mm wide, strongly resinous, broadly elliptic to oblong, apex rounded to obtuse, base obtuse, margins with 1–4 smooth teeth on distal half of each side, venation pinnate, craspedodromous, with 3–5 pairs of major lateral veins, midrib prominent on abaxial surface, glandular-punctate on both surfaces. *Capitula* solitary, in the leaf axis of the younger shoots. *Male capitula* with peduncles 1.2–2.5 mm long; capitula 2.5–2.7 mm long; florets 2–7; involucre 1.9–2.2 mm long, 1.2–2.7 mm diam., cup-shaped; phyllaries 3-seriate, outermost phyllaries lanceolate, median ovate, innermost ovate-lanceolate, stramineous, margins entire, scarious, apices acute; clinanthium plane, glabrous; corolla 1.9–2.3 mm long, tube 1.1–1.3 mm long, throat 0.2–0.3 , lobes 0.6–0.8 mm long; style 2.3–2.4 mm long, apex slightly cleft, distally dilated, ovary abortive, glabrous; pappus uniseriate, 2–2.3 mm long, bristles 14–18, apex broadened, short-protruding, erect terminal cell apices. *Female capitula* sessile, 3.5–4.1 mm long; involucre 3.5–4 mm long, 1–1.3 mm diam., cylindrical, narrowed at distal end; phyllaries 3–4-seriate, stramineous, outer lanceolate, median ovate, innermost linear-lanceolate, margins entire, scarious, apices acute; clinanthium slightly convex, glabrous; florets 1; corolla 1.4–1.5 mm long, filiform, with 5 obtuse apical teeth; style 1.4–1.6 mm long., branches 0.2–0.3 mm long; *cypselae* 1.5–1.7 mm long, 0.55–0.6 mm diam., brown, glabrous,



oblong, slightly narrowed at bases, with 12–14 strong longitudinal ribs; *pappus* biseriate, 1.2–1.4 mm long, bristles 60–80, apically not broadened, not elongated at cypsela maturity, deciduous.

*Distribution*:—Known only from altitudes between 1250–1414 m with two precise records at Alto do Palácio and in the private reserve of Brumas do Espinhaço (Figure 3) within the Serra do Cipó range, a portion of the Espinhaço ridge, the later extending from central Bahia to Southern Minas Gerais states (Giulietti et al. 1997).

*Habitat*:—*Baccharis simplex* grows in areas of exposed fine quartzite sediments found at the very top of elevations amidst the rocky grasslands (*campos rupestres*) vegetation.

*Phenology*:—Fertile specimens, flowering and setting fruit, have been collected in February and July.

*Conservation status*:—Because of the limited extent of occurrence, known only for small populations recorded at two, maybe three localities, and loss of quality of the *campos rupestres* ecosystem due to anthropogenic pressure (Burman 1991, Giulietti et al. 1997), the new species is assessed as Endangered: EN B1ab(iii) (IUCN 2011).

*Etymology*:—The specific epithet refers to the single-flowered female capitula and to the ordinary overall aspect of the plants, which share habit and leaf characters that are quite common to several other species of *Baccharis* subgen. *Baccharis*.

**Additional specimens examined (paratypes)**:— BRAZIL. Minas Gerais: Jaboticatubas, Serra do Cipó, APA Morro da Pedreira, Rodovia Belo Horizonte – Conceição do Mato Dentro (MG010), km 116, Alto do Palácio, topo das elevações com escarpas voltadas para o vale do Córrego Palácio, 19°15'S, 43°32'W, 1250 m, 17 February 2011, fl., ♂, *G. Heiden, J.R. Pirani, C.M. Siniscalchi & M.F. Devecchi 1610* (BHCB, JE, RB, SPF, Herbário da Embrapa Clima Temperado, Pelotas, RS, Brasil!). Santana do Riacho, RPPN Brumas do Espinhaço, 1414 m, 11 July 2012, fl., ♂, *M.G.C. Fernandes, F.M. Fernandes & C.A. Ferreira Júnior 1570* (BHZZB, HUFU,SPF); Serra do Cipó, 1400 m, 11 May 1974, fl., ♂, *G. Martinelli 315* (RB).

*Baccharis simplex* belongs to subgenus *Baccharis* based on style apex of male florets bearing sweeping hairs of unequal size, female florets with 5-dentate corolla apex and glabrous >8-costate

cypsela with deciduous biseriate pappus. The new species is similar to the sympatric *B. concinna* G.M.Barroso (1976: 162), also endemic to the Serra do Cipó. The two species possess leaves with dentate margins and axillary few-flowered male capitula and single-flowered female capitula, being distinguished by habit, leaf shape and female capitula length. While *B. simplex* is a small shrub (0.3–0.5 m tall) with oval to oblong leaves, obtuse base and rounded to obtuse apex with small teeth and shorter female capitula (3.5–4.1 mm long), floret (1.4–1.5 mm long) and cypsela (1.5–1.7 mm long), *B. concinna* is a taller shrub (0.5–1 m tall) with obovate to lanceolate leaves, attenuate base and rounded apex with coarse teeth and longer female capitula (4.5–5 mm long), floret (2–2.2 mm long) and cypsela (2–2.2 mm long).

### **Acknowledgements**

The authors acknowledge FAPESP (processes 2010/00519-8, 2011/18385-0 and 2012/17911-3) and CNPq for financial support. We are also grateful to the staff of the herbaria BHZB, RB and SPF for technical support, to the two anonymous referees for the invaluable comments, to João Iganci for preparing the illustrations, and to Carolina Moriani Siniscalchi for assistance with fieldwork, collecting additional samples of *B. obdeltata* and providing pictures of this species in its habitat.

### **References**

- Barroso, G.M. (1976) Subtribo Baccharidinae Hoffmann. Estudo das espécies ocorrentes no Brasil. *Rodriguésia* 40: 1–281.
- Burman, A. (1991) Saving Brazil's savannas. *New Scientist* 1758: 30–34.
- Echternacht, L., Trovó, M., Oliveira, C.T. & Pirani, J.R. (2011) Areas of endemism in the Espinhaço Range in Minas Gerais, Brazil. *Flora* 206: 782–791.
- Gardner, G. (1848) Contributions towards a Flora of Brazil, being the distinctive characters of some new species of Compositae, belonging to the tribe Asteroideae. *The London journal of botany; containing figures and descriptions of such plants as recommend themselves by their novelty, rarity,*

