

AN OUTLINE REVISION OF THE SUBTRIBE SIPHOCAMPYLINAE (LOBELIACEAE)

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Abstract

Morphological diagnostic characters to differentiate genera of subtribe Siphocampylinae (family *Lobeliaceae*) are indicated. A key to the genera of this subtribe is included.

Introduction

Lobeliaceae includes about 1200 species widespread in tropical and subtropical areas. Reviews by WIMMER (1943, 1953, 1968) have greatly clarified the taxonomic arrangement of the family, and many taxa are now better known. In this contribution a preliminary arrangement of subtribe *Siphocampylinae* "Eusiphon" is presented, as well as distributions areas of the accepted genera (fig. 1).

WIMMER (1948) described *Siphocampylinae* to include those *Lobeliaceae* with bilocular ovary, loculicidal capsule (dehiscent by two apical valves), and flowers crowded in apical racemes or solitary at the basis of uppermost leaves. The new subtribe included three groups ("rami"), of which "Eusiphon" grouped plants with a long entire (not longitudinally opened) tube of corolla. In this "ramus" he placed *Siphocampylus* Pohl, *Diastatea* Scheidw., and *Laurentia* (including other small genera as *Enchysia* C. Presl, *Hippobroma* G. Don, *Isotoma* (R. Br.) Lindl., *Palmerella* A. Gray, *Porterella* Torrey, or *Solenopsis* C. Presl).

Nevertheless, as *Laurentia* Adans. was published to replace the former *Lobelia* L. is to be treated as illegitimate (MEIKLE, 1979). In this situation, a rearrangement of the "ramus" is needed to clarify the position of genera related to the former *Laurentia*, which is here attempted from the basis of morphological, carpological, and biogeographical features.

Diagnostic characters

Several morphological characteristics are useful to distinguish genera of subtribe *Siphocampylinae*. Features used in this survey (Table 1) are as follows:

Biotype and habit

Siphocampylus is the only genus formed always by shrubs up to 6 m, and even vines. Other genera include annual or herbaceous perennial plants.

Stems are commonly erect. Nevertheless, *Enchysia* includes decumbent plants, and *Isotoma fluviatilis* is the only known species in the subtribe with rooting prostrate stems.

