



## A taxonomic revision of the genus *Bacopa* (Gratioleae, Plantaginaceae) in Argentina

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### Abstract

In the present work a revision of *Bacopa* for Argentina is presented. In this country the genus is integrated by twelve native taxa: eleven species and one variety. Full descriptions, along with distribution information, nomenclatural and taxonomical remarks and illustrations are provided. Two new synonyms are proposed, lectotypes are designated for the species and variety names: *Bacopa congesta* (second-step lectotype), *B. congesta* var. *hirsuta*, *B. dubia*, *B. hassleriana*, *B. pedersenii*, *B. ranaria* var. *guaranitica*, *B. simulans*, *Bramia indica*, *Gratiola repens*, *Herpestis salzmännii*, *Herpestis tweedii* (second-step lectotype), and a neotype is designated for *Monniera rotundifolia*.

**Key words:** Aquatic plants, Scrophulariaceae, South America

### Introduction

*Bacopa* Aublet (1775: 128) is a genus of flowering plants belonging to Plantaginaceae (sensu APG IV 2016). It comprises ca. 50–60 species of aquatic and palustrial herbs distributed throughout the tropical and subtropical areas, with the greatest diversity concentrated in America (Barret & Strother 1978, Fischer 2004, Albach *et al.* 2005).

*Bacopa* nests within the mainly South and Central American Gratioleae clade based on molecular phylogenetic studies (Albach *et al.* 2005), coinciding with earlier morphology-based classifications (Bentham 1846, 1876, Wettstein 1895, Thieret 1967) which grouped the genus within tribe Gratioleae. This tribe, as currently circumscribed, includes *Bacopa*, *Gratiola* Linnaeus (1753: 17), *Mecardonia* Ruiz & Pavón (1794: 95), *Otacanthus* Lindley (1862: 55), *Scoparia* Linnaeus (1753: 116), and *Stemodia* Linnaeus (1759: 1091), although further studies are necessary to identify its correct circumscription and relationships among its genera as well as the synapomorphies that define it (Albach *et al.* 2005, Estes & Small 2008).

The taxonomic history of *Bacopa* has been more than confusing. The genus was described by Aublet (1775) based on a single species, *Bacopa aquatica* Aublet (1775: 129). In his treatment of Scrophulariaceae, Wettstein (1895) placed several small genera (*Anisöcalyx* Hance ex Walpers (1852: 195), *Cardiophus* Griffith (1836: 376), *Heptas* Meissner (1840: 293), and *Herpestis* Gaertner (1807: 186)) within *Bacopa*, and splitted it into six sections. In a quite different approach Pennell (1935) bent upon the recognition of all genera possible in what he called the *Bacopa-Herpestis* complex. Later, Pennell (1946) stated that this treatment was illogical and reconsidered the circumscription anew based on the assembling of more specimens, data as to types of the names of species and also on comparative drawings of representative members of each of the subgroups involved. As a result Pennell (1946) reestablished *Bacopa* as a genus and treated much of the related genera as synonyms of it, even including *Monocardia* Pennell (1920: 155) which had been described by him. In this new circumscription, Pennell (1946) recognized six sections and several subsections within *Bacopa* based mainly on corolla morphology, leaf morphology and nervation, and presence or absence of bracteoles. Recently, Christenhusz (2011) stated that *Bacopa* is a poorly defined genus and that future molecular phylogenetic studies may result in a different generic delimitation.

*Bacopa* has been poorly treated in South American floras, with the exception of an extensive account of Scrophulariaceae native to Brazil (Souza & Giulietti 2009). In this work the authors refer to two informal groups

within the genus, morphologically different: one group unites species always growing in wet and damp soils, the other group unites terrestrial species or completely submerged plants. For Argentina there is the revision of Scrophulariaceae by Descole & Borsini (1954) where *Bacopa* is represented by eighteen species grouped within two subgenera: the subgenus *Mecardonia* (Ruiz & Pavón) Descole & Borsini (1954: 131) which encompassed those species currently accepted under the genus *Mecardonia* Ruiz & Pavón (1794: 95) (Rossow 1987), and the subgenus *Bacopa*, itself divided into two sections distinguished by the presence or not of a circle of hairs at the base of the ovary (Table 1). Since the time of Descole & Borsini's treatment until today no modern revision on *Bacopa* was performed for this country. It has only been treated regionally in floras for provinces where *Bacopa* is very poorly represented (Dawson 1965, Dawson 1979, Botta & Cabrera 1993, Rossow 1999). The last antecedent on the taxonomy of this genus in Argentina is the updated checklist of taxa listed by Zuloaga *et al.* (2008), where twelve species and one variety are recognized for this territory (Table 1).

For this reason, the main goal of this work is to provide a comprehensive taxonomic revision of the representatives of *Bacopa* in Argentina. This revision encompasses a new identification key for the accepted taxa, and for each taxon a detailed description, an illustration, remarks about similarity to related species, distribution and habitat notes, and nomenclatural issues concerning typifications are addressed.

**TABLE 1.** Comparative taxonomic treatments of *Bacopa* in Argentina. In bold taxa that are currently accepted.

Descole & Borsini (1954) 10 taxa	Zuloaga <i>et al.</i> (2008) 13 taxa	Taxa accepted in this study 12 taxa
	<b><i>B. australis</i></b> Souza	<i>B. australis</i>
	<i>B. cladostyla</i> Eskuche	
<b><i>B. congesta</i></b> Chodat & Hassl.	<i>B. congesta</i>	<i>B. congesta</i>
	<b><i>B. dubia</i></b> Chodat & Hassl.	<i>B. dubia</i>
<i>B. hassleriana</i> Chodat & Hassl.		
<i>B. hirsuta</i> (Hassl.) Descole & Borsini	<i>B. hirsuta</i>	
<b><i>B. monnieri</i></b> (L.) Wettst.	<i>B. monnieri</i>	<i>B. monnieri</i>
<b><i>B. monnierioides</i></b> (Cham.) Rob.	<i>B. monnierioides</i>	<i>B. monnierioides</i>
<b><i>B. paraguariensis</i></b> (Moore) Hassl.	<i>B. paraguariensis</i>	<i>B. paraguariensis</i>
	<b><i>B. repens</i></b> (Sw.) Wettst.	
	<i>B. rotundifolia</i> (Michx.) Wettst.	<i>B. rotundifolia</i>
<b><i>B. salzmännii</i></b> (Benth.) Wettst. ex Edwall	<i>B. salzmännii</i>	<i>B. salzmännii</i>
<b><i>B. scabra</i> var. <i>scabra</i></b> (Benth.) Descole & Borsini	<i>B. scabra</i> var. <i>scabra</i>	<i>B. scabra</i> var. <i>scabra</i>
<b><i>B. serpyllifolia</i></b> (Benth.) Pennell	<i>B. serpyllifolia</i>	<i>B. serpyllifolia</i>
<i>B. tweedii</i> (Benth.) Parodi		
	<b><i>B. verticillata</i></b> (Pennell & Gleason) Pennell	<i>B. verticillata</i>

## Material and Methods

This work is based on 324 specimens from the following herbaria: BAB, CORD, CTES, CTESN, LIL and SI (Thiers 2017). Flower measurements were taken from material rehydrated by boiling. Fruit measurements were taken from dried specimens. The morphological terms employed here are in accordance with Hickey (1974), and the pubescence was classified as strigose, villose, scabrid or hispid following Lawrence (1951). The distribution, habitat and elevation ranges of taxa were derived from label information of herbarium specimens. Illustrations have been drawn by M. L. Gomez from CTES. In Appendix 1 there is a list of the accepted taxa of *Bacopa* in Argentina, and in Appendix 2 there is an index to collectors.

Type specimens were examined from the material loaded on the JSTOR Global Plants database (ITHAKA 2017), from online access to herbaria K (The Kew Herbarium Catalogue 2017) and P (Collections du Muséum National d'Histoire Naturelle 2017), or through digital images obtained by personal communication with herbaria curators from G and OXF. Typifications follow recent clarification of the rules governing holotype recognition outlined and suggested by McNeill (2014).

## Taxonomic treatment

**Bacopa** Aublet (1775: 128–130), *nom. cons.*

**Type**.—*Bacopa aquatica* Aublet (1775: 129).

= *Bramia* Lamarck (1785: 459).

**Type**.—*Bramia indica* Lamarck (1785: 459) [= *Bacopa monnieri* (Linnaeus) Wettstein (1895: 77)].

= *Herpestis* Gaertner (1807: 186).

**Type**.—*Herpestis rotundifolia* Gaertn. (1807: 186) [= *B. repens* (Swartz) Wettstein (1895: 76)].

= *Ranaria* Chamisso (1833: 30).

**Type**.—*Ranaria monnierioides* Chamisso (1833: 30) [= *B. monnierioides* (Cham.) Robinson (1909: 614)].

= *Monocardia* Pennell (1920: 155).

**Type**.—*Monocardia violacea* Pennell (1920: 155) [= *B. salzmännii* (Bentham 1836: 58) Wettstein ex Edwall (1897: 175)].

*Herbs*, annual or perennial, erect, prostrate, or floating, glabrous or variously pubescent. *Leaves* opposite, sometimes verticillate, sessile or sub-petiolate, blade entire, exceptionally pinnatisect or pinnatifid, elliptic, ovate, orbicular, obovate or oblong, rounded, apex obtuse or acute, base rounded, acute, amplexicaul or auriculate, margin entire or serrate, glabrous or variously pubescent, generally with glandular punctuations on both surfaces. *Flowers* axillary, solitary or 2–3 per axil, sometimes arranged in terminal racemose inflorescences; sessile or generally with a long pedicel; bracteoles two, inserted at the base of the calyx or absent. *Calyx* pentamerous, three external lobes, plus two internal linear lobes. *Corolla* white or blue, violet or pale blue color, sometimes orange, pink or red color, slightly zygomorphic, superior lip bilobed, inferior lip trilobed. *Stamens* four, didynamous or two stamens plus staminodes, anthers with parallel thecae. *Gynoecium* composed of a bilocular, pluri-ovulated ovary, glabrous or with long bristles in a ring, entire or bifid style, with stigmatic apex smooth, globose or bilobed. Fruit composed of an ovoid or globose capsule, of loculicide dehiscence, apex acute or rounded. *Seeds* numerous, ovoid, ellipsoid, reticulate.

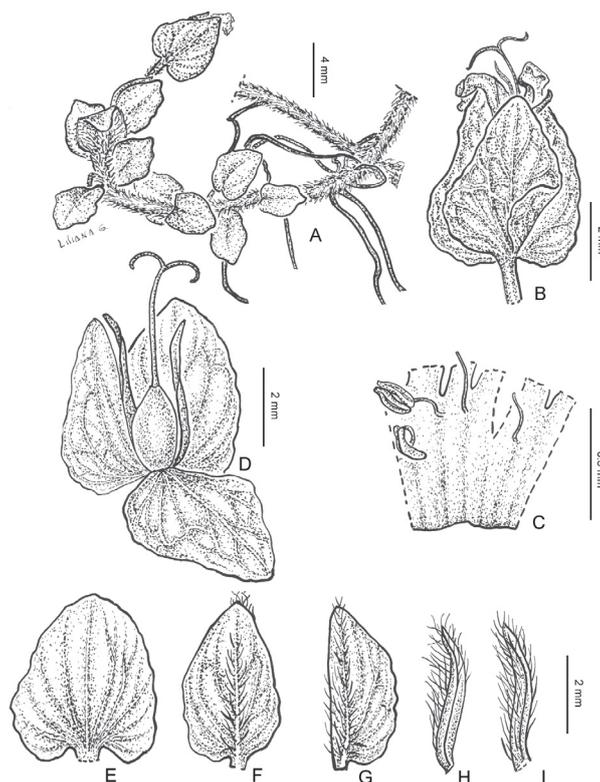
**Distribution**.—In Argentina there are 12 native taxa (11 species and one variety) of *Bacopa*, being the genus with the greatest number of representatives from Plantaginaceae in the country, after *Plantago* Linnaeus (1753). Only one species, *B. monnieri* is amply distributed in the country, reaching Tierra del Fuego province in the south, the rest of the species are only present in the north and northeastern region. The provinces with the highest specific diversity are Misiones, Chaco and Corrientes, in northeastern Argentina. The 12 taxa that grow in Argentina are present in Corrientes province except for *B. serpyllifolia* (Benth.) Pennell which has only been collected in Chaco province.

### Key to the taxa of *Bacopa* that occur in Argentina

1. Stems entirely glabrous, leaf blade obovate ..... *B. monnieri*
- Stems variously pubescent, leaf blade elliptic, ovate, orbicular or oblong, exceptionally pinnatisect or pinnatifid ..... 2
2. Stems strigose, villose, scabrid or hispid, mostly densely pubescent ..... 3
- Stems sub-glabrous, or slightly strigose or puberulous ..... 7
3. Stems erect; flowers arranged in terminal racemose inflorescences; corolla orange, pink or red ..... *B. congesta*
- Stems prostrate; flowers axillary, solitary; corolla white, blue, violet or pale blue ..... 4
4. Style entire ..... *B. salzmännii*
- Style bifid ..... 5
5. Ovary with a ring of long bristles, bracteoles present or absent, stems densely hispid villose ..... *B. serpyllifolia*
- Ovary glabrous, bracteoles absent, stems strigose, sometimes villose, denser towards the apex ..... 6
6. Stamens 4; floral pedicel longer than 10 mm ..... *B. australis*
- Stamens 2; floral pedicels less than 5 mm long ..... *B. repens*
7. Bracteoles absent ..... 8
- Bracteoles present ..... 9
8. Calyx glabrous ..... *B. rotundifolia*
- Calyx slightly puberulous ..... *B. dubia*
9. Leaves 3–5 verticillate, dimorphic: submerged leaves with pinnatisect or pinnatifid blade, aerial leaves with pinnatifid to entire blade ..... *B. verticillata*
- Leaves opposite, not dimorphic ..... 10
10. Stems sub glabrous; flowers sessile or with a brief pedicel up to 2 mm long; capsule with acute apex ..... *B. monnierioides*
- Stems slightly strigose or puberulous; flowers with a pedicel longer than 4 mm long; capsule with rounded apex ..... 11
11. Leaf blades oblong or narrow ovate, base auriculate; bracteoles 0.8–1 mm long ..... *B. paraguariensis*
- Leaf blades ovate, base acute; bracteoles 3–4 mm long ..... *B. scabra* var. *scabra*

1. *Bacopa australis* Souza (2001: 58). Fig. 1.