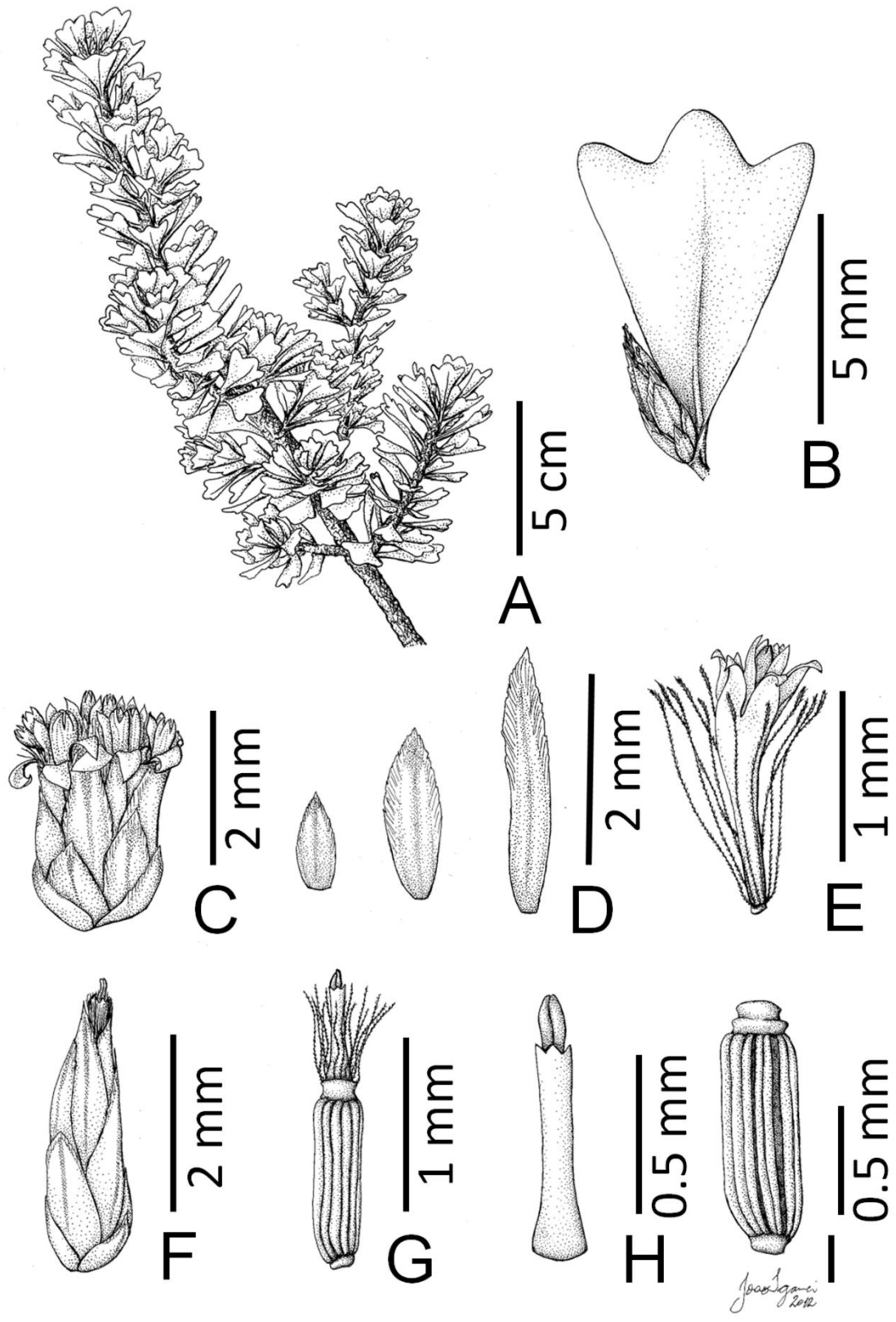
*history, or uses; together with botanical notices and information, and occasional portraits and memoirs of eminent botanists* 7: 78–90.

Giulietti, A.M., Pirani, J.R. & Harley, R.M. (1997) Espinhaço Range. In Davis, S.D., Heywood, V.H., Herrera-MacBryde, O. & Villa-Lobos, J. (eds.) *Centres of Plant Diversity. Vol. 3. The Americas*. National Museum of Natural History, Smithsonian Institution, Washington, p.397–404.

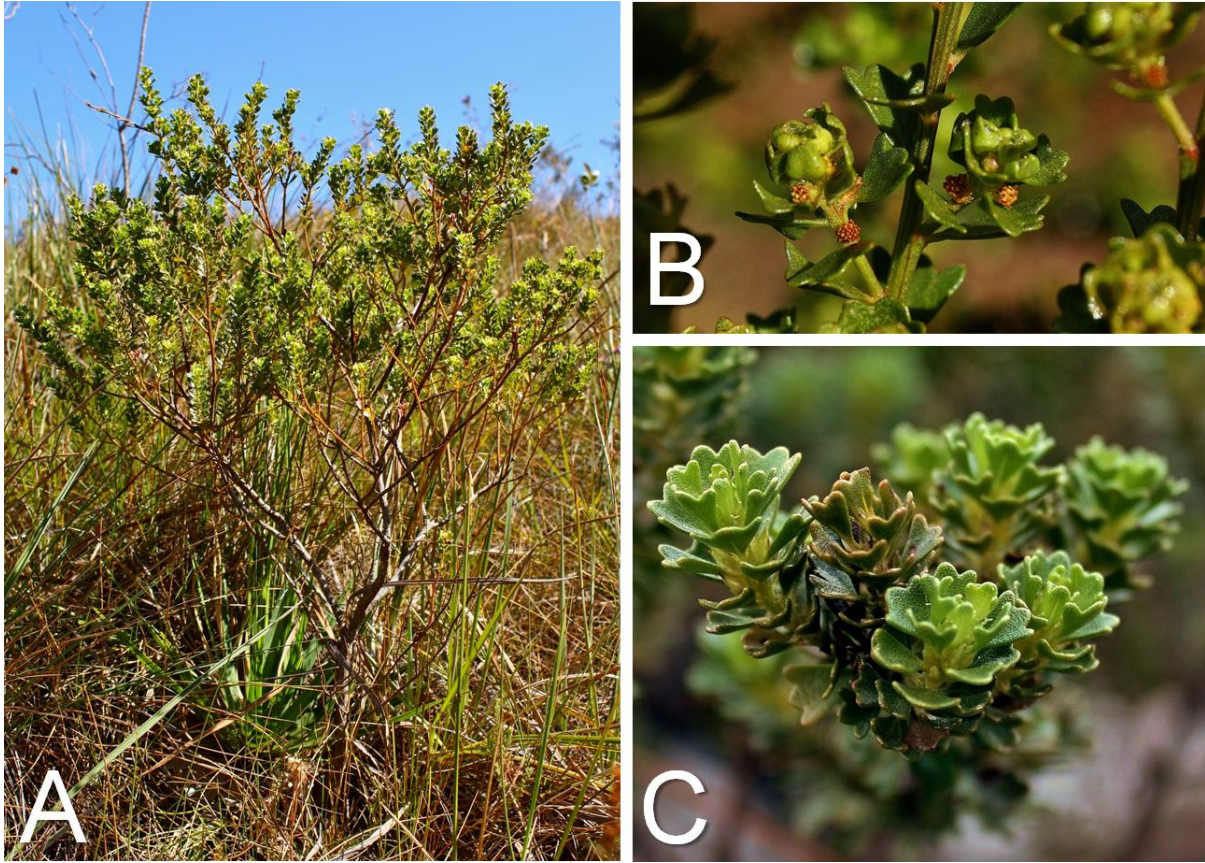
IUCN Standards and Petitions Subcommittee (2011) Guidelines for Using the IUCN Red List Categories and Criteria. Version 9. Prepared by the Standards and Petitions Subcommittee. Available from: (14 February 2012).