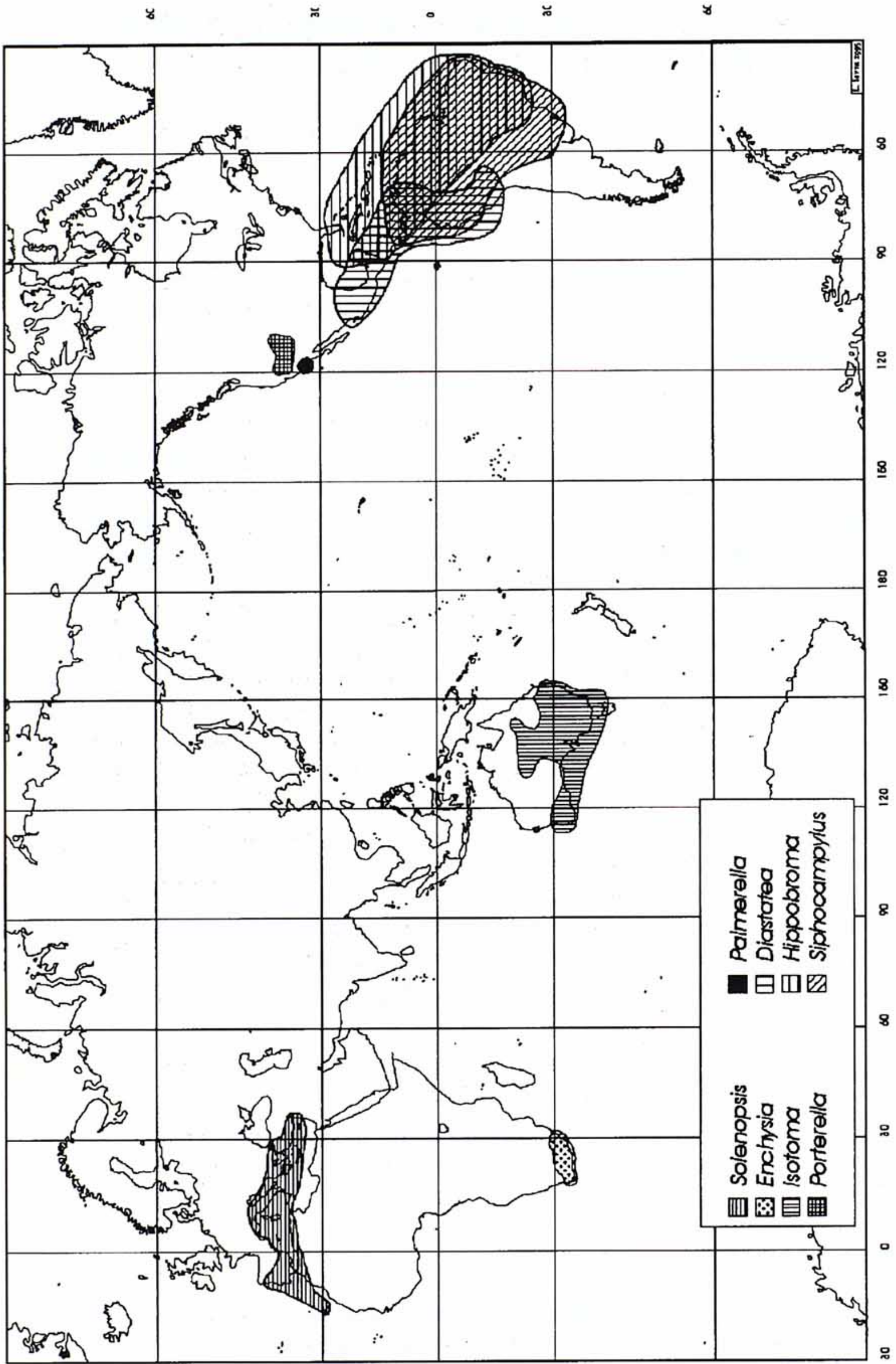


Fig. 1. World distribution of the studied genera.

	Annual	Perenn.	Inflor. axillary	Inflor. terminal (1-flower)	Inflor. terminal (many-flowered)	Length of calyx-lobes	Length of corolla	Position of the ovary	Length of filaments	N° of free filaments	Length of the anther tube	Length of capsules	Length of seeds	Shape of seeds	Surface of seeds
<i>Siphocampylus</i>	No	Yes	Yes	No	Yes	1-26	20-70	Inferior	10-80	0	4-16	4-20	0.6-1.5	ovoid, ellipsoid or rounded	reticulate
<i>Diastatea</i>	Yes	No	No	No	Yes	1.5-6.5	3-25	Superior	3-11	0	0.5-2	3-13	0.5-0.6	ellipsoid	lustrous, nearly smooth
<i>Isotoma</i>	Yes	Yes	Yes	Yes	Yes	2-10	3-30	Inferior	3-20	0	1.3-5	3-18(22)	0.4-0.7	elliptic to orbicular	reticulate, weakly striate, verrucose-rugose or sulcate
<i>Hippobroma</i>	Yes	No	Yes	No	No	10-22	50-140	Inferior	55-95	0	4-6	18-25	0.6-0.8	cylindrical	isodiametrically foveate-reticulate
<i>Palmerella</i>	Yes	Yes	No	No	Yes	5-14	20-30	Inferior	9.5-17	3	2-3	5-8(12)	0.5	ellipsoid-lenticular	lustrous, sulcate with flattened walls
<i>Porterella</i>	Yes	No	No	No	Yes	3-8(11)	(9)13-20	Inferior	3-7	5	1.5-2.6	5-10(16)	1	fusiform	lustrous, sulcate
<i>Enchysia</i>	Yes	Yes	Yes	No	Yes	1-3	3-18	Inferior	2-6	5	0.8-1	2.5-6	0.4-0.5	subglobose	lustrous, sulcate with flattened walls
<i>Solenopsis</i>	Yes	Yes	Yes	Yes	No	1-4	3.5-12	Inferior	1.5-2.5	5	0.7-1.75	1-3	0.3-0.55	ellipsoid	lustrous, sulcate-keeled

Table 1. Comparison of some characters among all studied genera (all measurements in mm).