**Type**.—BRAZIL. Paraná. Capanema, río Iguazú, J. Lindeman & H. Haas 3358 (holotype MBM!, isotype K!).



**FIGURE 1.** *Bacopa australis*. A. Plant aspect. B. Calyx. C. Portion of corolla opened, showing stamens. D. Calyx with one of the lateral lobes opened, showing gynoecium. E. Dorsal lobe, external view. F & G. Lateral lobes, internal views. H & I. Internal lobes (from Krapovickas *et al.* 17067, CTES).

*Herbs*, annual, 5–15 cm tall, prostrate, few branched, ascending stems, strigose, sometimes villose, denser towards the apex. *Leaves* opposite, sessile, blade orbicular, sometimes ovate or elliptic, 4–10 × 3–9 mm, apex rounded, base rounded, margin entire, adaxial surface glabrous, abaxial surface sparsely pubescent, more densely on the veins. *Flowers* axillary, solitary, pedicels 10–30(–50) mm long, sub-glabrous, bracteoles absent. *Calyx* 5-lobed, the external dorsal lobe wide ovate, 3.6–4.1 × 2.8–3.2 mm, apex rounded, base cordate, the two lateral lobes ovate, 3.8–4 × 1.8–2 mm, apex obtuse, base cordate, hispid towards the apex and in the central vein, the two internal lobes linear, 2–3 × 0.45–0.5 mm, apex acute, hispid on the margins. *Corolla* white, blue, or pale blue, tube 3–5 mm long, glabrous; stamens 4; ovary glabrous, style deeply bifid, stigmatic apex smooth. *Capsule* ovoid, apex acute, 3.5–3.7 × 1.8–2 mm.

**Distribution and habitat:**—Native species from South America, present in southern Brazil and in northeastern Argentina, in the province of Corrientes. It grows between 0–500 m elev., frequent in flood pastures.

**Taxonomic remarks:**—*Bacopa australis* is similar to *B. repens* (Swartz) Wettstein in the prostrate habit, strigose pubescence, and absence of bracteoles, being distinguished by the androecium with two stamens (*vs.* four), and by the longer pedicel (10–50 mm *vs.* 1–5 mm). It is also similar to *B. dubia* Chodat & Hassl., being distinguished by the strigose to villose pubescence (*vs.* slightly strigose); and by the corolla tube length (3–5 mm *vs.* 8–12 mm).

**Selected specimens examined:**—**Corrientes:** Itatí, ruta 12, 4 km E de acceso a Itatí, 23 Jan 1972, Krapovickas & Cristóbal 20816 (CTES!).

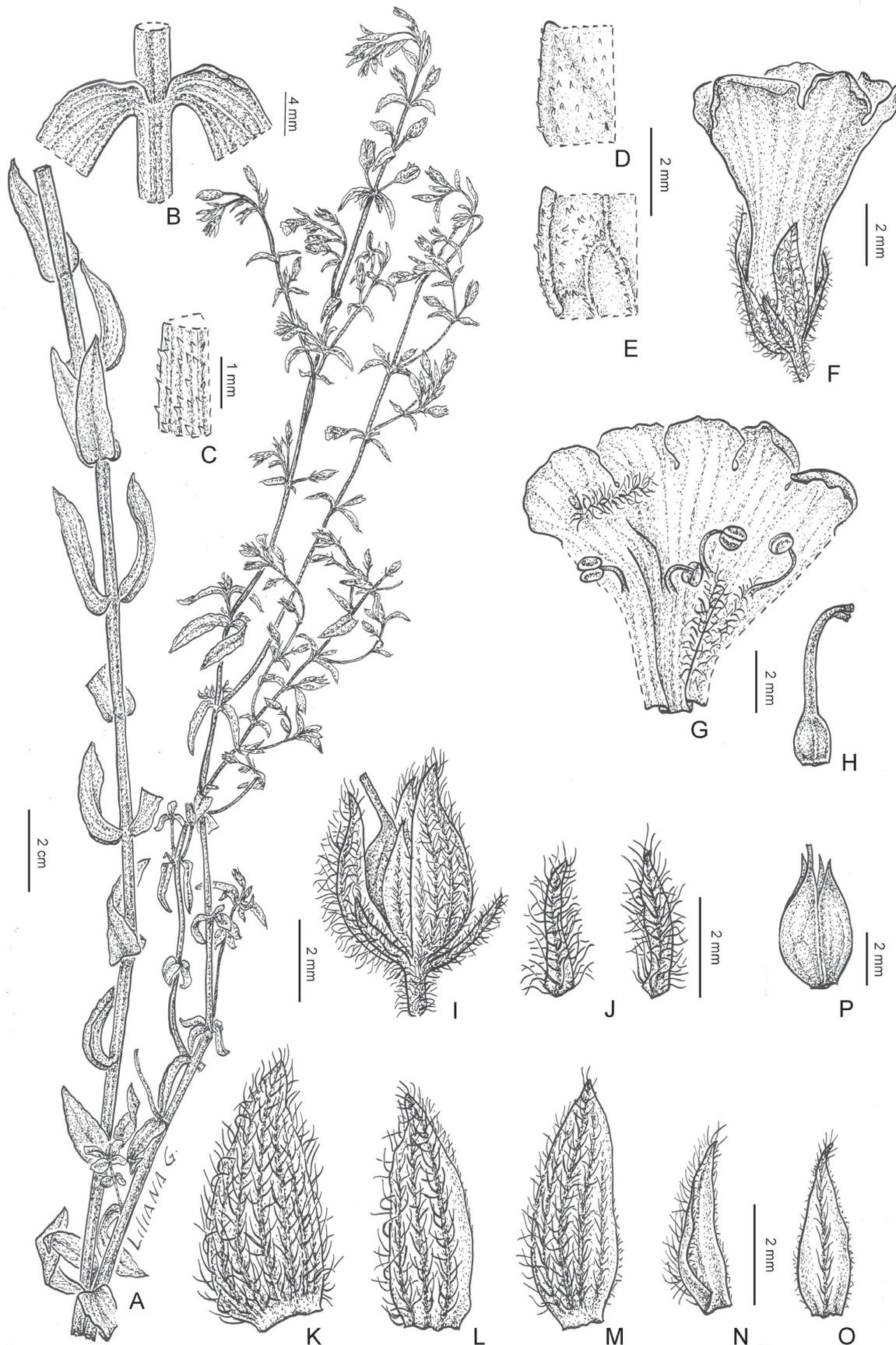
## 2. *Bacopa congesta* Chodat & Hassler (1904: 289). Fig. 2.

≡ *Bacopa paraguariensis* subsp. *congesta* (Chodat & Hassl.) Hassler (1917: 13).

**Type:**—PARAGUAY. Tucanguá, *E. Hassler* 3836 (lectotype G!, four sheets [first-step designated by Souza & Giulietti 2009: 30], second-step lectotype G 00229867! [designated here]; isolectotypes BM 000098479!, G 00229864!, G 00229865!, G 00229866!, MPU 020756!, NY 00067872!, P 00753795!).

= *Bacopa congesta* var. *hirsuta* Hassler (1912: 348) ≡ *Bacopa paraguariensis* var. *hirsuta* (Hassl.) Hassler (1917: 13) ≡ *Bacopa hirsuta* (Hassl.) Descole & Borsini (1954: 139), *syn. nov.*

**Type:**—PARAGUAY. Sierra de Amambay en pantanos cerca de Estrella, *T. Rojas* (Herb. Hassler 10207) (lectotype G 00229869! [designated here], isolectotypes G 00229868!, G 00229870!, G 00229871!, K 000533463!).



**FIGURE 2.** *Bacopa congesta*. A. Plant aspect. B. Detail of node with two leaves. C. Detail of stem pubescence. D. Detail of leaf pubescence, adaxial surface. E. Detail of leaf pubescence, abaxial surface. F. Flower. G. Corolla opened, showing stamens. H. Gynoecium. I. Calyx. J. Bracteoles. K. Dorsal lobe, external view. L & M. Lateral lobes, external views. N & O. Internal lobes. P. Capsule (from Pedersen 12399, CTES).

*Herbs*, biannual or perennial, 30–100 cm tall, erect, branched towards the apex, stems densely hispid with scabrid hairs. *Leaves* opposite, sessile, blade narrow ovate, 23–50 × 5–10 mm, apex acute, base amplexicaul, margin entire or slightly serrate, densely hispid with scabrid hairs on both surfaces. *Flowers* arranged in terminal racemose inflorescences, foliaceous, pedicels hispid, 4.8–5 mm long, bracteoles two, linear, 2–3 mm long, hispid. *Calyx* 5-lobed, the external dorsal lobe elliptic, 5.8–6 × 2–2.2 mm, apex acute, base truncate, the two lateral lobes ovate, 3.8–4 × 1.8–2 mm, apex acute, base truncate, notoriously nerved and densely hispid with scabrid hairs, the two internal lobes linear, 1.8–2 × 0.4–0.5 mm, apex acute, densely hispid. *Corolla* orange, pink or red color, tube 8–10 mm long, slightly puberulous; stamens 4; ovary glabrous, style bifid, stigmatic apex smooth. *Capsule* ovoid, apex acute, 3.8–4 × 2.8–3 mm.

**Distribution and habitat:**—Native to South America, it is found in southern Brazil, Paraguay and northeastern Argentina. It grows between sea level and 800 m elev., in wet lands and flood plains.

**Nomenclatural remarks:**—*Bacopa congesta* was described from material collected by E. Hassler in Paraguay. Souza & Giulietti (2009) designated the Hassler material at G as lectotype. However, four sheets were found there, and therefore the statement of the authors must be considered as a first-step typification. In order to narrow this designation the most complete specimen is here selected as second-step lectotype (Art. 9.17 ICN, McNeill *et al.* 2012, McNeill 2014).

*Bacopa congesta* var. *hirsuta* (Hassler 1912) was described from material collected by T. Rojas in Paraguay. Four sheets belonging to the collection T. Rojas (Herb. Hassler 10207) were found at G, where Hassler collections from Paraguay are kept (Stafleu & Cowan 1979). Thus, the specimen showing the best quality of preservation of the important diagnostic features of the taxon is here chosen as lectotype of the name (Art. 9.17).

**Taxonomic remarks:**—Hassler (1912) establishes the variety *B. congesta* var. *hirsuta* differentiating it from the type variety because of its much branched stem, its hirsute-tomentose pubescence in stems and scabrid bracteoles, and its corolla tube almost 10 mm long. Descole & Borsini (1954), later followed by Zuloaga *et al.* (2008), consider both taxa as different species based on different pedicel lengths and insertion of the calyx lobes: *B. congesta* and *B. hirsuta* (Hassl.) Descole & Borsini. The study of numerous herbarium specimens (see Appendix 2), together with the type materials, evidence it is not possible to differentiate neither varieties nor different species within the taxonomical concept of *B. congesta*, so *B. congesta* var. *hirsuta* is here considered a synonym of the type variety.

**Selected specimens examined:**—**Corrientes:** Ituzaingó, Estancia Santa Rita, 6 Mar 1987, Krapovickas *et al.* 41232 (CTES, LIL). **Misiones:** Capital, Bañado de Arroyo Caimán, 16 Nov 1994, Lirussi *et al.* 586 (CTES).

### 3. *Bacopa dubia* Chodat & Hassler (1904: 290). Fig. 3.

**Type:**—PARAGUAY. In palude Tapangua, Oct, E. Hassler 3309 (lectotype G 00307148! [designated here], isolectotypes BM 000953363!, G 00307156!, G00307158!, MPU 020755!, S-04-3405!).