Linnaeus, C. (1753). *Species plantarum*. Vol. 2. L. Salvii, Holmiae.

Müller, J. (2006) Systematics of *Baccharis* (Compositae–Astereae) in Bolivia, including an overview of the genus. *Systematic Botany Monographs* 76: 1–341.

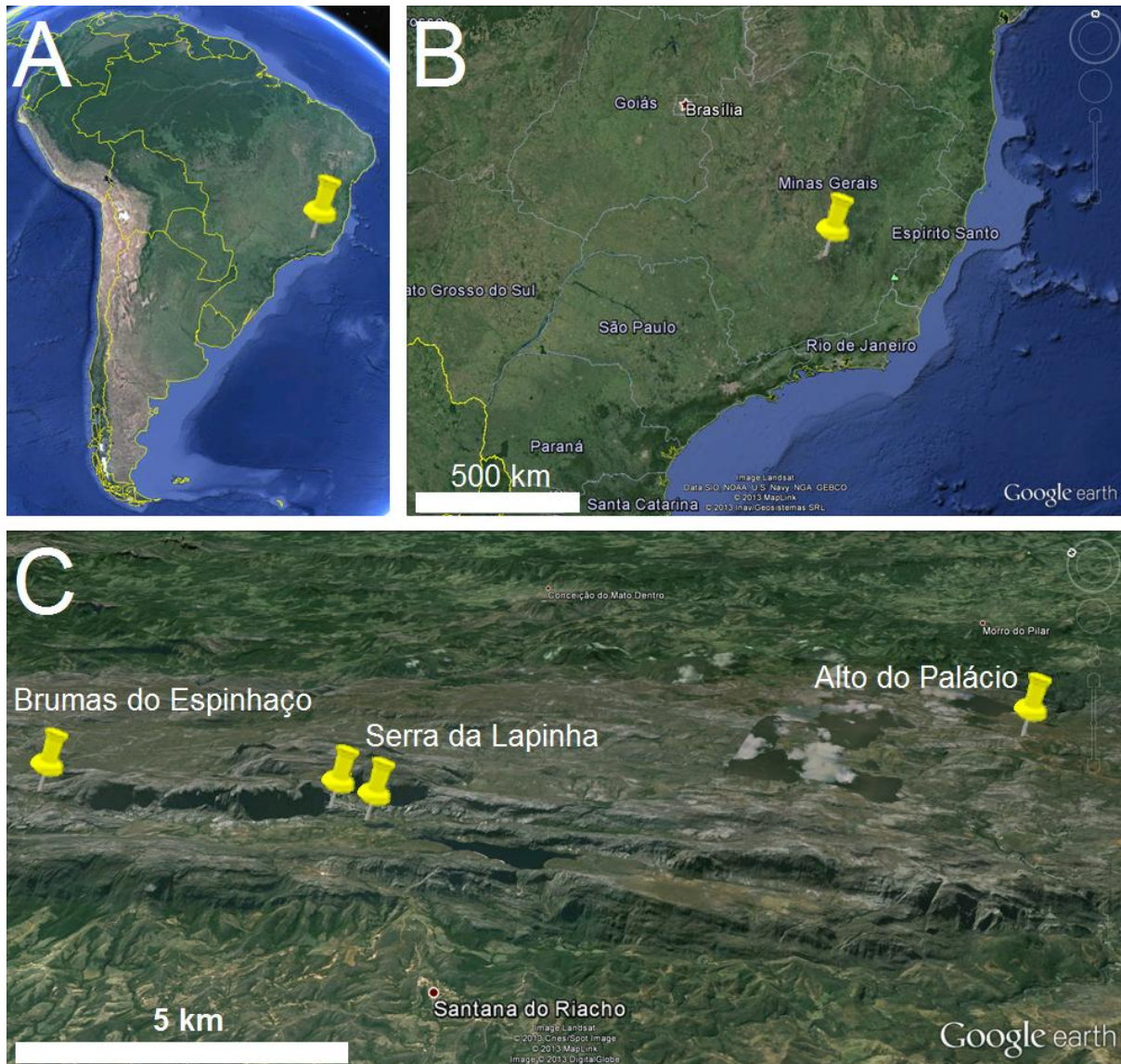


**FIGURE 1.** *Baccharis obdeltata*. **A.** Fertile shoot. **B.** Leaf and female capitulum. **C.** Male capitulum. **D.** Phyllaries of male capitulum. **E.** Male floret. **F.** Female capitulum. **G.** Female floret. **H.** Corolla and style of female floret. **I.** Cypsela (pappus removed). **A–B, F–I:** *Heiden et al. 1385* (SPF). **C–E:** *Heiden et al. 1386* (SPF). Illustration by João Iganci.