Leaves

As commonly occurs in *Lobeliaceae*, leaves should not be used to separate genera within the subtribe. They are generally linear to orbicular, and entire to pinnate. Nevertheless, leaves can be useful to distinguish amongst species within a genus.

Inflorescence

Three inflorescence types are present in *Siphocampylinae* which can be successfully used to taxonomy in generic and infrageneric ranks.

First of all, one-flowered scapes arising from a basal rosette of leaves are quite rare, and are found only in most of *Solenopsis* species and *Isotoma scapigera* (R. Br.) G. Don. Moreover, in *Solenopsis* flowering scapes bear 1-3-bracteoles at the middle, which are always basal or absent in the other genera.

Secondly and related to the former type, one-flowered inflorescences arising from bracts generally quite similar to cauline leaves. This second type appears in all genera, excepting *Diastatea*, *Palmerella*, and *Porterella*.

Finally, dense to lax racemose axillary inflorescences (few- to many-flowered) are quite common in the subtribe, although lacking in *Hippobroma* and *Solenopsis*.

Calyx

Calyx features are quite similar in all cases. All calyx-lobes are similar in size (1-26 mm long) and shape (linear to lanceolate), and generally erect (some species of *Siphocampylus* have reflexed lobes). In *Diastatea* and *Isotoma* calyx indumentum, size or margin can be used for taxonomic purposes.

Corolla

In all genera, corolla is generally bluish or whitish, sometimes with spotted throat. Nevertheless, several species of *Siphocampylus* have sometimes cream, greenish-white, purplish, reddish or yellowish-green corolla. *Hippobroma* has the largest corolla, up to 140 mm, which is long tubular. Only several *Siphocampylus* have also a larger corolla up to 70 cm. All the other genera have a quite smaller corolla (3-30 mm).

With regard to the corolla shape, *Hippobroma* is the only genus with clearly regular flowers, although some species of *Isotoma* have very slightly zygomorphic ones. In all the other genera, flowers are strongly zygomorphic, and commonly 2-lipped (2 erect lanceolate lobes in the upper lip, and 3 wider lobes in the lower). *Siphocampylus*, however, has long tubular flowers weakly curved near the apex, with all lobes erect and acute.

Filaments and anther tube

Both characteristics are quite interesting to separate genera in *Lobeliaceae*. Staminal filaments are adnate to corolla or not (*free*), and vary in length according to corolla size. Attending to number of free filaments, the following situations appear: 1, *Diastatea*, *Hippobroma*, *Isotoma* and *Siphocampylus* have all filaments connate to corolla. 2, *Palmerella* has only two filaments connate to corolla. 3, *Enchysia*, *Porterella* and *Solenopsis* have all filaments free. This latter case is quite common in *Lobeliaceae*.

Anthers are connate into a tube round the style, always with apical setae (bearded). *Diastatea*, *Enchysia*, *Palmerella*, *Porterella* and *Solenopsis* bear the smallest anthers (0.5-3 mm). *Isotoma* and *Hippobroma* vary from 1.3 to 6 mm, and *Siphocampylus* has again the largest anthers (4-16 mm).

Anther colour is generally grey or brightly black, and only *Hippobroma* has white anthers.

Indumentum of anthers could be interesting to differentiate infrageneric taxa, mainly with regard to density, size, and also number of apical setae. Further studies are needed to establish their taxonomic value.

Fruit

In *Siphocampylinae* fruit is always a bilocular capsule. Inferior ovaries are quite common in this subtribe, excepting *Diastatea* with superior ovary which is present only in a few genera of *Lobeliaceae*. Other characteristics (indumentum, size, etc.) are quite variable within a single genus. Nevertheless, *Solenopsis* (1-3 mm) and *Enchysia* (2-6 mm) have the smallest fruits, and *Hippobroma* (18-25 mm) has the largest.

Seed

Seed features are perhaps the most important characters to distinguish most of genera of *Siphocampylinae* (fig. 2), since there are very small variations within a single genus. Most of genera have ellipsoid seeds, which also can be orbicular to cylindrical in both *Isotoma* and *Siphocampylus*. However, seeds are always cylindrical in *Hippobroma*, and subglobose in *Enchysia*. The largest seeds appear in *Porterella* (up to 1 mm) and *Siphocampylus* (up to 1.5 mm).