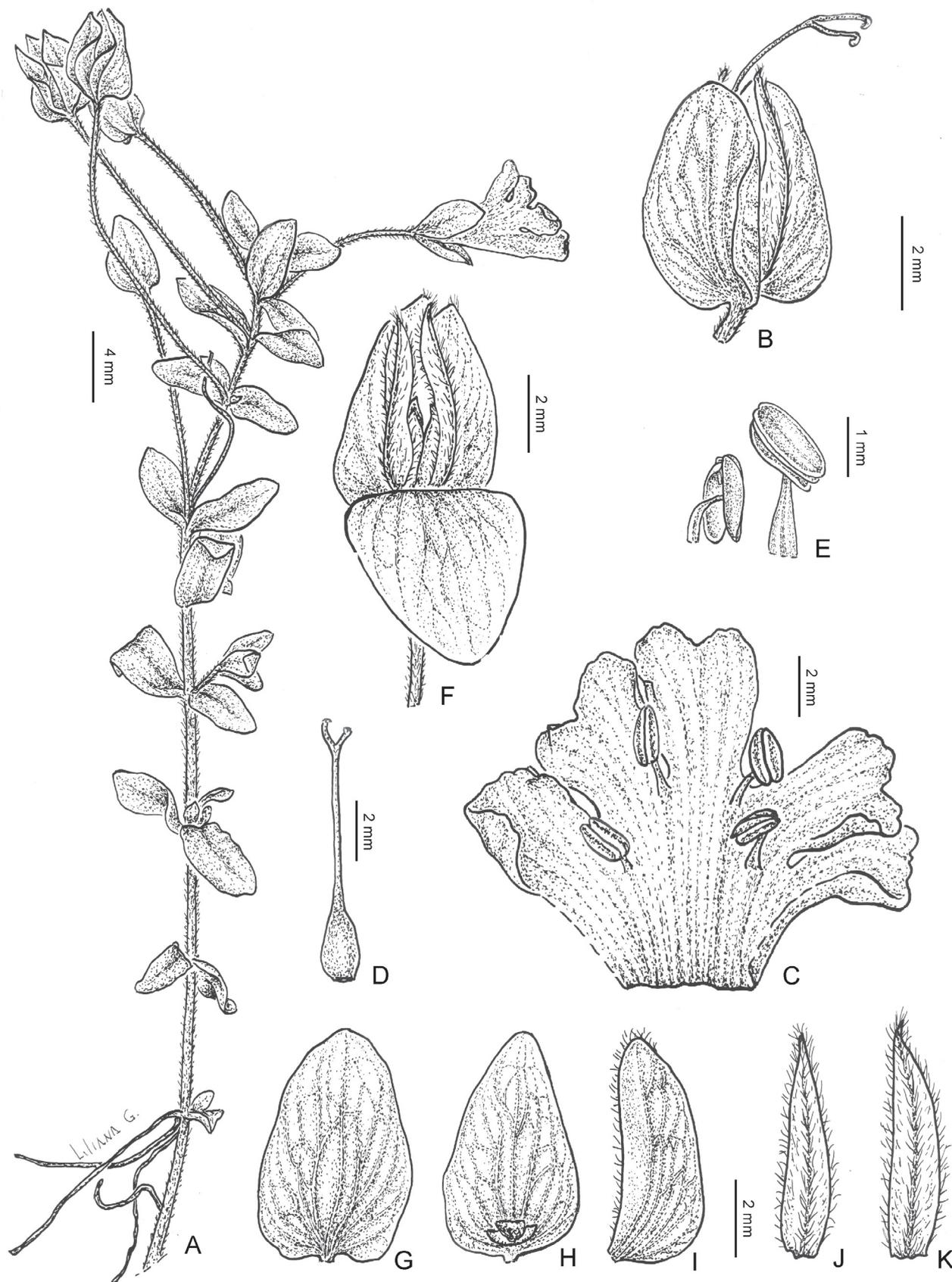
*Herbs*, annual 7–10(–20) cm tall, prostrate, stems flexuous, slightly strigose. *Leaves* opposite, sessile, blade ovate, 6–10 × 4–6 mm, apex rounded, base rounded, margin entire, abaxial surface puberulous on the veins. *Flowers* axillary, solitary, pedicels 40–50 mm long, slightly strigose, bracteoles absent. *Calyx* 5-lobed, the external dorsal lobe wide ovate, 5.5–6 × 3.8–4 mm, apex rounded, base cordate, the two lateral lobes ovate, 4.8–5 × 2.8–3.2 mm, apex acute, base cordate, slightly puberulous, the two internal lobes linear, 4.8–5 × 1.5–1.8 mm, apex acute, puberulous. *Corolla* white, tube 8–12 mm long, glabrous; stamens 4; ovary glabrous, style bifid, stigmatic apex globose or smooth. *Capsule* ovoid, apex acute, 2.8–3 × 1.8–2 mm.

**Distribution and habitat:**—Native to South America, it is found in Paraguay and northeastern Argentina, in the provinces of Corrientes and Misiones. It grows between sea level and 500 m elev.

**Nomenclatural remarks:**—In describing *B. dubia* Chodat & Hassler (1904) cited five collections from Paraguay in the protologue. Since no holotype was indicated they are all syntypes (Arts. 9.3, 9.5). In spite of the fact that all the collections are totally in agreement with the protologue, the syntype Hassler 6161 is preferred over the other elements since it is the most plentiful and best preserved. Thus, one of the specimens belonging to this collection is here selected as lectotype of the name.

**Taxonomic remarks:**—*Bacopa dubia* is similar to *B. australis* (see remarks under this last species).

**Selected specimens examined:**—**Corrientes:** San Cosme, ruta 12, límite con dpto. Itatí, 28 Nov 1981, Krapovickas *et al.* 37552 (BAB, CTES, LIL). **Misiones:** Capital, Bañado Arroyo Zaimán, 15 Sep 1995, Guillén & Lirussi 460 (CTES).



**FIGURE 3.** *Bacopa dubia*. A. Plant aspect. B. Calyx. C. Corolla opened, showing stamens. D. Gynoecium. E. Detail of two stamens. F. Calyx with dorsal lobe opened. G. Dorsal lobe, external view. H & I. Lateral lobes, external views. J & K. Internal lobes (from *Arbo 598*, CTES).

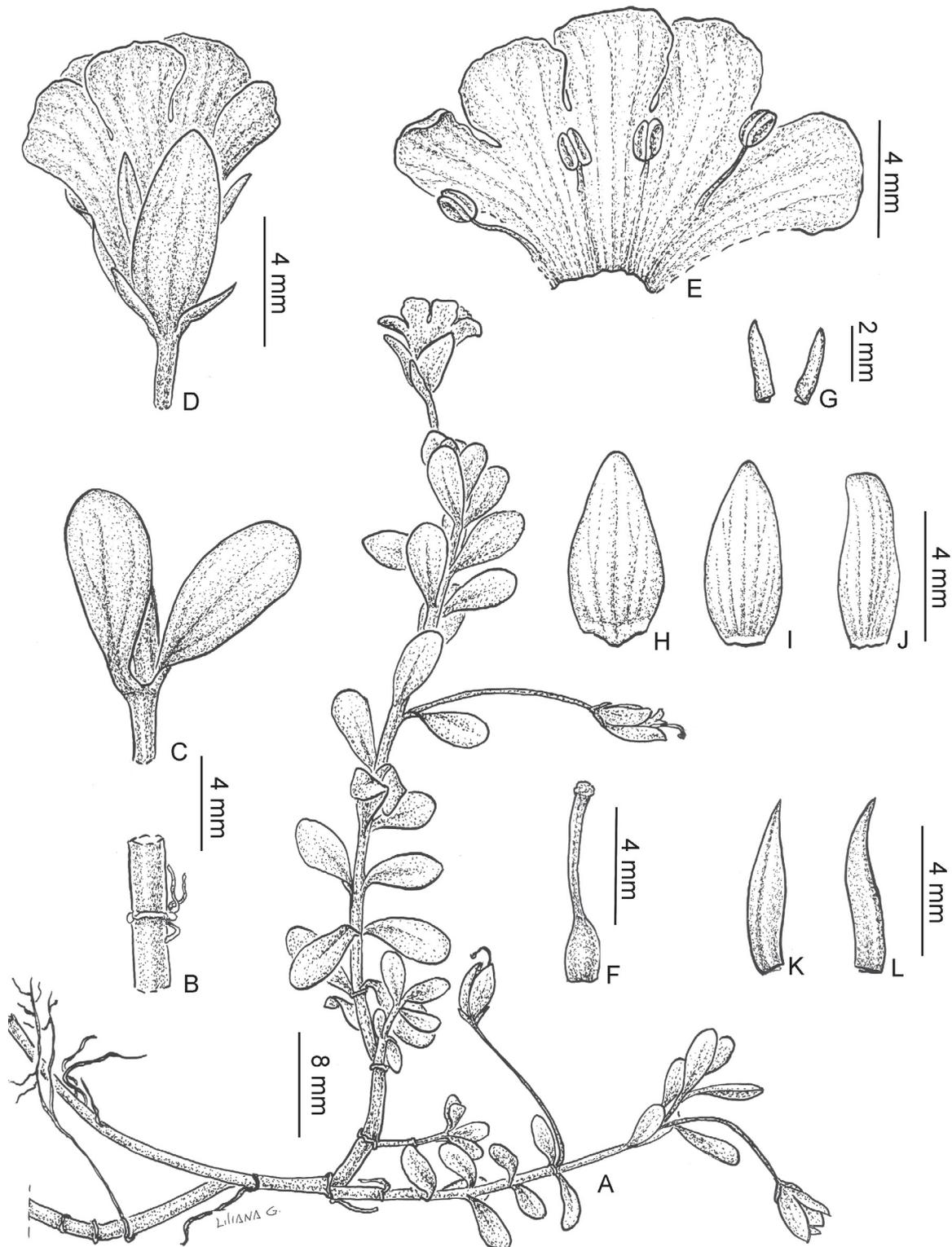
4. *Bacopa monnieri* (L.) Wettstein (1895: 77). Fig. 4.

≡ *Lysimachia monnieri* Linnaeus (1756: 9) ≡ *Gratiola monnieri* Linnaeus (1759: 851). ≡ *Capraria monniera* (L.) Roxburgh (1814: 47)  
 ≡ *Herpestis monniera* (L.) Kunth (1818: 366) ≡ *Bramia monniera* (L.) Drake (1893: 142) ≡ *Monniera monniera* (L.) Britton (1894:  
 292) *nom. inv.* ≡ *Bramia monnieri* (L.) Pennell (1919: 243).

**Type**—Browne (1756) t. 28, f. 3 [lectotype, designated by Cramer (1981: 421)].

= *Bramia indica* Lamarck (1785: 459).

**Type**—[LOCATION UNKNOWN], P-LA! (lectotype P 00357973! [designated here]).



**FIGURE 4.** *Bacopa monnieri*. A. Plant aspect. B. Detail of rooting node. C. Detail of node with two leaves. D. Flower. E. Corolla opened, showing stamens. F. Gynoecium. G. Bracteoles. H. Dorsal lobe, external view. I & J. Lateral lobes, external views. K & L. Internal lobes (from Schinini 19195, CTES).

*Herbs*, annual or perennial, 10–20 cm tall, prostrate, glabrous. *Leaves* opposite, sessile, blade obovate, 5–14 × 2–5 mm, apex obtuse, base acute, margin entire, glabrous. *Flowers* axillary, solitary, pedicels 10–20 mm long, bracteoles two, linear, 2–3 mm long, glabrous. *Calyx* 5-lobed, the external dorsal lobe ovate, 4.8–5 × 2.5–3 mm, apex rounded or acute, base truncate, the two lateral lobes ovate, 5 × 2 mm, apex acute, base truncate, glabrous, the two internal lobes linear, 4.8–5 × 0.8–1 mm, apex acute, glabrous. *Corolla* white, blue or lilac color, tube 7–8 mm long, glabrous; stamens 4; ovary glabrous, style entire, stigmatic apex globose. *Capsule* ovoid, apex acute, 3.5–3.8 × 1.8–2 mm.

**Distribution and habitat:**—*Bacopa monnieri* is the most widely distributed species of the genus, present in all the continents, with the largest number of collected specimens in tropical and subtropical America. In Argentina it is found in Chaco and Salta at 400 m elev., to the Prepuna at 3500 m elev. and down towards Tierra del Fuego province. It frequently forms grass in moist, sandy or marshy soils.

**Nomenclatural remarks:**—Lamarck (1785) in the protologue of *Bramia indica* mentioned a new *nomen specificum legitimum* citing two synonyms: the first one from Rheede (1690: 27), and the other one from Commelijn (1696: 33). The author also mentioned that he had studied a dried specimen (*v.s.*) to describe the species. Lamarck's types are mainly kept at P-LA (Stafleu & Cowan 1979) and so original material of the name should be there. Indeed a specimen in agreement with the diagnosis and annotated by Lamarck was located at P-LA. As specimens are preferable to illustrations, this specimen is selected as lectotype of the name.

For a discussion on the complex nomenclature of the species see Philcox (1979).

**Taxonomic remarks:**—*Bacopa monnieri* is easily distinguished being the only Argentine *Bacopa* that is entirely glabrous, and has obovate leaf blades.

**Selected specimens examined:**—**Buenos Aires:** Pdo. De la Costa, San Clemente del Tuyú, Punta Rasa, 22 Jan 1979, *Tur 1693* (CTES, SI). **Catamarca:** Ambato, Valle Río Los Puestos, 29 Feb 1996, *Saravia Toledo 13785* (CTES). **Chaco:** Libertad, Col. Popular, 28 Nov 1967, *Schulz 16237* (CTES). **Córdoba:** Río Cuarto, 19 Apr 2011, *Keller 10179* (CTES). **Corrientes:** San Martín, Carlos Pellegrini, 30 Oct 1971, *Krapovickas et al. 20298* (BAB, CTES). **Entre Ríos:** Concordia, 7 Sep 1978, *Neiff 890* (CTES). **Formosa:** Pilcomayo, 24 Oct 1995, *Schinini 30296* (CTES). **Jujuy:** Santa Bárbara, 11 Feb 2010, *Zuloaga 11544* (CTES, SI). **La Rioja:** Chamental, 20 Feb 2000, *Biurrun 6399* (CTES). **Mendoza:** Las Heras, El Callao, *Ruiz-Leal 8410* (BAB, LIL). **Neuquén:** Huiliches, Pampa del Malleo, Jan 1996, *Martínez-Crovetto AN-44* (CTES). **Salta:** Rivadavia, La Merced Vieja, 25 Dec 2002, *Scarpa 496* (CTES, SI). **Santiago del Estero:** Pellegrini, río Urueña, *Venturi 5657* (BAB, LIL). **San Juan:** Ullum, 1 Dec 1985, *Kiesling 5060* (CTES). **San Luis:** Junín, Bajo de Véliz, *Kurtz 8459* (CORD). **Tierra del Fuego:** San Sebastián, Río Grande, *Castellanos* (BA 45746). **Tucumán:** Tafí, 25 Mar 1989, *Pedersen 15335* (CTES).

##### 5. *Bacopa monnierioides* (Chamisso) Robinson (1909: 614). Fig. 5.

≡ *Ranaria monnierioides* Chamisso (1833: 31) ≡ *Herpestis ranaria* Bentham (1836: 57) *nom. illeg. superfl.* ≡ *Bacopa ranaria* Chodat & Hassler (1904: 288) *nom. illeg. superfl.* ≡ *Monniera monnierioides* (Cham.) Kuntze (1891: 463).

**Type:**—BRAZIL. *F. Sellow s.n.* (lectotype K 000533423! [designated by Souza & Giulietti 2009: 27], isolectotype HAL 0115853!).

= *Bacopa ranaria* var. *guaranitica* Chodat & Hassler (1904: 288).

**Type:**—PARAGUAY. “In palude pr. Tobaty, Sep 1900, *E. Hassler 6412* (lectotype G00229874! [designated here], isolectotypes BM 000098488!, G 00229872!, G 00229873!, K 000533422!, MPU 020754!, NY 00067876!).