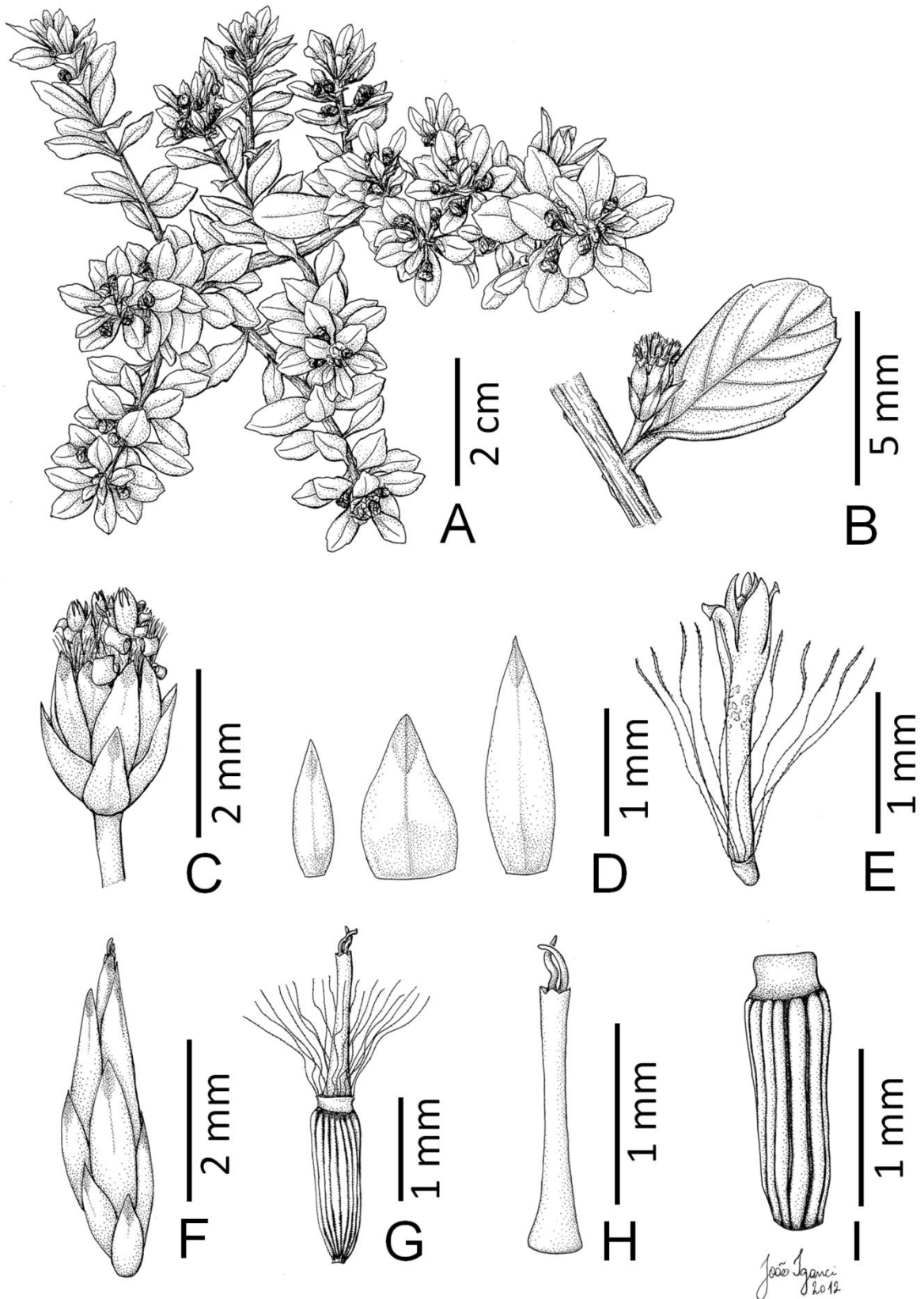


**FIGURE 2.** *Baccharis obdeltata*. **A.** Habit. **B.** Flowering shoot of a male plant. **C.** Flowering shoot of a female plant. Photos by C.M. Siniscalchi.





**FIGURE 3.** Distribution of *Baccharis obdeltata* and *B. simplex*. **A.** Overview map of South America pinpointing the position of the Serra do Cipó in Southeastern Brazil. **B.** A highlight in Southeastern Brazil depicting the boundaries of Minas Gerais state and the position of Serra do Cipó. **C.** Three dimensional map showing part of the Serra do Cipó range, plotting the known distribution of *B. obdeltata* (Brumas do Espinhaço and Serra da Lapinha) and *B. simplex* (Alto do Palácio and Brumas do Espinhaço).



**FIGURE 4.** *Baccharis simplex*. **A.** Fertile shoot. **B.** Leaf and male capitulum. **C.** Male capitulum. **D.** Phyllaries of male capitulum. **E.** Male floret. **F.** Female capitulum. **G.** Female floret. **H.** Corolla and style of female floret. **I.** Cypsela (pappus removed). **A–E:** *Heiden et al. 1610* (SPF). **F–I:** *Heiden et al. 1611* (SPF). Illustration by João Iganci.





**FIGURE 5.** *Baccharis simplex*. **A.** Habitat and habit. **B.** Flowering shoot of a male plant. **C.** Flowering shoot of a female plant. Photos by G. Heiden.



## APPENDIX 7

***Baccharis nebularis* (Asteraceae, Astereae): a new species of subgen. *Tarchonanthoides* from the mountains of southern Brazil**



***Baccharis nebularis* (Asteraceae, Astereae): a new species of subgen. *Tarchonanthoides* from the mountains of Southern Brazil**

GUSTAVO HEIDEN<sup>1,2</sup> & JOSÉ RUBENS PIRANI<sup>1</sup>

<sup>1</sup>*Departamento de Botânica, Instituto de Biociências, Universidade de São Paulo, Rua do Matão, Travessa 14, 321, São Paulo, SP 05508-090, Brazil.*

<sup>2</sup>*gustavo.heidem@gmail.com*

*Manuscript accepted for publication in Phytotaxa.*



## **Abstract**

*Baccharis nebularis*, a new species belonging to *B.* subgen. *Tarchonanthoides* sect. *Curitybenses*, is described, illustrated, compared to *B. chionolaenoides* and *B. curitybensis*, and a key for identification is provided. The new species occurs in patches of cloud forest thickets mixed with high altitude tropical grasslands in the Southern Brazilian Mountains. Data on distribution and habitat, phenology, conservation status and a list of specimens examined are also presented.

## **Resumo**

*Baccharis nebularis*, uma nova espécie pertencente a *B.* subgen. *Tarchonanthoides* sect. *Curitybenses* é descrita, ilustrada, comparada a *B. chionolaenoides* e *B. curitybensis* e uma chave de identificação é fornecida. A nova espécie ocorre em capões de mata nebulosa entremeados com manchas de campo de altitude nas montanhas do Sul do Brasil. Dados sobre a distribuição e o habitat, fenologia, estado de conservação e uma lista de espécimes examinados também são apresentados.

**Key words:** Atlantic rainforest, Baccharidinae, Compositae, cloud forests, tropical highland grasslands



## Introduction

*Baccharis* Linnaeus (1753: 860; Asteraceae: Astereae) is a New World genus that comprises between 354 and 400 species (Bremer 1994, Müller 2013). *Baccharis* sect. *Curitybenses* Giuliano (2005: 536) was described to accommodate *B. curitybensis* Heering ex Malme (1933) which was not placed in a subgenus and neither in a section before. The monotypic section was justified by the unusual characters of the species, since number and structure of the achene ribs and number of series and caducous condition of the pappus bristles are similar to those of *B.* subgen. *Baccharis*, while the style branches in *B. curitybensis* are lanceolate as in the remaining subgenera of *Baccharis* (Giuliano 2005).

Müller (2006) did not follow any sectional scheme for infrageneric classification of *Baccharis* and considered *B. curitybensis* within *B.* subgen. *Tarchonanthoides* Heering (1904: 26) along with 13 other eastern South American species. Later, *B. chionolaenoides* Falkenberg & Deble (2010: 64) was described and placed into *B.* subgen. *Tarchonanthoides* sect. *Curitybenses*.

Heiden & Pirani (2012a, 2012b) published a synopsis of *Baccharis* subgen. *Tarchonanthoides*, including four sections and 22 species (of which one species was new). In this treatment, *B.* sect. *Curitybenses* comprised the two aforementioned species. Recently Deble (2012) had proposed to segregate *B.* subgen. *Tarchonanthoides* as a new genus, *Lanugothamnus* Deble (2012: 11), a proposal which was rejected by Heiden (2013) for phylogenetic reasons.

The ongoing studies on this subgenus allowed the recognition of a further species belonging here, the third to be included in *B.* sect. *Curitybenses*. The new species is described here and its affinities are discussed as follows.