Testa surface is normally reticulate or sulcate and lustrous, excepting *Diastatea* which has nearly smooth seeds. In a few species of *Isotoma* testa can be also striate or rugose, and in *Hippobroma* and *Siphocampylus* it always is isodiametrically foveate-reticulate or reticulate. Other microsculptural features (e.g. shape and size of walls, aspect of the ornament, etc.) can be used to differentiate amongst genera or species.

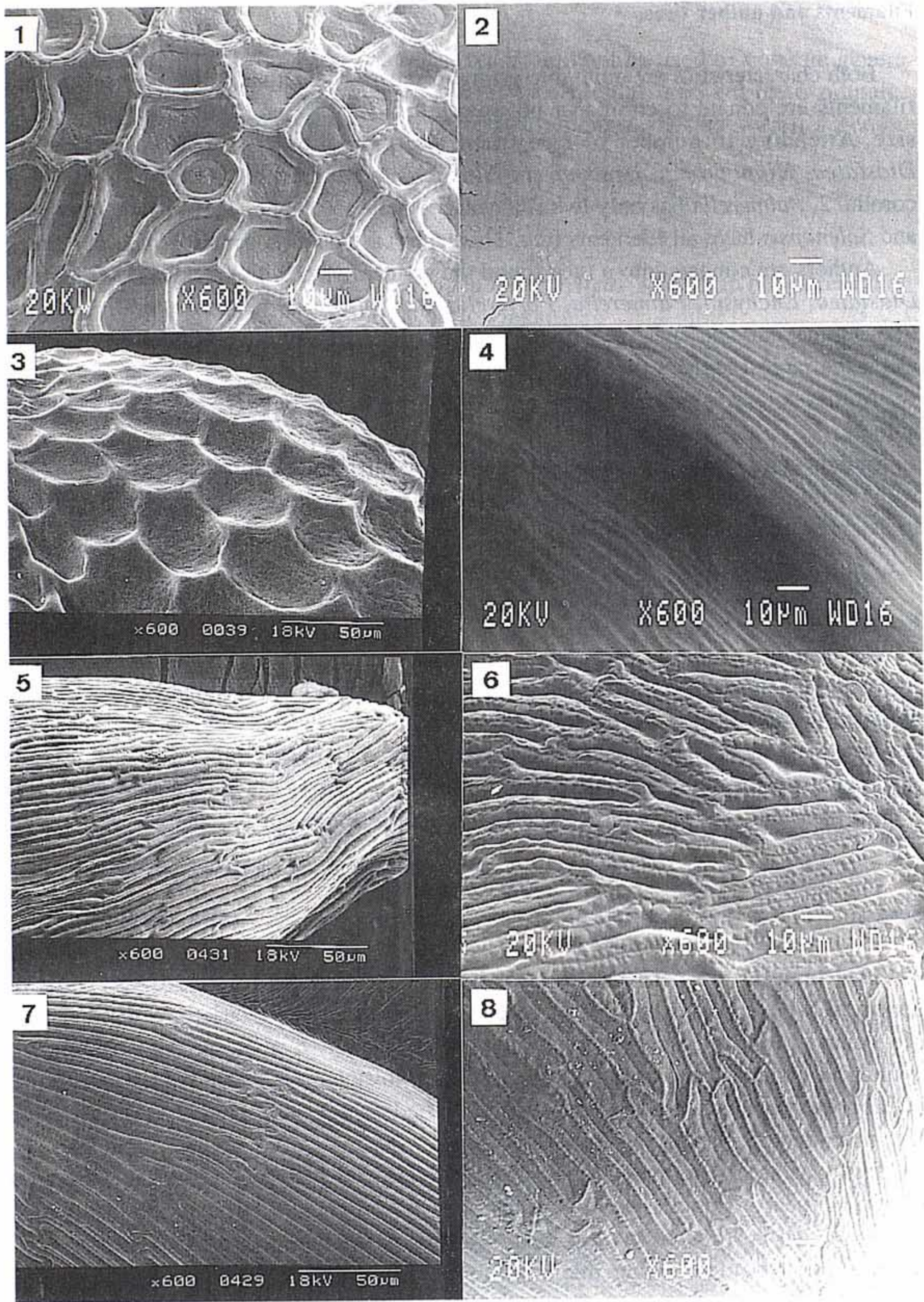


Fig. 2. Testa of all accepted genera in *Siphocampylinae* "Eusiphon"; 1, *Siphocampylus* (reticulate); 2, *Diastatea* (smooth); 3, *Hippobroma* (foveate-reticulate); 4, *Isotoma* (striate); 5, *Porterella* (sulcate); 6, *Palmerella* (sulcate with flattened walls); 7, *Solenopsis* (sulcate), and 8, *Enchysia* (sulcate with flattened walls).

Key to genera of *Siphocampylinae* "Eusiphon"

1. Perennial plants, small trees, shrubs, or vines. Corolla commonly with curved tube, and lobes always upright to the corolla tube.
Anthers with tube 4-16 mm long *Siphocampylus*
- Herbaceous plants, generally annual. Corolla with straight tube, 2-lipped or rarely regular, and with at least 3 lobes almost perpendicular to the corolla tube. Anthers with tube 0.5-6 mm long 2
2. Ovary and capsule superior. Calyx-lobes free from the base. Seed nearly smooth and bright *Diastatea*
- Ovary and capsule inferior. Calyx-lobes shaping a crown. Seed ornamented 3
3. Filaments of stamens adnate to at the corolla. Corolla nearly regular 4
Three or more filaments free to the corolla. Corolla clearly zygomorphic,
– 2-lipped, the upper lip 2-lobed and the lower 3-lobed 5
4. Corolla up to 30 mm. Calyx-lobes 2-10 mm long. Filaments 3-20 mm long. Anther tube bright black. Lower anthers setose at the apex *Isotoma*