= *Caconapea appressa* Pennell (1920: 152).

**Type:**—COLOMBIA. Meta, moist depression in llano east of Villavicencio, 26 August 1917, *F. W. Pennell 1460* (holotype NY00067933!, isotypes CAS0001555!, GH 00078025!, F 0072320F!, K 000533455!, PH 00010106!, US 00122508!).

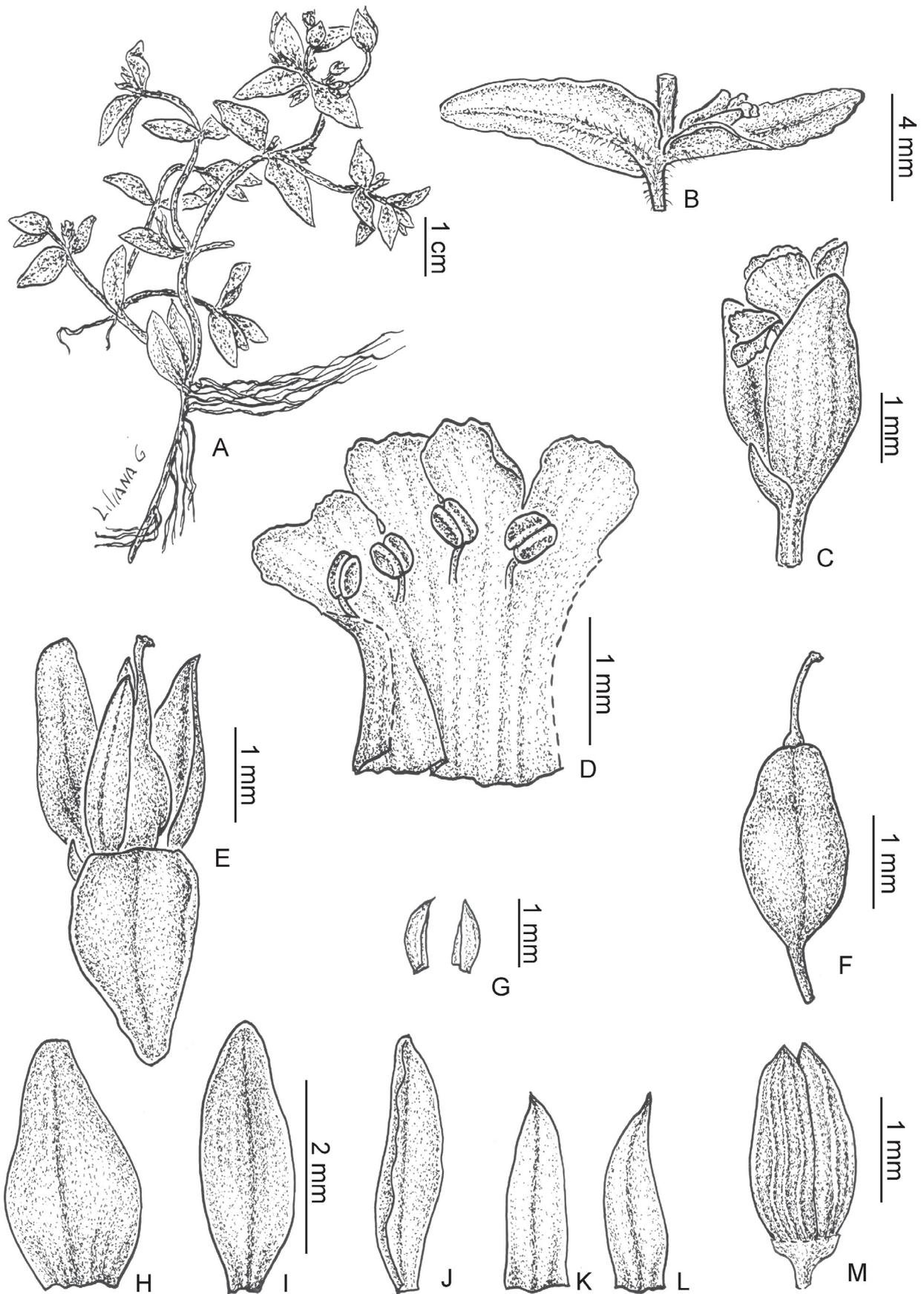
= *Bacopa conferta* (Pennell) Standley (1936: 174) ≡ *Caconapea conferta* Pennell (1920: 153).

**Type:**—COLOMBIA. Moist depression, in llano E of Villavicencio, Meta, 1917, *F. W. Pennell 1435* (holotype NY 00067934!, isotypes CAS 0001556!, F 0072321F!, GH 00078026!, GH 00078027!, K 000533453!, MO 150748!, PH 00010107!, US 00122509!).

= *Bacopa parviflora* Standley ex Williams (1972: 118).

**Type:**—PANAMA. Prov. Panamá, Tecumen River, vicinity of Juan Díaz, 9 Nov 1017, *E.P. Killip 3420* (holotype F 0093089F!).

*Herbs*, perennial, 5–30 cm tall, erect, branched towards the apex, sub-glabrous. *Leaves* opposite, sessile, blade elliptic, 8–31 × 8–12 mm, apex rounded or acute, base amplexicaul, margin entire, exceptionally slightly serrate, glabrous or slightly puberulous. *Flowers* axillary, 2–3 per axil, exceptionally solitary, sessile or with a brief pedicel up to 2 mm long, glabrous; bracteoles two, linear, ca. 1 mm long, glabrous. *Calyx* 5-lobed, the external dorsal lobe ovate, 1.5–2.5 × 1–1.5 mm, apex obtuse, base rounded, the two lateral lobes ovate, 1–2 × 0.8–1 mm, apex obtuse, base rounded, glabrous, the two internal lobes linear, 1.8–2 × 0.45–0.55 mm, apex acute, glabrous. *Corolla* white, rarely blue or violet color, tube 1.5–2 mm long, glabrous; stamens 4; ovary glabrous, style entire, stigmatic apex globose or smooth. *Capsule* ovoid, apex acute, 1.5–2 × 0.85–1 mm.



**FIGURE 5.** *Bacopa monnierioides*. A. Plant aspect. B. Detail of node with two leaves and an axillary flower. C. Flower. D. Corolla opened, showing stamens. E. Calyx with dorsal lobe opened. F. Fructiferous gynoecium. G. Bracteoles. H. Dorsal lobe, external view. I & J. Lateral lobes, external views. K & L. Internal lobes. M. Caspule (from Krapovickas *et al.* 24190B, CTES).

**Distribution and habitat:**—This species grows from Panamá to northeastern Argentina, Brazil and Paraguay. It is found in flood plains. It grows between sea level and 500 m elev.

**Nomenclatural remarks:**—Christenhusz (2010) designated the sheet K [barcode] K000533423 as lectotype of *Ranaria monnierioides*, not taking into account a previous typification of the species name by Souza & Giuliatti (2009). Therefore Christenhusz's designation should be treated as superfluous.

Chodat & Hassler (1904) mentioned the specimen *Hassler 6412* in the protologue of *Bacopa ranaria* var. *guaranitica*. Four sheets belonging to this collection were found at herbarium G, where Hassler's collections from Paraguay are kept (Stafleu & Cowan 1979). Thus, the specimen showing the best quality of preservation of the important diagnostic features of the taxon is here chosen as lectotype of the name (Art. 9.17).

**Taxonomic remarks:**—*Bacopa monnierioides* could be confused with *B. paraguariensis* (Moore) Hass. or *B. scabra* (Benth.) Descole & Borsini var. *scabra*. The three are perennial herbs, branched, erect, with presence of bracteoles. However *B. monnierioides* is sub-glabrous, and has sessile or briefly petiolate flowers, up to 2 mm long vs. slightly strigose or puberulous plants with floral pedicels longer than 4 mm in both *B. paraguariensis* and *B. scabra* var. *scabra*.

**Selected specimens examined:**—**Corrientes:** Ituzaingó, 10 Dec 1973, *Krapovickas 24190 B* (CTES). **Misiones:** San Javier, 22 May 1951, *Cabrera et al. 282* (CTES).

#### 6. *Bacopa paraguariensis* (Moore) Hassler (1917: 13). Fig. 6.

≡ *Herpestis paraguariensis* Moore (1895: 407).

**Type:**—PARAGUAY. Caaguazú, 1876, *B. Balansa 2142* (holotype K 000533457!).

*Herbs*, perennial, 35–80 cm tall, prostrate stems with stout erect branches, puberulous. *Leaves* opposite, sessile, blade oblong or narrow ovate, 20–45 × 5–10 mm, apex acute, base auriculate, margin entire exceptionally slightly serrate, glabrous or slightly puberulous. *Flowers* axillary, solitary or 2 per axil, pedicel 4–20 mm long, bracteoles two, linear, 0.8–1 mm long, puberulous. *Calyx* 5-lobed, the external dorsal lobe ovate, 4–6 × 1.8–2 mm, apex acute, base truncate, the two lateral lobes ovate, 4.9–5 × 1.8–2 mm, apex acute, base acute, glabrous or slightly puberulous, the two internal lobes linear, 4.8–5.2 × 0.8–1.2 mm, apex acute, glabrous or slightly puberulous. *Corolla* lilac, tube 7–8 mm long, puberulous; stamens 4; ovary glabrous, style entire, stigmatic apex bilobed. *Capsule* globose, apex rounded, 2.8–3 × 2.8–3.2 mm.

**Distribution and habitat:**—Native from South America, it is found in Paraguay and northern Argentina in the provinces of Chaco, Corrientes, Formosa and Misiones. It grows between sea level and 500 m elev.

**Taxonomic remarks:**—*Bacopa paraguariensis* could be confused with *B. monnierioides* (Cham.) Rob. (see remarks under this last species). It is also very similar to *B. scabra* var. *scabra*. However, they are distinguished because leaf blades are oblong or narrow ovate with auriculate base, and bracteoles are ca. 1 mm long in *B. paraguariensis*, vs. ovate leaf blades, with acute base, and bracteoles longer, 3–4 mm long in the latter.

**Selected specimens examined:**—**Chaco:** Primero de Mayo, Col. Benítez, Jan 1935, *Schulz 1582* (CTES). **Corrientes:** Concepción, Carambola, 20 Mar 1987, *Pedersen 14850* (BAB, CTES). **Formosa:** Guaycalee, 1919, *Jorgensen 2997* (LIL). **Misiones:** Cainguás, *Scharwz 6680* (LIL).

#### 7. *Bacopa repens* (Swartz) Wettstein (1895: 76). Fig. 7.

≡ *Gratiola repens* Sw. (1788: 14) ≡ *Herpestis repens* (Sw.) Schlechtendal & Chamisso (1830: 107) ≡ *Herpestis obovata* Poeppig. ex Chamisso & Schlechtendal (1830: 107) *pro. syn.* ≡ *Macuillamia repens* (Sw.) Pennell (1923: 9).

**Type:**—JAMAICA. Jun. 1786, *O. P. Swartz s.n.* (lectotype S 04-341! [designated here], isolecotypes BM 000953377!, LINN-HS No. 48-3!, LD 1741638!, S-R-2471!, S-R-2470!).

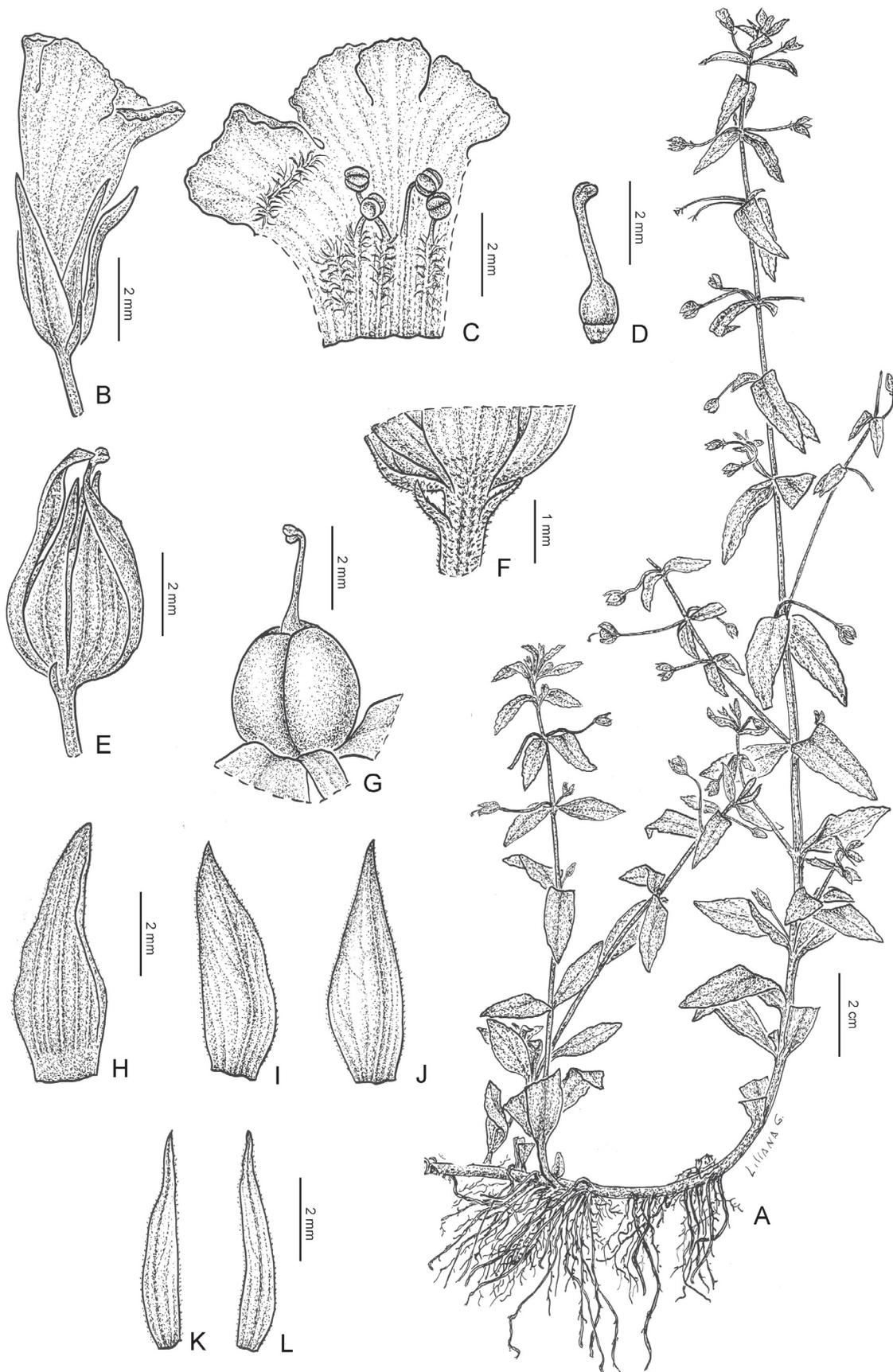
≡ *Macuillamia limosa* Pennell (1920: 158) ≡ *Bacopa limosa* (Pennell) Standley (1925: 460).