***Baccharis nebularis* G.Heiden, sp. nov.** (Figs. 1, 2)

*Baccharis nebularis* G.Heiden differs from *B. chionolaenoides* Falkenb. & Deble by pappus of male florets not twisted and broadened in the apex and by cypsela densely covered by twin trichomes; from *B. curitybensis* Heering ex Malme it is distinguished by leaves crowded at the apex of the branches and peduncles with a tomentose indumentum.

**Type:**—BRASIL. Paraná: Guaratuba, Serra de Araçatuba, Morro dos Perdidos, cume, 25° 53' 21" S, 48° 57' 28" W, 1411 m, 17 December 2010, ♀, G. Heiden, J.R.V. Iganci, J.M. da Silva & J.M. Vaz 1449 (holotype SPF!; isotypes FLOR!, K!, MBM!, RB!, US!).

*Shrubs* 0.5–2 m tall, erect; fertile shoots ascending, terminating in a capitulescence, proliferating. *Stems* brown, fissured, ochraceous or whitish in younger shoots; indumentum tomentose, trichomes filiform, flagelliform and biseriate glandular. *Leaves* 1.2–5 cm long, 0.7–2 cm wide, petioles 2–18 mm long, evenly distributed along the branches; leaf blade discoloured, adaxial surface green, abaxial surface white to ochraceous, chartaceous, obovate to elliptic, apex acute to obtuse, sometimes mucronulate, base acute, margin entire or with 1–3 pairs of teeth; leaves basally 3-nerved, acrodromous imperfect, with a secondary semicraspedodromous reticulum, adaxial surface with a caducous lanose indumentum, abaxial surface with a persistent felted indumentum, both surfaces with filiform, flagelliform and biseriate glandular trichomes. *Capitulescences* corymbose, terminal; corymbs lax, 3–6.5 cm long, 3.3–6.8 cm wide. *Capitula* pedunculate; peduncles 0.7–2.5 cm long, ochraceous, tomentose. *Male capitula* 4.7–6 mm long; florets 34–45; involucre 4–5 mm long, 7–9.6 mm wide, cup-shaped; phyllaries in 3–4 series, outer phyllaries and median phyllaries ovate, innermost phyllaries linear-lanceolate, margin entire, apex rounded; clinanthium plane, nearly glabrous, with scarce biseriate trichomes; corolla 3–3.6 mm long, tube 1.6–1.9 mm long, throat 0.7–0.9 mm, lobes 0.7–0.8 mm long, biseriate hairs on the lobes; anthers including apical appendages 2.3–2.7 mm long; style 2.3–2.9 mm long, branches free, lanceolate; ovary abortive, 0.3–0.5 mm long, 0.1–



0.3 mm wide, covered by biseriate and twin trichomes; pappus uniseriate, 3.3–3.7 mm long, bristles 18–22, not twisted, apically broadened, with short-protruding, adpressed cell apices. *Female capitula* 6.7–8.5 mm long; florets 26–44; involucre 4.2–5.5 mm long, 7.3–9.9 mm wide, campanulate; phyllaries in 4–5 series, outer phyllaries elliptic, median ovate, innermost phyllaries oblanceolate-linear, margin entire, apex rounded; clinanthium plane, nearly glabrous, with scarce flagelliform trichomes; corolla 2.8–3 mm long, filiform, with 5 teeth; style 3.9–4.2 mm long, branches 0.3–0.5 mm long; cypselae 1.2–1.4 mm long, 0.4–0.8 mm wide, brown, evenly covered by twin trichomes, obconical, narrowed at base, 8–10 longitudinal ribs; pappus multiseriate, 2.9–3.2 mm long, deciduous; bristles 32–48, connate basally, slightly broadened apically, not elongated at cypselae maturity. Chromosome number unknown.

**Etymology:**—The specific epithet refers to the habitat in cloud forest thickets amidst high altitude grasslands.

**Distribution and habitat:**—*Baccharis nebularis* occurs in southern Brazil (Paraná and Santa Catarina) and is restricted to the summits of the peaks of the southernmost range of Serra do Mar, at elevations between 1400 and 1700 m a.s.l. (Fig. 3). It grows in patches of high altitude tropical grasslands mixed with cloud forest thickets (Fig. 2), forming sparse populations, in the buffer zone between the ombrophilous dense forest and the high altitude tropical grasslands of the Atlantic province.

**Phenology:**—Fertile specimens have been recorded from August to late December with a flowering peak in October and November.

**Conservation status:**—The new species is known from five massifs (Serra de Araçatuba, Serra de Capivari, Serra da Graciosa, Serra do Ibitiraquire or Serra dos Órgãos, and Serra do Quiriri – Fig. 3), represented in herbaria by 24 collections made between 1960 and 2010. Only five of these collections, all from Serra de Araçatuba, were made in the last 10 years. The high altitude tropical grasslands and cloud forest environments in the southern range of Serra do Mar have different levels of accessibility and are partially covered by diverse levels of preserves, but several of its mountain peaks are private

owned. The environment of the new species is naturally fragmented, related to the sky island distribution of its habitats. Some of these areas are remote and inaccessible, while others are under anthropogenic pressure such as cattle, tourism, accidental fires, forestry and introduction of exotic species. Disturbances of the natural environment occur because some peaks can be reached by car for installation and maintenance of antennas and other telecommunication facilities in the summits. During the collection of the type specimens in Serra do Araçatuba it was observed that *B. nebularis* is a rare species with sparse populations and discontinuous distribution, but due to the lack of more precise information the data available was found to be insufficient to place the taxon into a category of threat and the new species is considered Data Deficient: DD (IUCN 2013).

**Etnobotany & vernacular names:**—Unknown.

**Specimens examined:**—BRAZIL. Paraná: Campina Grande do Sul, Serra do Capivari, 23 October 1997, ♂, *C.V. Roderjan & A.P. Tramujas 1510* (MBM, UPCB); Capivari Grande, 23 October 2001, ♂, *E. Barbosa, O.S. Ribas & E.F. Costa 670* (B, MBM); Serra do Ibitiraquire (Serra dos Órgãos), 2 November 2001, ♂, *A.Y. Mocochinski & M. Scheer 40* (UPCB); Morro Camapuã, 9 September 1999, ♂, *E. Barbosa, J.M. Silva & L.A. Ferreira 390* (C, CTES, ESA, G, INPA, MBM); Morro Tucum, 19 November 1999, ♂, *J. Cordeiro, J.M. Cruz & L.A. Ferreira 1643* (B, CESJ, G, MBM, UFP); Pico Caratuba, 2 August 1967, 1950 m, ♂, *G. Hatschbach 16829* (MBM); 5 October 1967, *G. Hatschbach 17322* (CTES, K, MBM, MO, UPCB); ♂, 15 November 1967, *G. Hatschbach 17845* (HBR, MBM, UPCB). Guaratuba, Serra de Araçatuba, 9 November 1983, ♂, *R. Kummrow 2391* (GB, HBG, MBM, NY, UB, UPCB); 23 November 1996, ♂, *E.P. Santos, H.M. Fernandes & C.M.S. Coimbra 297* (MBM, UPCB); 1 December 1998, ♂, *J.M. Silva, E. Barbosa & J.M. Cruz 2661* (C, FLOR, G, HBG, HUEFS, K, MBM, NY, SPF); 25 February 2000, ♂, *J.M. Silva, E. Barbosa & J. Cordeiro 3262* (CESJ, ESA, HUEFS, MBM); 30 October 2003, ♂, *J.M. Silva, E. Lucas, F.F. Mazine & C.M. Sakuragui 3809* (CORD, MBM, NY, SP); Morro dos Perdidos, cume, 25° 53' 21" S, 48° 57' 28" W, 1411 m, 17 December 2010, ♂, *G. Heiden, J.R.V. Iganci, J.M. da Silva & J.M. Vaz 1450* (MBM, RB, SPF, US); 9 November 1994, ♀, *C.B. Poliquesi & J.M. Cruz 208* (BHCB, HAS, MBM, UB); 9 September 2006, bud, *G.O. Romão & A.P.T. Dantas 1676* (BHCB, ESA, UEC); 29 October 2006, ♂,