- Corolla more than 50 mm. Calyx lobes 10-22 mm long. Filaments 55-95 mm long. Anther tube white. All anthers setose at the apex *Hippobroma*
5. Filaments of 3 lower stamens free to the corolla. Corolla 20-30 mm long. Filaments 9.5-17 mm long *Palmerella*
- All filaments free. Corolla 3-20 mm long. Filaments 1.5-7 mm long 6
6. Capsule 5-10 (16) mm long. Seed 1 mm long. Calyx-lobes 3-8 (11) mm long. Stems fleshy *Porterella*
- Capsule 1-6 mm long. Seed 0.3-0.5 mm long. Calyx-lobes 1-4 mm long. Stems not fleshy 7
7. Seed subglobose, without strophiole, sulcate with flattened walls. Capsule 2.5-6 mm long. Filaments 2-6 mm long. Pedicels bracteate at the base. Decumbent herbs with axillary inflorescence, or erect plants with terminal many-flowered inflorescence *Enchysia*
- Seed ellipsoid, strophiolate, sulcate with keeled walls. Capsule 1-3 mm long. Filaments 1.5-2.5 mm long. Pedicels with 1-3 bracteoles in the middle part. Plants erect, never decumbent, with 1-flowered axillary or terminal inflorescences *Solenopsis*

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References

- MEIKLE, R. D. (1979). Some notes on *Laurentia* Adanson (Campanulaceae). *Kew Bull.* **34**(2): 373-375.
- WIMMER, F.E. (1943). Campanulaceae-Lobelioideae. In A. Engler (ed.). *Das Pflanzenreich* **106** (IV.276b)1. Leipzig.
- (1948). Vorarbeiten zur Monographie der Campanulaceae-Lobelioideae: II. Trib. Lobelieae. *Ann. Naturhist. Mus. Wien* **56**: 317-347.
- (1953). Campanulaceae-Lobelioideae. In: A. ENGLER & L. DIELS (eds.). *Das Pflanzenreich.* **107** (IV.276b), vol. II. Leipzig.
- (1968). Campanulaceae-Lobelioideae Supplementum et Campanulaceae-Cyphioideae. In: H. STUBBE (ed.) *Das Pflanzenreich.* **108** (IV.276c). Leipzig.

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