**Type:**—COLOMBIA. Cundinamarca: Melgar, open pool in clayey loam, alt. 400–500 m, *F.W. Pennell 2927* (holotype NY 00090653, isotypes CAS 0003270!, PH 00016463!, US 00122518!).

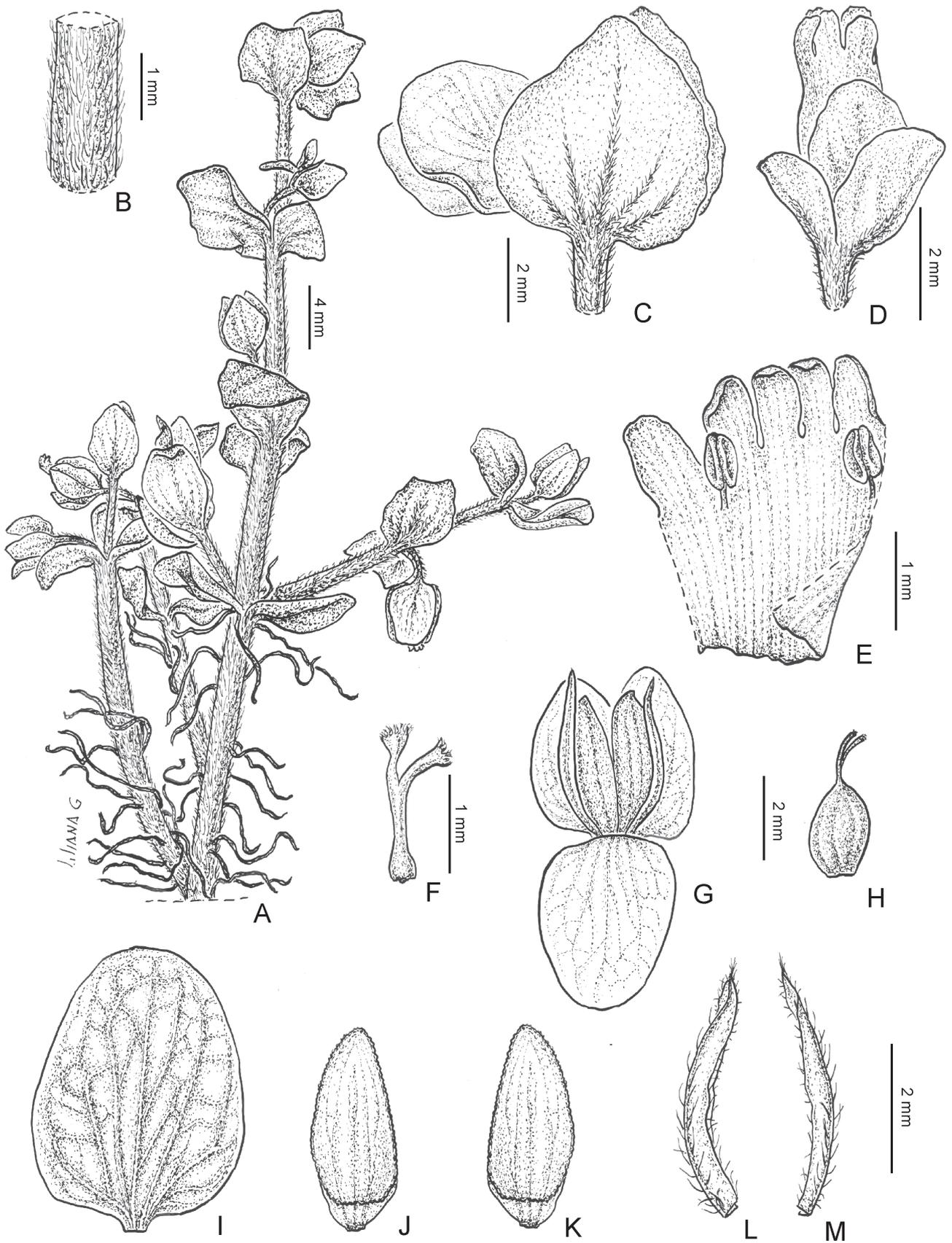
≡ *Bacopa cladostyla* Eskuche (1989: 11), *syn. nov.*

**Type:**—PARAGUAY. San Bernardino, campo estero Ciervo-cuá, Feb 1915, *T. Rojas 1043* (holotype LIL 222.457!, isotypes LIL 70.170 ex Hb. Gray!).

*Herbs*, annual, 3–5 cm tall, prostrate, ascending stems, strigose. *Leaves* opposite, sessile, blade ovate elliptic, 6–8 × 5–7 mm, apex rounded, base rounded, margin entire, adaxial surface glabrous, abaxial surface sparsely pubescent, more densely on the veins. *Flowers* axillary, solitary, pedicels 1–2(–5) mm long, villose; bracteoles absent. *Calyx* 5-



**FIGURE 6.** *Bacopa paraguariensis*. A. Plant aspect. B. Flower. C. Corolla opened, showing stamens. D. Gynoecium. E. Calyx. F. Detail of bracteoles. G. Fructiferous gynoecium. H. Dorsal lobe, external view. I & J. Lateral lobes, external views. K & L. Internal lobes (from Pedersen 14850, CTES).



**FIGURE 7.** *Bacopa repens*. A. Plant aspect. B. Detail of stem pubescence. C. Detail of node. D. Flower. E. Corolla opened, showing stamens. F. Gynoecium. G. Calyx with dorsal lobe opened. H. Fructiferous gynoecium. I. Dorsal lobe, external view. J & K. Lateral lobes, internal views. L & M. Internal lobes (from *Eskuche 3454*, CTES).

lobed, the external dorsal lobe wide ovate, 2–4 × 2–2.8 mm, apex rounded, base cordate, the two lateral lobes ovate, 2–3 × 1.3–2 mm, apex obtuse, base cordate, strigose towards the apex and in the central vein, the two internal lobes linear, 2–4 × 0.4–0.6 mm, apex acute, hispid on margins and veins. *Corolla* white, tube 2.5–3 mm long, puberulous; stamens 2 plus 1 or 2 staminodes; ovary glabrous, style deeply bifid, stigmatic apex hairy globose. *Capsule* ovoid, apex acute, 2.8–3 × 2.2–2.5 mm.

**Distribution and habitat:**—*Bacopa repens* is found growing from the United States of America to Argentina, in the northeastern provinces of Corrientes, Formosa and Santa Fe. It is also frequent in China (Deyuan *et al.* 1998). It grows between sea level and 500 m elev.

**Nomenclatural remarks:**—Swartz (1788) described *Gratiola repens* from material collected in Jamaica. According to Christenhusz (2011) the holotype is at S, where most of Swartz's collections from the West Indies are housed (Stafleu & Cowan 1986, Pupulin 2009). However, three sheets that can be undoubtedly attributed to Swartz were located there. Souza & Giulietti (2009: 54) lectotypified this name on a Bertero specimen from Jamaica although this element cannot be considered original material for the name since Swartz based the *Prodromus* on his own collections and those in the Banksian herbarium (Nicolson & Jarvis 1990). Therefore, Souza & Giulietti's designation is not in conformity with Art. 9.12 and must be superseded. Among the original material at S there is a specimen annotated in Swartz's handwriting: "*Gratiola repens* 1786 Jamaica". Thus, this specimen is here selected as lectotype of the name.

**Taxonomic remarks:**—The analysis of the type material of *B. cladostyla*, together with the description in the protologue evidences that it is a synonym of *B. repens*.

The presence of two stamens, instead of four, differentiates *B. repens* from the rest of the *Bacopa* that grow in Argentina. See remarks under *B. australis*.

**Selected specimens examined:**—**Corrientes:** Itatí, arrocera Repezcki, 28 Feb 1977, *Ahumada et al.* 891 (CTES). **Formosa:** Arrocera Sur. Establecimiento Negra-í, RN 11, km 1251, 20 Jan 2000, *Iriart 577-8b* (CTESN). **Santa Fe:** San Javier, 8 Feb 2000, *Iriart 604-14<sup>a</sup>* (CTESN).

#### 8. *Bacopa rotundifolia* (Michx.) Wettstein (1895: 76). Fig. 8.

≡ *Monniera rotundifolia* Michaux (1803: 22) ≡ *Herpestis rotundifolia* (Michx.) Pursh (1813: 418) *nom. illeg., hom. non* Gaertner (1807: 186) ≡ *Macuillamia rotundifolia* (Michx.) Rafinesque (1840: 44) ≡ *Ranapalus rotundifolius* (Michx.) Pennell (1920: 242).

**Type:**—UNITED STATES OF AMERICA. Illinois, État de l'Illinois, dans les marais, May 1849, *A. Trécul 742* (neotype P 03535493! [designated here], isoneotypes P 03535482!, P 03535499!).

= *Herpestis tweedii* Benth (1846: 397) ≡ *Monniera tweedii* (Benth.) Kuntze (1891: 463) ≡ *Bacopa tweedie* (Benth.) Parodi (1930: 240).

**Type:**—ARGENTINA. Córdoba, *J. Tweedie s.n.* (lectotype K!, two sheets [first-step designated by Souza & Giulietti 2009: 48], second-step lectotype K 000373794! [designated here], isolectotype K 000533445!).

= *Bacopa limosa* (Pennell) Standley (1925: 460) ≡ *Macuillamia limosa* Pennell (1920: 158).

**Type:**—COLOMBIA. Cundinamarca, Melgar, Dec 1917, *F.W. Pennell 2927* (holotype NY 00090653!, isotypes CAS 0003270!, PH 00016463!, US 00122518!).

= *Bacopa simulans* Fernald (1942: 438).

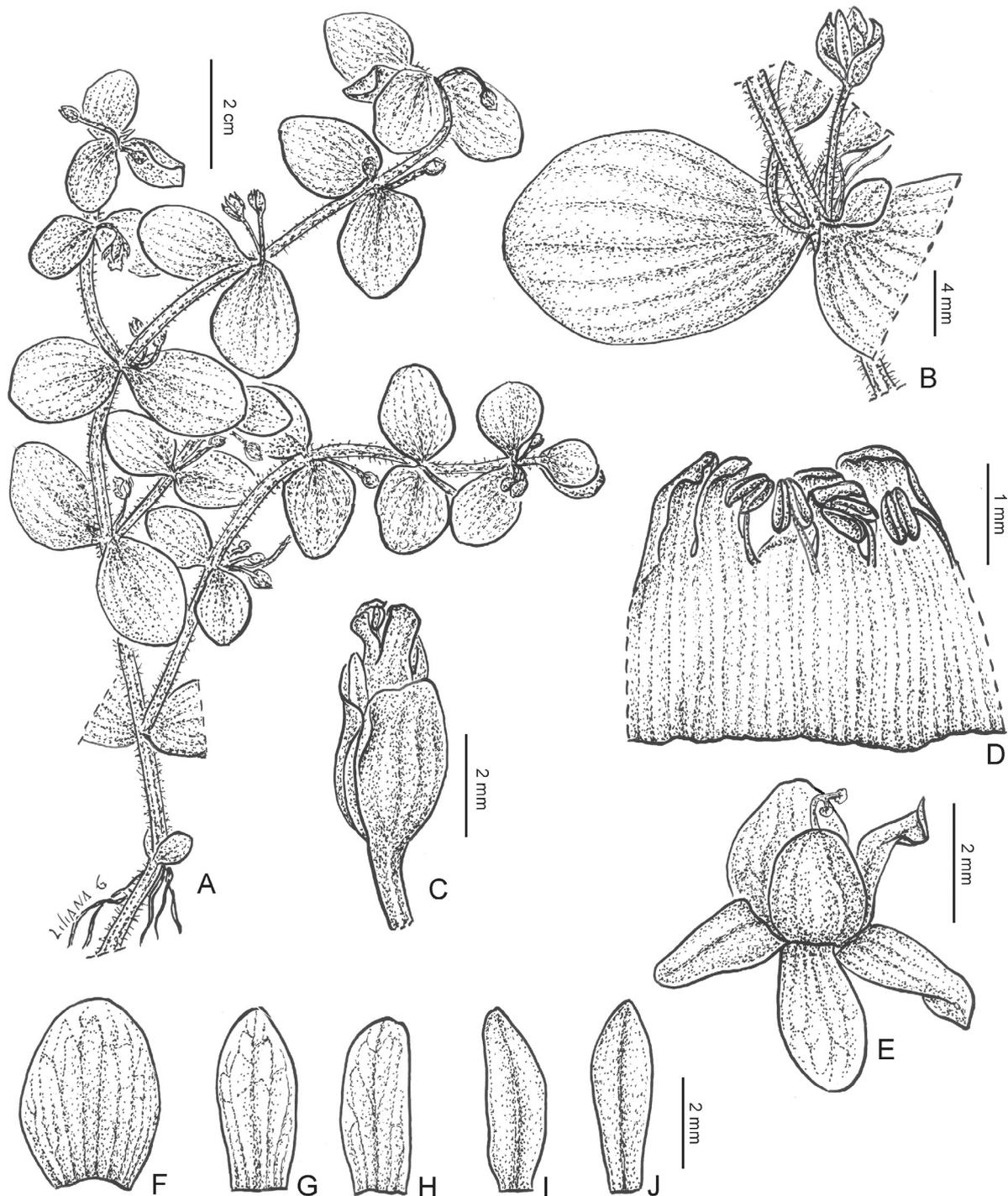
**Type:**—UNITED STATES OF AMERICA. Virginia, Charles City County, sandy-muddy fresh tidal shore of Chichahominy River, Graves Landing, north of Holderoft, Sep 10 1941, *M. L. Fernald & B. H. Long 13749* (lectotype GH 00077923! [designated here], isolectotypes BM 001025113!, BRIT 23358!, F 0072297F!, GH 00077924!, K 000979484!, MICH 1109980!, NY00067865!, US 00036890!, WIS v0256278!).