*G.O. Romão, C.D. Rodrigues & A.P. Dantas 1496* (BHCB, ESA, SPF, UEC); 23 November 1996, ♂, *E.P. Santos, H.M. Fernandes & C.M.S. Coimbra 297* (NY, UPCB). Quatro Barras, Serra da Graciosa, Morro Mãe Catira, 8 October 1985, ♀, *R. Kummrow & J.M. Silva 2626* (C, CORD, FLOR, GB, MBM, US); 31 October 1989, ♂, *J.M. Silva & C.B. Poliquesi 655* (MBM, SP). Santa Catarina: Campo Alegre, Serra do Quiriri, 19 November 1992, *J. Cordeiro & C.B. Poliquesi 953* (C, HUEFS, MBM, MO); 28 December 1999, ♀, *J. Cordeiro, J.M. Silva, E. Barbosa & O.S. Ribas 1747* (CTES, MBM). Garuva, Monte Crista, 6 October 1960, *R. Reitz & R.M. Klein 10034* (HBR, RB).

*Baccharis nebularis* is placed in *B.* subgen. *Tarchonanthoides* based on the following combination of features: conspicuous indumentum of filiform hairs and lack of tufted indumentum; cup-shaped involucre of male capitula, contrasting to cylindrical to campanulate involucre of female capitula, and corollas of female florets with five papillose teeth. The new species is assigned to *B.* sect. *Curitybenses* due to female flowers with deciduous pappus and ca. 10-ribbed cypselae covered by twin trichomes.

Both in habit and habitat, *B. nebularis* resembles the allopatric *B. chionolaenoides*: they are densely branched shrubs with leaves crowded at the apex of branches, growing in moist places in the transition zone of cloud forest thickets to open areas. However, *B. chionolaenoides* is endemic to the cliffs of Morro da Igreja further south in Santa Catarina, and the new species is more similar to the parapatric *B. curitybensis*, distributed in high altitude open and dry grasslands from Serra da Mantiqueira range in southeastern Minas Gerais and São Paulo south to the highlands of Aparados da Serra in Rio Grande do Sul. *Baccharis curitybensis* and *B. nebularis* have a small area of contact in the Serra do Quiriri massif, at the boundary between Paraná and Santa Catarina. In that area, open and dry high altitude grasslands co-exist with thickets of cloud forest and moist grasslands and both species are recorded there, although growing in distinct habitats. The studied specimens of *B. nebularis* were previously determined in herbaria as *B. curitybensis*. The two species have in common similar 3-nerved, entire or dentate leaves, corymbose capitulescences, cup-shaped male and campanulate female capitula, apically broadened pappi of male florets and cypselae densely covered by twin trichomes. A key for differentiating the three species of sect. *Curitybenses* is provided below.

### Key to the species of *Baccharis* sect. *Curitybenses*

1. Pappus of male floret twisted, not broadened at apex; cypsela sparsely covered by twin trichomes  
..... *B. chionolaenoides*
1. Pappus of male floret not twisted, broadened in the apex; cypsela densely covered by twin trichomes.
2. Leaves evenly distributed along the branches; peduncles with pilose indumentum; female floret with style 3–3.4 mm long; pappus 3.6–4 mm long, longer than style ..... *B. curitybensis*
2. Leaves crowded at the apex of the branches; peduncles with tomentose indumentum; female floret with style 3.9–4.2 mm long, pappus 2.9–3.2 mm long, shorter than style ..... *B. nebularis*