= *Bacopa nobisiana* Mason (1952: 206).

**Type:**—UNITED STATES OF AMERICA. California, rice fields, Sutter bypass, just south of Marysville, Sutter County, Jul 29, 1949, *M. Nobs & S. G. Smith 1097* (holotype UC 927650!, isotypes CAS 0027916!, K 000979488!, NY 00067864!).

*Herbs*, annual, 20–30 cm tall, prostrate, sub-glabrous or slightly strigose. *Leaves* opposite, sessile, blade orbicular, 10–14 × 10–13 mm, apex obtuse, base rounded, margin entire, glabrous. *Flowers* axillary, solitary, pedicels 5–10 mm long, sub-glabrous or slightly puberulous, bracteoles absent. *Calyx* 5-lobed, the external dorsal lobe wide ovate, 3.8–4.2 × 2.5–3 mm, apex rounded, base cordate or rounded, the two lateral lobes oblong, 3.8–4.2 × 1.8–2.2 mm, apex acute or obtuse, base truncate, glabrous, the two internal lobes linear, 3.8–4.2 × 1.4–1.6 mm, apex acute, glabrous. *Corolla* white, tube 4.5–5 mm long, glabrous; stamens 4; ovary glabrous, style bifid, stigmatic apex globose. *Capsule* ovoid, apex rounded, 2.8–3 × 1.8–2 mm.

**Distribution and habitat:**—*Bacopa rotundifolia* is a species of wide geographic distribution, occurring from southern United States of America to northern Argentina. It grows between sea level and 500 m elev.



**FIGURE 8.** *Bacopa rotundifolia*. A. Plant aspect. B. Detail of node. C. Flower. D. Corolla opened, showing stamens. E. Open calyx showing fruiting gynoecium. F. Dorsal lobe, external view. G & H. Lateral lobes, external views. I & J. Internal lobes (from Ahumada 2002, CTES).

**Nomenclatural remarks:**—Michaux (1803) described *Monniera rotundifolia* based on a specimen collected by him in Illinois, USA. Michaux's herbarium is kept at P, separate as *l'herbier historique* (Stafleu & Cowan 1981) but there is no material associated with this name there. However, a specimen annotated by Michaux as *M. rotundifolia* (P [barcode] 03535496 [digital image!]) was traced in the general herbarium of P. Even though Michaux studied this specimen, there is no evidence concerning the place of collection or date of herborization, therefore this material cannot be considered as original material. For this reason, the specimen *Trécul 742* is here selected as a neotype since it shows all the morphological features described in the protologue.

Souza & Giuliatti (2009) designated as lectotype of *Herpestis tweedii* a specimen housed at K. There are, however, two sheets associated with this name and these authors did not distinguish between them. Thus Souza & Giuliatti's

designation is here considered as a first-step typification (Art. 9.17). This designation is here narrowed by selecting the most complete specimen as a second-step lectotype.

Although Fernald (1942) clearly indicated the herbarium which houses the type collection of *Bacopa simulans*, two sheets were found at GH. Thus, the specimen showing the best quality of preservation of the important diagnostic features of the taxon is here chosen as lectotype of the name (Art. 9.17).

**Taxonomic remarks:**—*Bacopa rotundifolia* could be confused with *B. dubia*, being both small annual herbs, prostrate, sub-glabrous or slightly strigose, with absence of bracteoles. They are distinguished because *B. dubia* has slightly puberulous calyx lobes, vs. glabrous in *B. rotundifolia*.

**Selected specimens examined:**—**Chaco:** Primero de Mayo, Col. Benítez, Jan 1934, *Schulz 859* (CTES). **Corrientes:** Bella Vista, ruta 117, 11 Mar 1976, *Ahumada 311* (CTES). **Formosa:** Patiño, Bartolomé de las Casas, Apr 1971, *Schulz 658* (CTES). **Salta:** Anta, Forestal, 17 Feb 1988, *Saravia Toledo 1595* (CTES).

9. *Bacopa salzmännii* (Benth.) Wettstein ex Edwall (1897: 181). Fig. 9.

≡ *Herpestis salzmännii* Benth (1836: 58).

**Type:**—BRAZIL. Bahia, *P. Salzmänn s.n.* (lectotype K 000533400! [designated here], isolectotypes HAL 0115854!, K 000533400!, MO 503753!).

= *Bacopa violacea* (Pennell) Standley (1925: 460) ≡ *Monocardia violacea* Pennell (1920: 156).

**Type:**—COLOMBIA. Near Villavicenco, wet loam, along trail in forest, 450 m. elev., 28 Aug 1917, *F. W. Pennell 1480* (holotype NY 00090826!, isotypes GH 00078967!, K 000533448!, PH 00018342!, US 00122507!).

= *Bacopa humilis* (Pennell) Standley (1925: 460) ≡ *Monocardia humilis* Pennell (1920: 157).

**Type:**—COLOMBIA. Huila, “seepy place in plain east of Neiva”, 8 Aug 1917, *H. H. Rusby & F.W. Pennell 1065* (holotype NY 00090824!, isotypes GH 00078965!, K 000533452!, PH 00018340!, US 00122505!).

= *Bacopa lilacina* (Pennell) Standley (1936: 174) ≡ *Monocardia lilacina* Pennell (1920: 72).

**Type:**—COLOMBIA. Meta, in forest near Villavicencio, 28 Aug 1917, *F. W. Pennell 1476* (holotype NY 00090825!, isotypes GH 00078966!, K 000533449!, PH 00018341!, US 00122506!).

*Herbs*, annual, 6–20 cm tall, prostrate, stems ascending, densely hispid villose. *Leaves* opposite, sessile, blade ovate, 12 × 8 mm, apex obtuse or rounded, base rounded to amplexicaul, margin entire, hispid villose in the margin and on the veins of abaxial face. *Flowers* axillary, solitary, pedicels (6–)8–20 mm long, villose, bracteoles absent. *Calyx* 5-lobed, the external dorsal lobe wide ovate, 4.5–5 × 4.8–5 mm, apex rounded, base cordate, the two lateral lobes wide ovate, 4.8–5 × 4.8–5.2 mm, apex rounded, base cordate, hispid villose in the margin and on the veins, the two internal lobes linear, 4.5–4.8 × 0.8–1 mm, apex acute, base truncate, hispid villose. *Corolla* white, blue, or pale blue color, tube 5.8–6.2 mm long, glabrous; stamens 4; ovary glabrous, style entire, stigmatic apex globose. *Capsule* ovoid, apex acute, 3.5–3.8 × 1.8–2.1 mm.

**Distribution and habitat:**—Species broadly distributed found from Mexico to northern Argentina, between sea level and 1000 m elev. It is found on stony grounds and on lagoon banks.

**Nomeclatural remarks:**—Souza & Giuletta (2009: 57) and Christenhusz (2011) mentioned that the holotype of *Herpestis salzmännii* is housed at herbarium K. However two sheets annotated “*Herpestis salzmännii*” by Benth have been located there. Both specimens agree with the diagnosis and the locality cited in the protologue (i.e. Bahia). Thus, the element showing the best quality of preservation of the important diagnostic features of the taxon is here chosen as lectotype of the name.

**Taxonomic remarks:**—*Bacopa salzmännii* is easily distinguished by its dense hispid villose pubescence, also present in *B. serpyllifolia*. However this last is differentiated by its bifid style and presence of long bristles in a ring around the ovary, vs. entire style and glabrous ovary in *B. salzmännii*.

**Specimens examined:**—**Chaco:** Primero de Mayo, Col. Benítez, 1 Jan 1937, *Schulz 9149* (CTES). **Corrientes:** San Cosme, ruta 12, 28 Sep 1981, *Krapovickas et al. 37553* (BAB, CTES, LIL). **Formosa:** “Guaycalée”, Feb 1919, *Jørgensen 3282* (LIL). **Misiones:** San Ignacio, 29 Dec 2010, *Keller 9330* (CTES).

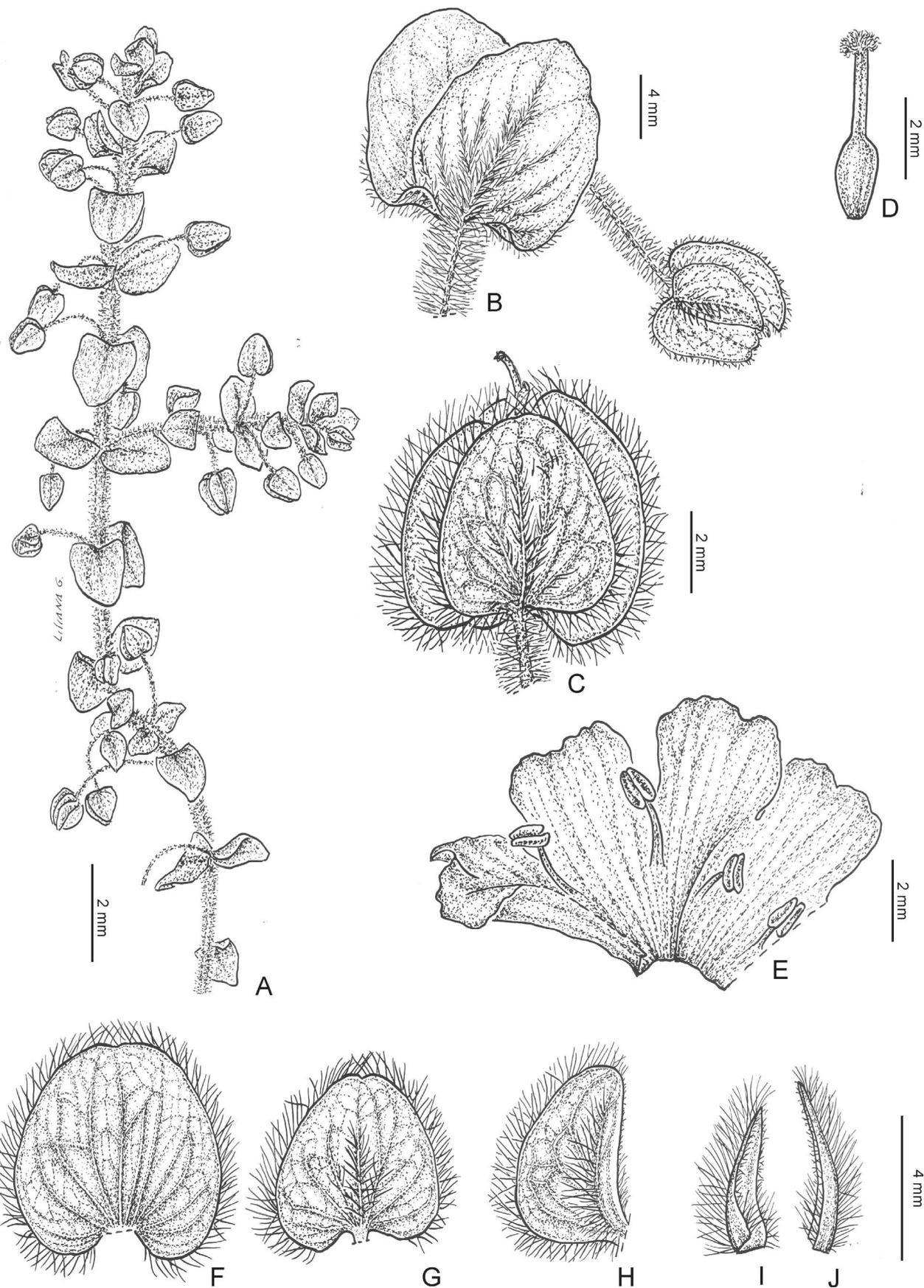
10. *Bacopa scabra* (Benth.) Descole & Borsini (1954: 137) var. *scabra*. Fig. 10.

≡ *Herpestis scabra* Benth (1836: 57) ≡ *Monniera scabra* (Benth.) Kuntze (1891: 463).