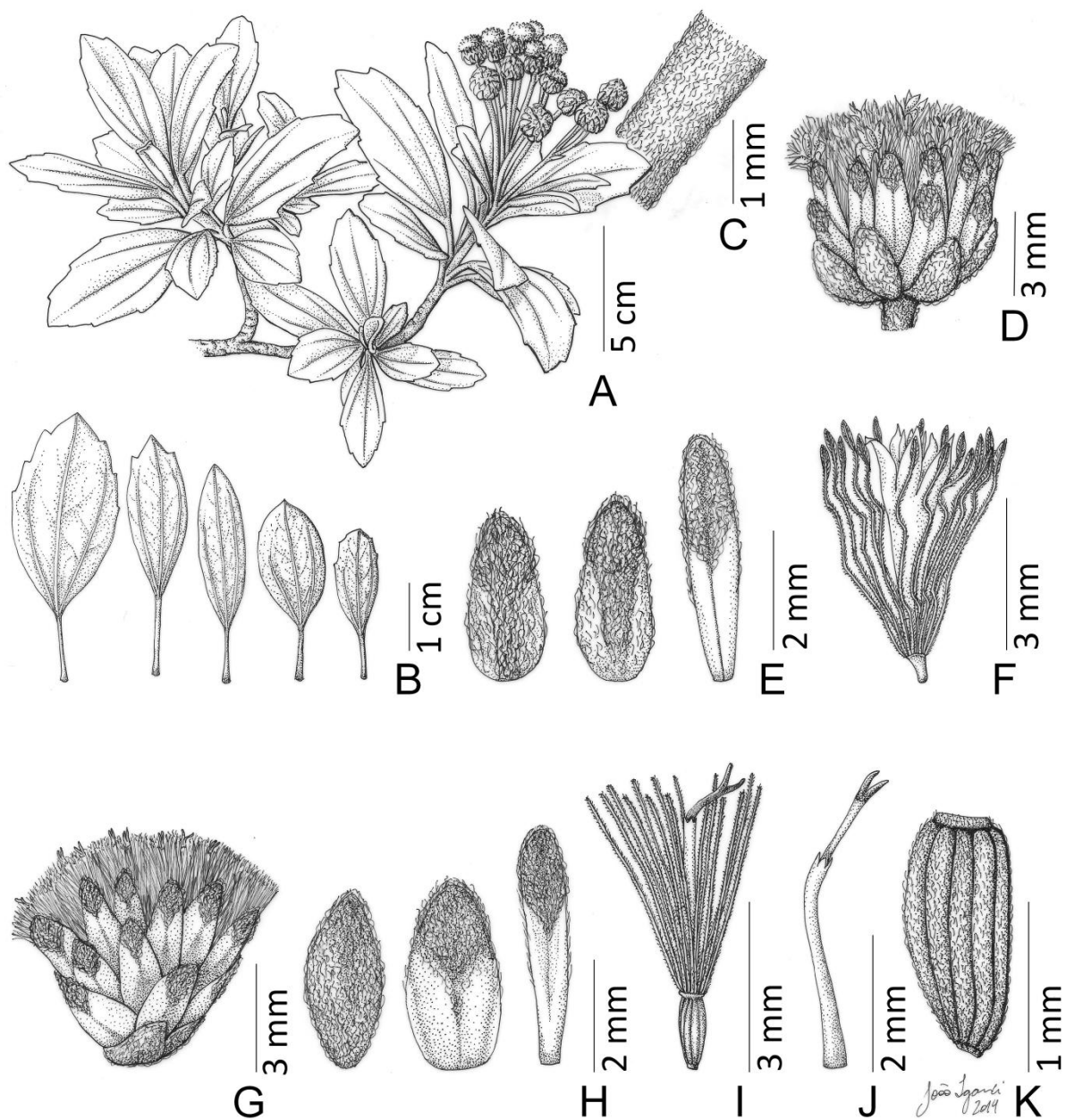
### Acknowledgements

The authors acknowledge FAPESP (processes 2010/00519-8, 2011/18385-0 and 2012/17911-3), IAPT Research Grants in Plant Systematics 2010, and the Smithsonian Institution's 2011 Cuatrecasas Fellowship Award, for the financial support. We are also grateful to the staff of the herbaria consulted (B, BHCB, C, CESJ, CORD, CTES, ESA, G, GB, FLOR, HAS, HBG, HBR, HUEFS, INPA, K, MBM, MO, NY, RB, SP, SPF, UB, UEC, UFP, UPCB, US) for offering support and loaning the specimens for study; to João Iganci for preparing the illustration; and to the staff of Museu Botânico Municipal de Curitiba, Paraná, especially Clarisse Bolfe Poliquesi, Joel Morais da Silva, Joel Vaz, and Osmar dos Santos Ribas, for assistance during fieldwork in Paraná State.

### References

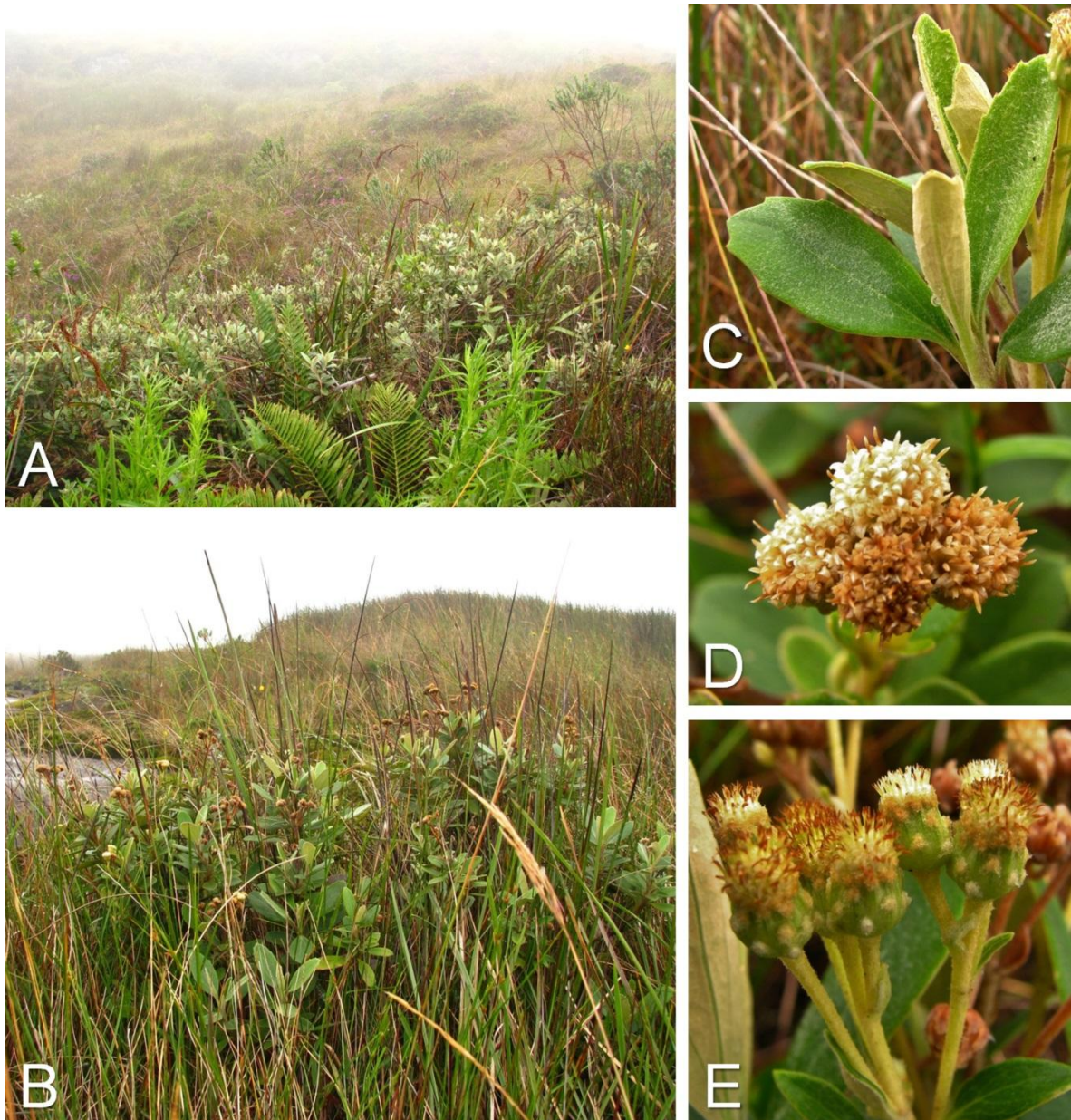
- Bremer, K. (1994) *Asteraceae: Cladistics & Classification*. Timber Press, Portland, 752 pp.
- Deble, L.P. (2012) Studies in Baccharidinae (Asteraceae: Astereae). I: *Lanugothamnus* a new genus from South America. *Balduinia* 37: 2–25.
- Falkenberg, D.B. & Deble, L.P. (2010) *Baccharis chionolaenoides* (Asteraceae), a new species of subgenus *Tarchonantoides* from Santa Catarina state (Brazil). *Darwiniana* 48: 64–67.