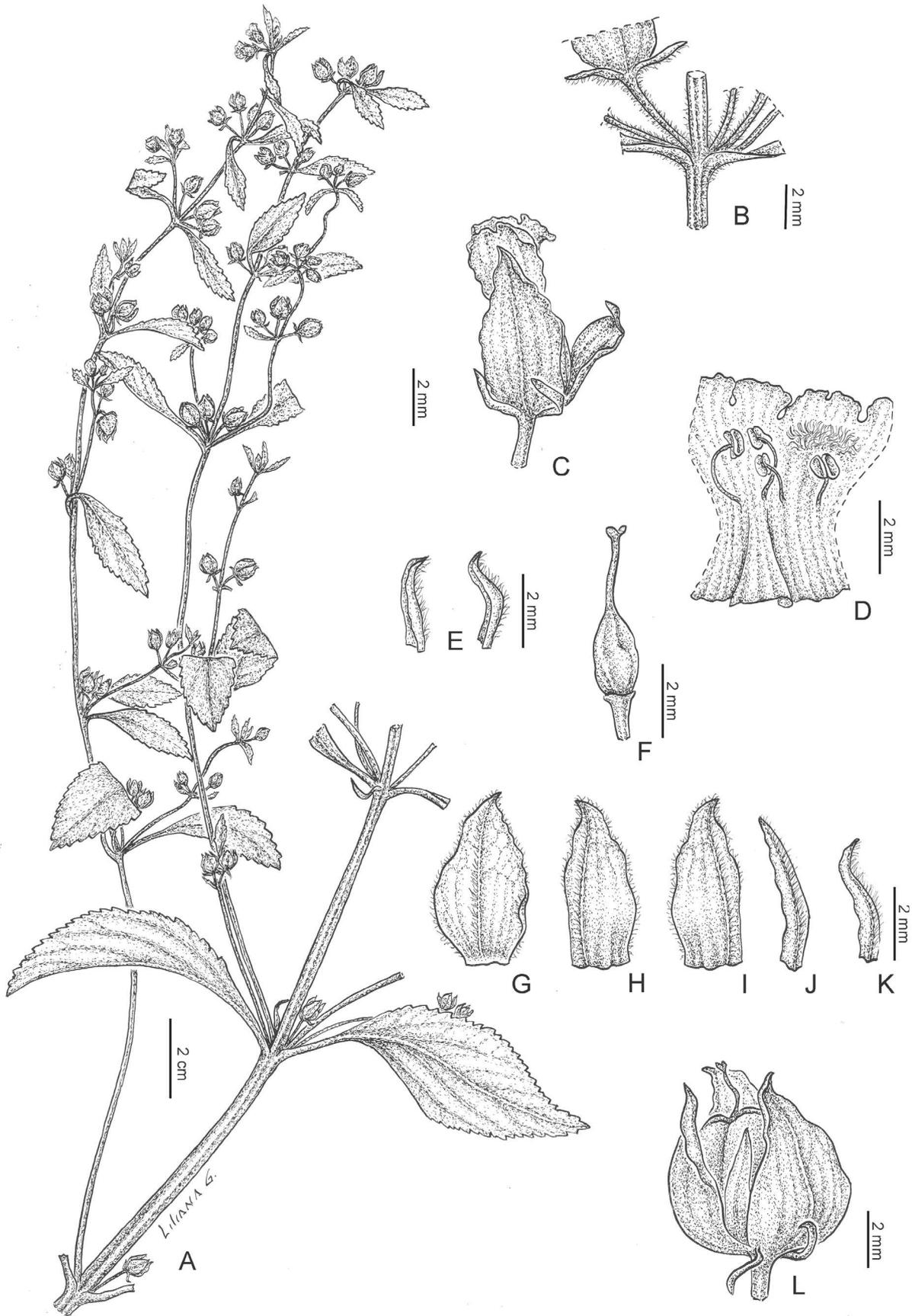
**Type:**—BRAZIL. Rio Grande do Sul, *J. Tweedie 177* (lectotype K 000533413! [designated by Souza & Giuletta 2009: 40]).

= *Bacopa hassleriana* Chodat & Hassler (1904: 289).

**Type:**—PARAGUAY. Carimbatay, *E. Hassler 5820* (lectotype G 00229876! [designated here], isolectotypes BM 000098485!, G 00229875!, G 00229877!, G 00229878!, K 000533458!, NY 00067874!, P 00634488!).



**FIGURE 9.** *Bacopa salzmännii*. A. Plant aspect. B. Detail of nodes. C. Calyx. D. Gynoecium. E. Corolla opened, showing stamens. F. Dorsal lobe, internal view. G & H. Lateral lobes, external views. I & J. Internal lobes (from *Arbo 8786*, CTES).



**FIGURE 10.** *Bacopa scabra* var. *scabra*. A. Plant aspect. B. Detail of node. C. Flower. D. Corolla opened, showing stamens. E. Bracteoles. F. Gynoecium. G. Dorsal lobe, external view. H & I. Lateral lobes, external views. J & K. Internal lobes. L. Fruiting calyx (from *Schinini 8706*, CTES).

*Herbs*, perennial 15–40(–100) cm tall, erect, branched, slightly strigose or puberulous. *Leaves* opposite, sessile or with a brief petiole, blade ovate, 17–32 × 4–12 mm, apex acute, base acute, margin slightly serrate, hispid strigose on abaxial surface. *Flowers* axillary, solitary or 2 per axil, pedicel 4–8(–13) mm long, densely strigose, bracteoles two, linear, 3–4 mm long, strigose. *Calyx* 5-lobed, the external dorsal lobe ovate to oblong, 3–4.5 × 2–2.5 mm, apex acute, base truncate, the two lateral lobes ovate, 4 × 2 mm, apex acute, base acute, puberulous, the two internal lobes linear, 2.5–4 × 0.5–1 mm, apex acute, puberulous. *Corolla* lilac, tube 5–6 mm long, puberulous; stamens 4; ovary glabrous, style entire, stigmatic apex bilobed. *Capsule* globose, apex rounded, 4–5 × 3.5–4 mm.

**Distribution and habitat:**—Native to South America, it grows in Brazil, Paraguay and northeastern Argentina, between sea level and 1000 m elev.

**Nomenclatural remarks:**—Chodat & Hassler (1904) described *Bacopa hassleriana* based on a collection made by E. Hassler in Paraguay. Four sheets belonging to this collection were found at G where Hassler's type material from Paraguay is kept (Stafleu & Cowan 1979). Thus, the specimen showing the best quality of preservation of the important diagnostic features of the taxon is here chosen as lectotype of the name (Art. 9.17).

**Taxonomic remarks:**—*Bacopa scabra* var. *scabra* is similar to *B. paraguariensis* (see remarks under this last).

**Selected specimens examined:**—**Corrientes:** Capital, 6 Apr 1974, *Schinini 8706* (CTES). **Chaco:** Primero de Mayo, Col. Benítez, 20 Apr 1965, *Schulz 15018* (CTES). **Misiones:** Iguazú, *Denis s.n.* (LIL 70166).

11. *Bacopa serpyllifolia* (Benth.) Pennell (1946: 98). Fig. 11.

≡ *Herpestis serpyllifolia* Benth (1846: 398) ≡ *Herpestis lanigera* var. *serpyllifolia* (Benth.) Schmidt (1862: 313).

**Type:**—BRAZIL. Minas Gerais, São Romeo, 1840, *J. Gardner 5055* (lectotype K 000533480! [designated by Souza & Giuliatti 2009: 63], isolectotypes BM 000953367!, OXF 00009688V!, P 00584296!).

= *Bacopa ciliata* (Pennell) Pennell (1946: 98) ≡ *Herpestis ciliata* Pennell (1940: 2).

**Type:**—GUYANA. 25–26 Oct 1937, *A. C. Smith 2281* (holotype PH [not located], isotypes F 0072500F!, GH 00078562!, K000533464!, MO 503757!, NY 00068528!, S 04-3403!, U 0006742!, US 00122513!).

*Herbs*, annual or perennial, 8–10 cm tall, prostrate, densely hispid villose. *Leaves* opposite, sessile, blade ovate or elliptic, 6–10 × 3–8 mm, apex obtuse, base rounded to amplexicaul, margin entire, hispid villose in the margin and on the veins of abaxial face. *Flowers* axillary, solitary, pedicels 4–20 mm long, bracteoles absent or two, linear, 1–2 mm long, villose. *Calyx* 5-lobed, with the external dorsal lobe ovate, 4–5 × 2.5–3 mm long, apex rounded, base truncate, the two lateral lobes ovate, 3.8–4 × 2.5–2.8 mm, apex rounded, base truncate, hispid villose in the margin and on the veins, the two internal lobes linear, 4–4.2 × 0.8–1 mm, apex acute, base truncate, hispid villose. *Corolla* blue or violet color, tube 7–10 mm long, glabrous; stamens 4; ovary with long bristles in a ring, style bifid, stigmatic apex smooth. *Capsule* ovoid, apex acute, 3.2–3.5 × 2.1–2.5 mm.

**Distribution and habitat:**—*B. serpyllifolia* is distributed in South America from Venezuela to northern Argentina in the province of Chaco, between sea level and 500 m elev.

**Taxonomic remarks:**—*Bacopa serpyllifolia* is similar to *B. salzmännii* (see remarks under this last).

**Selected specimens examined:**—**Chaco:** San Fernando, Fontana, *Meyer 563* (LIL 73117).

12. *Bacopa verticillata* (Pennell & Gleason) Pennell (1946: 92). Fig. 12.

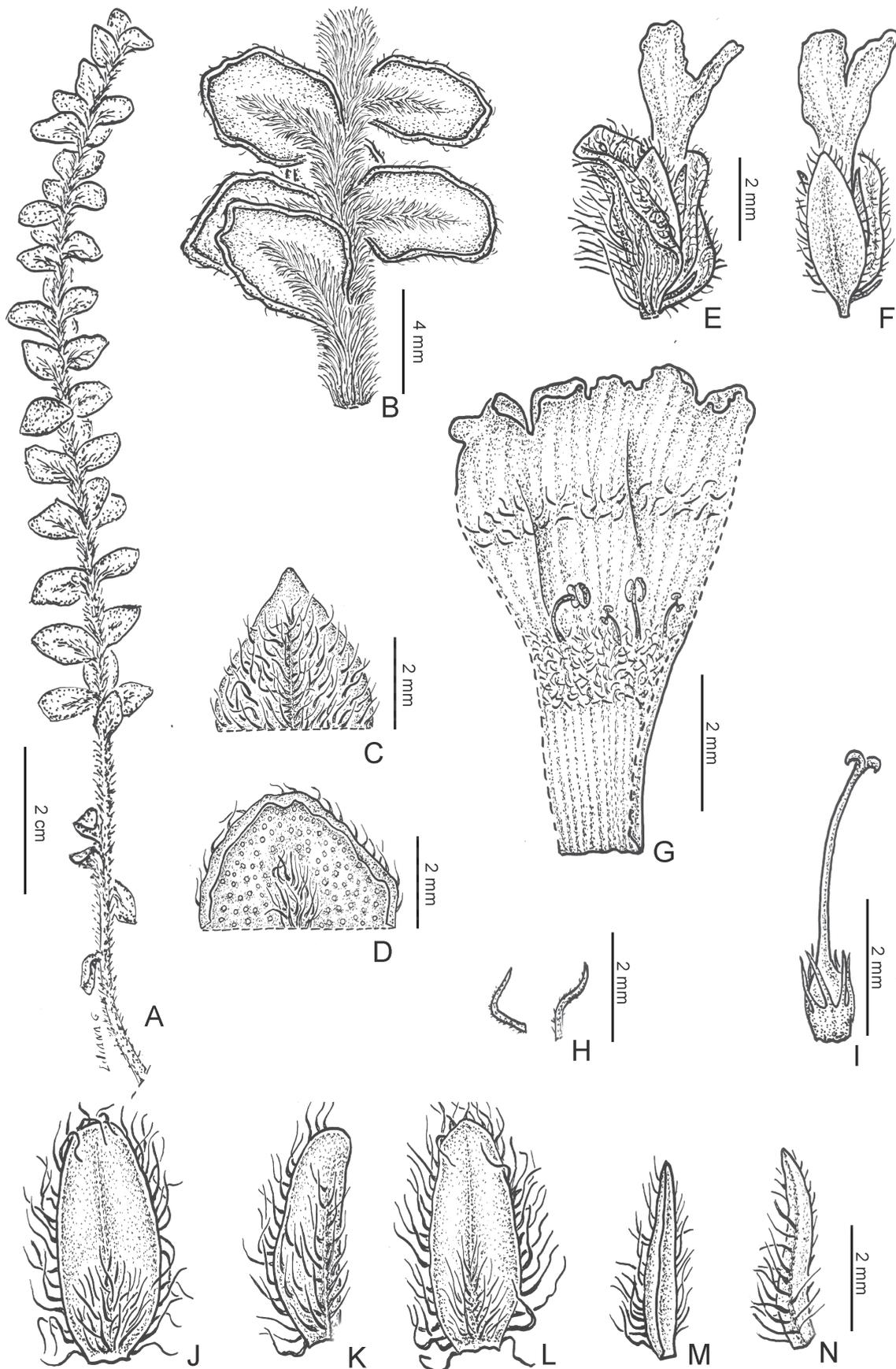
≡ *Caconapea verticillata* Pennell & Gleason (1929: 403).

**Type:**—BRAZIL. “Extreme northern Brazil south of Mount Roraima”, 21 Sep 1927, *O. Tate 72* (holotype NY 00067936!, isotype PH 00010109!).