- Giuliano, D.A. (2005) New infragenera in *Baccharis* (Asteraceae, Astereae). *Novon* 15: 534–541.
- Heering, W. (1904) Die *Baccharis*-Arten des Hamburgers Herbars. *Jahrbuch der Hamburgischen Wissenschaftlichen Anstalten* 21: 1–45.
- Heiden, G. (2013) Two new combinations in *Baccharis* (Asteraceae: Astereae). *Phytoneuron* 78: 1–2.
- Heiden, G. & Pirani, J.R. (2012a) A synopsis and notes for *Baccharis* subgen. *Tarchonanthoides* (Asteraceae: Astereae). *Phytotaxa* 60: 41–49.
- Heiden, G. & J.R. Pirani (2012b) *Baccharis napaea* (Asteraceae, Astereae): a new species of subgen. *Tarchonanthoides* sect. *Coridifoliae* from the subtropical highlands of southern Brazil. *Phytotaxa* 66: 49–54.
- IUCN (2013) *Guidelines for using the IUCN Red List Categories and Criteria*. Version 10.1. Prepared by the Standards and Petitions Subcommittee. Available from: <http://jr.iucnredlist.org/documents/RedListGuidelines.pdf> (accessed 21 January 2014).
- Linnaeus, C. (1753). *Species plantarum*. L. Salvius, Stockholm, 1200 pp.
- Malme, G.O.A. (1933) Compositae paranenses dusenianae. *Kongliga Svenska Vetenskaps-Akademiens Handlingar* 12: 1-122.
- Müller, J. (2006) Systematics of *Baccharis* (Compositae–Astereae) in Bolivia, including an overview of the genus. *Systematic Botany Monographs* 76: 1–341.
- Müller, J. (2013) *World checklist of Baccharis L. (Compositae–Astereae)*. Available from: <http://www.spezbot.uni-jena.de/wp-content/uploads/2013/09/World-checklist-of-Baccharis-L..pdf> (accessed 20 January 2014).

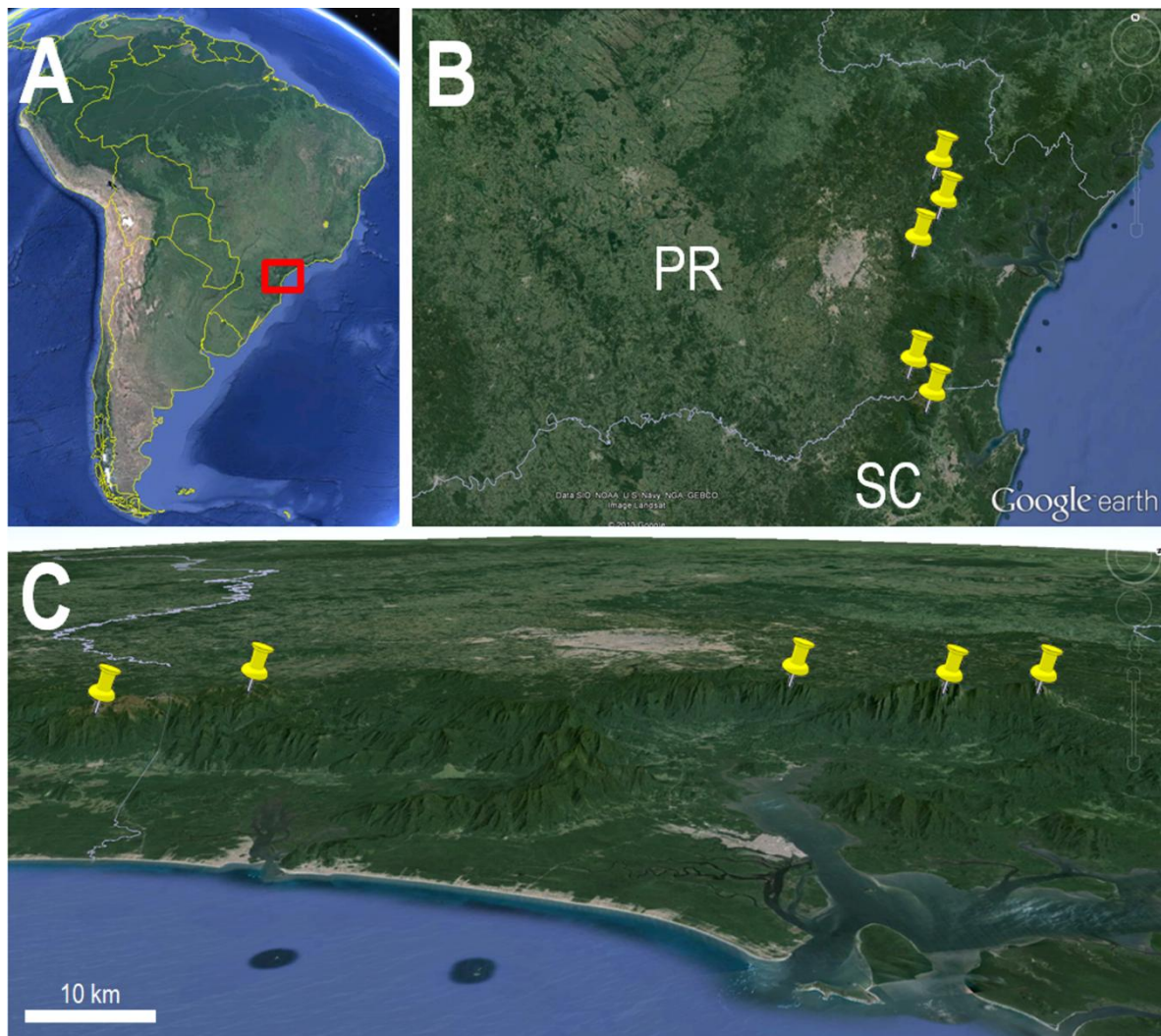


**FIGURE 1.** *Baccharis nebularis*. **A.** Fertile shoot of pistillate plant. **B.** Leaves. **C.** Peduncle indumentum. **D.** Male capitulum. **E.** Phyllaries of male capitulum (outer to inner). **F.** Male floret. **G.** Female capitulum. **H.** Phyllaries of female capitulum (outer to inner). **I.** Female floret. **J.** Corolla and style of female floret. **K.** Cypsela. **A, C, G–K:** *Heiden 1449* (SPF). **B** (from left to right): *Roderjan 1510* (MBM); *Hatschbach 6835* (MBM); *Kummrow 2626* (MBM); *Santos 297* (MBM); *Heiden 1449* (SPF). **D–F:** *Heiden 1450* (SPF). Illustration by João Iganci.





**FIGURE 2.** *Baccharis nebularis*. **A.** Habitat. **B.** Habit. **C.** Leaves. **D.** Male capitula. **E.** Female capitula.



**FIGURE 3.** Distribution of *Baccharis nebularis* in southern Brazil. **A.** Overview map of South America highlighting the position of the Southern range of Serra do Mar. **B.** Known distribution in Paraná and Santa Catarina from north to south: Capivari, Ibitiraquire or Serra dos Órgãos, Graciosa, Araçatuba, and Quiriri. **C.** Southern range of Serra do Mar: the five massifs where the new species is recorded are pinpointed from left to right: Quiriri, Araçatuba, Graciosa, Ibitiraquire or Serra dos Órgãos and Capivari.