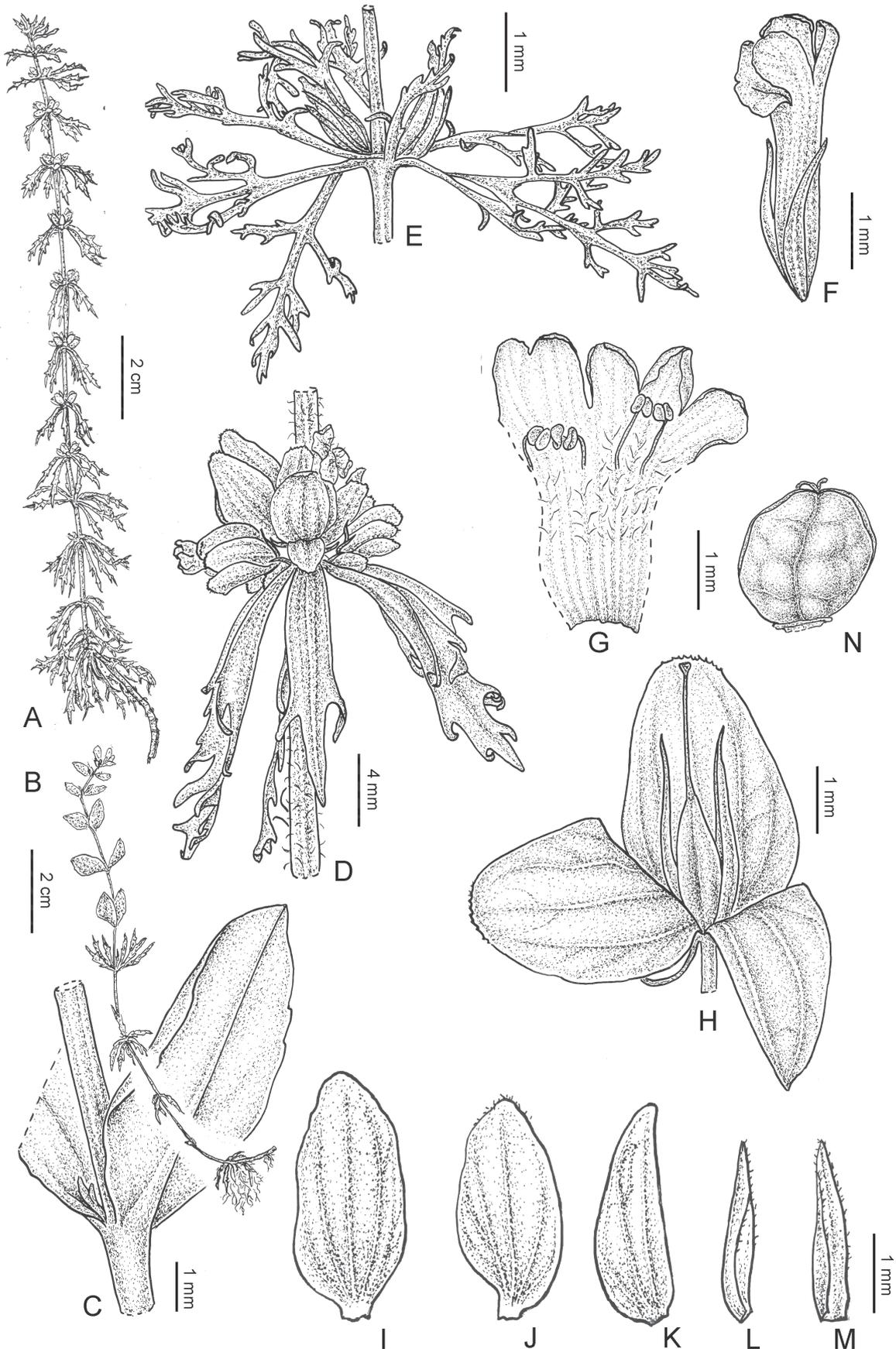
= *Bacopa pedersenii* Rossow (1986: 176).

**Type:**—ARGENTINA. Corrientes. Mburucuyá, Santa Teresa, Quebrachal, Cañada Fragosa. 26 Dec 1980, *T. M. Pedersen 12980* (lectotype CTES 0013901! [designated here], isolectotypes BR 0000005423767!, CTES 0013902!, G 00356531!, S 04-3412!, UPS V-708427!).

*Herbs*, annual, 20 cm tall, prostrate stems, slightly puberulous. *Leaves* 3–5 verticillate, sessile, dimorphic: submerged leaves with blade pinnatisect or pinnatifid, aerial leaves with blade pinnatifid to entire, margin entire to serrate, 7–16 × 1–3 mm, apex acute or obtuse, base amplexicaul or auriculate, glabrous on both surfaces. *Flowers* axillary, solitary, sessile or with brief pedicels 0.5 mm long, bracteoles two, linear, 1–2 mm long, glabrous. *Calyx* 5-lobed, the two external dorsal lobe ovate, 2.5–3 × 1.5–2 mm, apex rounded, base truncate, lateral lobes ovate, 3.2–3.8 × 1.8–2 mm, apex acute, base truncate, glabrous; two internal lobes linear, 1.8–2 × 0.8–1 mm, apex acute, glabrous or with glandular hairs. *Corolla* white, or pale blue color, tube 3–4 mm long, glabrous; stamens 4; ovary glabrous, style entire, stigmatic; apex bilobed. *Capsule* globose, apex rounded, 2.5–2.8 × 2.4–2.5 mm.



**FIGURE 11.** *Bacopa serpyllifolia*. A. Plant aspect. B. Detail of apical nodes. C. Detail of leaf adaxial surface pubescence. D. Detail of leaf abaxial surface pubescence. E. Flower. F. Flower with dorsal lobe removed. G. Corolla opened, showing stamens. H. Bracteoles. I. Gynoecium. J. Dorsal lobe, internal view. K & L. Lateral lobes, internal views. M & N. Internal lobes (from *Hatschbach & Kummrow 35038*, CTES, Brasil, Matto Grosso, Mun. Alto Araguaia, Corrego do Sapo, 21 Sep 1974).



**FIGURE 12.** *Bacopa verticillata*. A. Plant aspect. B. Plant with submerged and aerial leaves. C. Detail of node with aerial leaves. D. Detail of node with submerged leaves and flowers. E. Detail of node with submerged leaves. F. Flower with internal lobes. G. Corolla opened, showing stamens. H. Calyx and gynoecium. I. Dorsal lobe, internal view. J & K. Lateral lobes, internal views. L & M. Internal lobes. N. Capsule (A–H, N, from Wood & Huaylla 20745, LPB, Bolivia, Dpto. Santa Cruz, Velazco, camino entre el Refugio hacia los Fierros, 14° 34'S, 61° 01' W, 18 Apr 2004; I–M, from Pedersen 12980, CTES, lectotype *Bacopa pedersenii*).

**Distribution and habitat:**—Native species from South America, distributed from Guyanas and Venezuela to northeastern Argentina in the province of Corrientes. It is found on humid, sometimes submerged terrain.

**Nomenclatural remarks:**—Rossow (1986) clearly indicated that the type collection is housed at CTES. However, two sheets were found there, thus the specimen showing the best quality of preservation of the important diagnostic features of the taxon is here chosen as lectotype of the name (Art. 9.17).

**Taxonomic remarks:**—*Bacopa verticillata* is easily distinguished being the only Argentine *Bacopa* with 3–5 verticillate leaves with pinnatisect or pinnatifid blades (being opposite leaves with entire blades in the rest of the species).

**Selected specimens examined:**—**Corrientes:** San Miguel, Ea. San Juan Poriajhu, ruta 17, *Tressens 4277* (CTES, LIL).

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## APPENDIX 1. List of recognized taxa of *Bacopa* in Argentina.

1. *Bacopa australis* Souza
2. *Bacopa congesta* Chodat & Hassler
3. *Bacopa dubia* Chodat & Hassler
4. *Bacopa monnieri* (Linnaeus) Wettstein
5. *Bacopa monnierioides* (Chamisso) Robinson
6. *Bacopa paraguayensis* (Moore) Hassler
7. *Bacopa repens* (Swartz) Wettstein
8. *Bacopa rotundifolia* (Michaux) Wettstein
9. *Bacopa salzmännii* (Benth) Wettstein ex Edwall
10. *Bacopa scabra* (Benth) Descole & Borsini
11. *Bacopa serpyllifolia* (Benth) Pennell
12. *Bacopa verticillata* (Pennell & Gleason) Pennell

**APPENDIX 2.** Index to collectors. Each specimen is cited by the surname of the first collector followed by the collection number. Between brackets is the reference to the taxa, which corresponds to the ordinal number in Appendix 1.

**Aguilar** 347 (8). **Ahumada** 311 (8), 447 (8), 498 (6), 500 (8), 821 (6), 891 (7), 963 (9), 1532 (8), 1646 (8), 1797 (6), 1844 (1), 1857 (8), 1951 (3), 2002 (8), 2087 (6), 2127 (8), 2254 (3), 2362 (3), 2496 (8), 3284 (4), 3310 (4), 3489 (4), 8915 (4). **Arbo** 122 (3), 122A (4), 257 (3), 275 (9), 598 (3), 774 (4), 1004 (3), 1005 (9), 1045 (9), 1328 (9), 1500 (3), 6563 (10), 6906 (3), 7002 (3), 7101 (3), 8119 (4), 8290 (4), 8786 (9). **Balegno** 1559 (4). **Biurrun** 5375 (4), 6292 (4), 6399 (4).

**Burkart** 4365 (4). **Cabrera** 282 (5), 8604 (4), 10009 (4), 10102 (4). **Cardozo** 259 (9), 265 (5). **Carenzo** 3381 (4). **Carnevali** 1856 (4), 2362 (3), 4164 (6), 4188 (6), 4329 (4), 4337 (6), 5352 (9), 5353 (3), 5422 (9), 5578 (9), 5857 (6). **Castellanos** s.n. (LIL 71797) (4), 97870 (4). **Castillon** 14291 (4). **Chalukian** 575 (4). **Clos** 1001 (4), 3835 (4). **Covas** 19076 (4), 19079 (4). **Cristóbal** 1108 (3), 1465 (4), 1859 (3). **Cuezzo** 795 (4). **Del Castillo** 662 (4). **Dematteis** 1377 (9). **Denham** 134 (3). **Denis** s.n. (LIL 70166) (10). **Dimitri** 399 (4). **Dinelli** 653 (4). **Eskuche** 3454 (7), 3515 (7), 4240 (7), 4450 (7), 4465 (7). **Ferrucci** 2139 (4). **Fortunato** 2718 (4), 7928 (4). **Garino** s.n. BAB 91750 (3). **Guaglianone** 145 (3). **Guillén** 460 (3). **Guitierrez** 79 (4). **Hatschbach** 35038 (11). **Hayward** s.n. LIL 80753 (4), sn. LIL 300169 (4). **Heinonen** 41 (1). **Holmberg** 29 (4). **Huidobro** 69 (4), 4782 (2), 4868 (2), 5008 (2), 5057 (2). **Hurrel** 3393 (4), 3516 (4), 3796 (4), 6280 (4). **Ibarrola** 427 (3), 1235 (6), 3552 (4), 4376 (2). **Iriart** 373 (7), 392-4 (7), 401-23 (7), 415-15 (7), 483 (7), 577-8b (7), 604-14a (7), 615-17 (7). **Jorgensen** 2997 (6), 3282 (9). **Keller** 979 (9), 980 (3), 5342 (2), 5475 (9), 9330 (9), 10179 (4), 11253 (6), 11323 (2), 11457 (9). **Kermes** 201 (10), 672 (8). **Kiesling** 5060 (4). **Krapovickas** 11683 (4), 12678 (3), 12959 (8), 13738 (3), 14317 (3), 15401 (9), 17068 (9), 17067 (1), 17225 (2), 17253 (9), 18013 (9), 18090 (2), 18221 (9), 20298 (4), 20816 (1), 20956 (2), 21590 (2), 22207 (10), 23825 (3), 24190A (9), 24190 B (5), 25188 (2), 25194 (2), 25362 (2), 25394 (2), 28953 (2), 29395 (4), 35737 (4), 37553 (9), 37552 (3), 41218 (9), 41232 (2). **Kurtz** 8459 (4). **Lahitte** 48875 (4). **Lirussi** 586 (2). **Lourteig** 476 (4), 958 (4). **Lucena** 254 (4). **Mari** 467 (4), 728 (4). **Martínez Crovetto** 5441 (3), 8071 (2), AN-44 (4). **Mazocca** s.n. BAB92263 (4). **Meyer** 563 (11), 2139 (4), 6079 (3), 6241 (2), 13056 (4), 16234 (8). **Molfino** 136 (3). **Monetti** 1347 (4). **Morel** 972 (8), 3335 (8), 6522 (4). **Morello** 116 (4). **Múlgura** 4254 (4). **Neiff** 890 (4). **Novara** 8463 (4), 9687 (8). **O'Donell** 5091 (4). **Olea** 144 (4). **Pedersen** 7749 (7), 11877 (9), 12399 (2), 13474 (4), 14850 (6), 15335 (4). **Peralta** 592 (4). **Piccinini** 1797 (4). **Pierotti** 109 (4), 4095 (4). **Pire** 45 (3), 337 (3). **Portugal** 105 (4). **Quarín** 1381 (4). **Ragonese** 5052 (4). **Renvoize** 3670 (8). **Romanczuk** 247 (9). **Romero** s.n. LIL 208463 (4). **Rossow** 1985 (12). **Ruiz Leal** 9928 (4), 1800 (4), 8410 (4), 14519 (4), 21717 (4). **Salgado** 38 (3), 78 (3). **Saravia Toledo** 1595 (8), 13226 (4), 13785 (4). **Scarpa** 496 (4). **Schinini** 8306 (9), 8343 (9), 8549 (9), 8566 (3), 8680 (9), 8706 (10), 8754 (10), 11227 (2), 12025 (3), 12662 (4), 12709 (4), 13115 (10), 13127 (9), 13244 (9), 13246 (3), 14384 (4), 15568 (3), 19195 (4), 23746 (2), 25280 (6), 27556 (6), 27575 (2), 30296 (4), 34942 (9), 34949 (3), 35633 (9). **Schreiter** 11244 (4). **Schulz** 242 (4), 658 (8), 859 (8), 1025 (9), 1026 (9), 1027 (9), 1030 (4), 1571 (4), 1572 (4), 1585 (10), 1582 (6), 1584 (6), 1586 (10), 1587 (10), 3740 (4), 3824 (9), 3953 (9), 4015 (4), 4258 (10), 5248 (4), 7544 (9), 9149 (9), 9150 (4), 10418 (8), 10970 (9), 13669 (4), 15018 (10), 16237 (4), 17224 (4), 18490 (3). **Schwarz** 17 (4), 6007 (9), 6680 (6), 8509 (4), 8860 (3). **Schwindt** 1302 (9). **Solís Neffa** 214 (3). **Sosa** 25 (3), 181 (9), 182 (3), 266 (2). **Souza** 7488 (2). **Sparre** 5505 (4). **Spegazzini** s.n. BAB792a (4), 15648 (4), 17042 (5), 19744 (9), 20061 (9), 20701 (2), 22026 (2), 28848 (4), 29533 (4), 69308 (4), 69309 (4). **Tressens** 887 (9), 888 (3),

4172 (3), 4223 (6), 4277 (12), 3341 (9). **Troncoso** 1604 (4). **Tur** 1600 (4), 1604 (4), 1693 (4). **Vanni** 1504 (3), 1532 (3), 1595 (3). **Venturi** 538 (4), 1994 (4), 2118 (4), 2933 (4), 4822 (4), 5657 (4). **Vervoost** 5128 (4). **Villafañe** 217 (4). **Wood** 20745 (12). **Zuloaga** 11544 (4).