

## ON THE STATUS OF *STATICE DIANIAE* PAU (*PLUMBAGINACEAE*)\*

by

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### Resumen

SOLER, J.X. & J.A. ROSSELLÓ (1997). Consideraciones sobre *Statice dianiae* Pau (*Plumbaginaceae*). *Anales Jard. Bot. Madrid* 55(1): 9-15 (en inglés).

Se describe *Limonium interjectum* como especie nueva del Levante peninsular español, el cual había sido previamente denominado con el nombre ilegítimo de *Statice dianiae* Pau. *L. interjectum* es una especie apomíctica que presenta una sola combinación polínico-estigmática (tipo B). Sus afinidades morfológicas son próximas a *L. virgatum* (Willd.) Fourr. y *L. girardianum* (Guss.) Girard, y se sugiere que *L. interjectum* es un taxon híbrido genético que pudo haberse originado a partir de ambas especies.

Palabras clave: *Plumbaginaceae*, *Limonium*, taxonomía, táxones apomícticos, hibridación, flora mediterránea.

### Abstract

SOLER, J.X. & J.A. ROSSELLÓ (1997). On the status of *Statice dianiae* Pau (*Plumbaginaceae*). *Anales Jard. Bot. Madrid* 55(1): 9-15.

An apomictic *Limonium* with a single pollen-stigma combination (B type), *Limonium interjectum*, is proposed as a new species to replace the invalid name *Statice dianiae* Pau. The new species has a restricted distribution on the sea coasts of eastern Spain (Alicante Province). It shows a striking morphological similarity to *L. virgatum* (Willd.) Fourr. and *L. girardianum* (Guss.) Girard; on this basis it is suggested that *L. interjectum* is a hybrid derived from the two species.

Key words: *Plumbaginaceae*, *Limonium*, taxonomy, apomictic taxa, hybridization, Mediterranean flora.

### INTRODUCTION

The western Mediterranean Basin is one of the most important regions where the genus *Limonium*, notably section *Limonium*, has diversified. Comprehensive treatments of PIGNATTI (1972, 1982), ERBEN (1993) and ARRIGONI & DIANA (1993) have greatly improved the taxonomy, nomenclature and distribution of most taxa. Despite these

efforts, some taxonomic and nomenclatural issues remain largely unresolved, mainly in the Iberian Peninsula and the Balearic Islands. One of the names awaiting clarification is that of *Statice dianiae* Pau. This taxon was obscurely published by PAU (1898) on the basis of plants gathered at one locality in southeast Spain (Alicante Province). He tentatively related the new plant to *L. virgatum* (Willd.) Fourr. and *L. girar-*

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Fig. 1.—Original specimens of *Statice dianiae* Pau (MA).

*dianum* (Guss.) Girard (sub *Statice*). But the only information given by the author is the very short diagnosis of *S. dianiae* which refers to its narrow leaves. Since then, the taxonomic status of *S. dianiae* has not been reappraised in any of the papers dealing with the European species of *Limonium* (cf. GREUTER & al., 1989). In fact, the name is not included in the recent comprehensive treatment of the Iberian taxa (ERBEN, 1993).

The examination of the original material of *S. dianiae* (MA; fig. 1) revealed that the plant is very similar to *L. virgatum*, but constant and conspicuous morphological differences do exist between them. More herbarium specimens from the surroundings of the type locality which resembled *S. dianiae* became available (ABH, MA) when the collections of *L. virgatum* were examined. Such new material was labelled either as *L. virgatum* or as a hybrid between this species and *L. rigualii* Crespo & Erben, a restricted triploid species growing in the same area (ERBEN, 1991, 1993). Living plants collected from the type locality permitted detailed study, revealing that *S. dianiae* is an apomictic species sharing several diagnostic features with *L. virgatum* and *L. girardianum*. These data suggest that *S. dianiae* could be of hybrid origin, arising from a cross between the former two species. Unfortunately, the name *Statice dianiae* was not validly published, since PAU (1898) stated that it was a provisional name. The use of the word "provisionally" precludes valid publication under the rules of the Botanical Nomenclatural Code and therefore it could not be used as basionym for its transfer to *Limonium*. No other available names exist. For these reasons we propose the southeast Spanish plant as a new species, *L. interjectum*.

## RESULTS

***Limonium interjectum* Soler & Rosselló, sp. nov.** (figs. 2, 3)

= *Statice virgata* var. *macroclada* Pau, Actas Soc. Esp. Hist. Nat. 27: 199 (1898)

= *Statice dianiae* Pau, Actas Soc. Esp. Hist. Nat. 27: 199 (1898), nom. inval.

*A Limonium girardianum et L. virgatum valde similis. A L. virgatum affinis sed rami omnia fertiles, folia glauca, leviter, florendi tempore persistentia, spicae dense dispositis, minoribus, atque bractea inferior minoribus differt. A L. girardianum similis sed inflorescentia ramosa, folia minoribus, anguste obovata, spiculae subarcuate differt.*

*Derivatio nominis:* from the latin, *interjectum*, *i* = *intermediate*.

*Typus.* Hispania, Lucentina, locus dictus Montanyar (31SBC59) *prope oppidulum Xàbia, in rupestribus maritimus ubi J.X. Soler legi 5-VII-1992 (holotypus: VAB 933865; isotypus: ABH, G, MA, M).*

Perennial with many stems, glabrous. Caudicles 1.5-15 cm long, spirally leafy in upper third. Basal leaves erect, usually green at anthesis, 15-80 × 4-9(12) mm, glaucous. Blade lanceolate, tip acute, with a short terminal apiculum; flattened at the margins, smooth on both faces, usually 3-nerved. Petiole canaliculate, 3/4 as long as the blade, 1-3.5 mm wide. Stem 15-45 cm long, erect, branched in the lower half (rarely in the lower third); usually without sterile branches (rarely with 1-2). Inflorescence paniculate, loosely branched, triangular. Branches up to 16 cm long, subcurved at the ends, obliquely inserted (45-60°), flowering in the upper third; non-flowering branches absent. Spikes 10-30 mm long, straight to curved, obliquely inserted, with 5-8 spikelets per cm. Spikelets 6-7.2 mm long, 2-5(8) flowered. Outer bract 2.9-3.4 × 2-2.3 mm, triangular-ovate, acute, margin membranous highly variable; central part subfleshy, 2-2.5 × 1.8-2 mm, triangular to oblong; tip 0.9-1 mm, acute, the acumen reaching the margin. Middle bract 2.4-3 × 1.7-2 mm, broadly oblong-obovate, blunt to subemarginate, membranous. Inner bract 5.2-6 × 3-3.6 mm, oblong-elliptical, blunt to acute, with a thin membranous margin; central part subfleshy, 4-5 × 2-3 mm, oblong, acuminate, acumen 0.9-1.2 mm long, not reaching the margin. Calyx 5.5-6.5 mm long, overtopping by 1-2 mm the inner bract, tube hairy, with short eglandular hairs; tooth

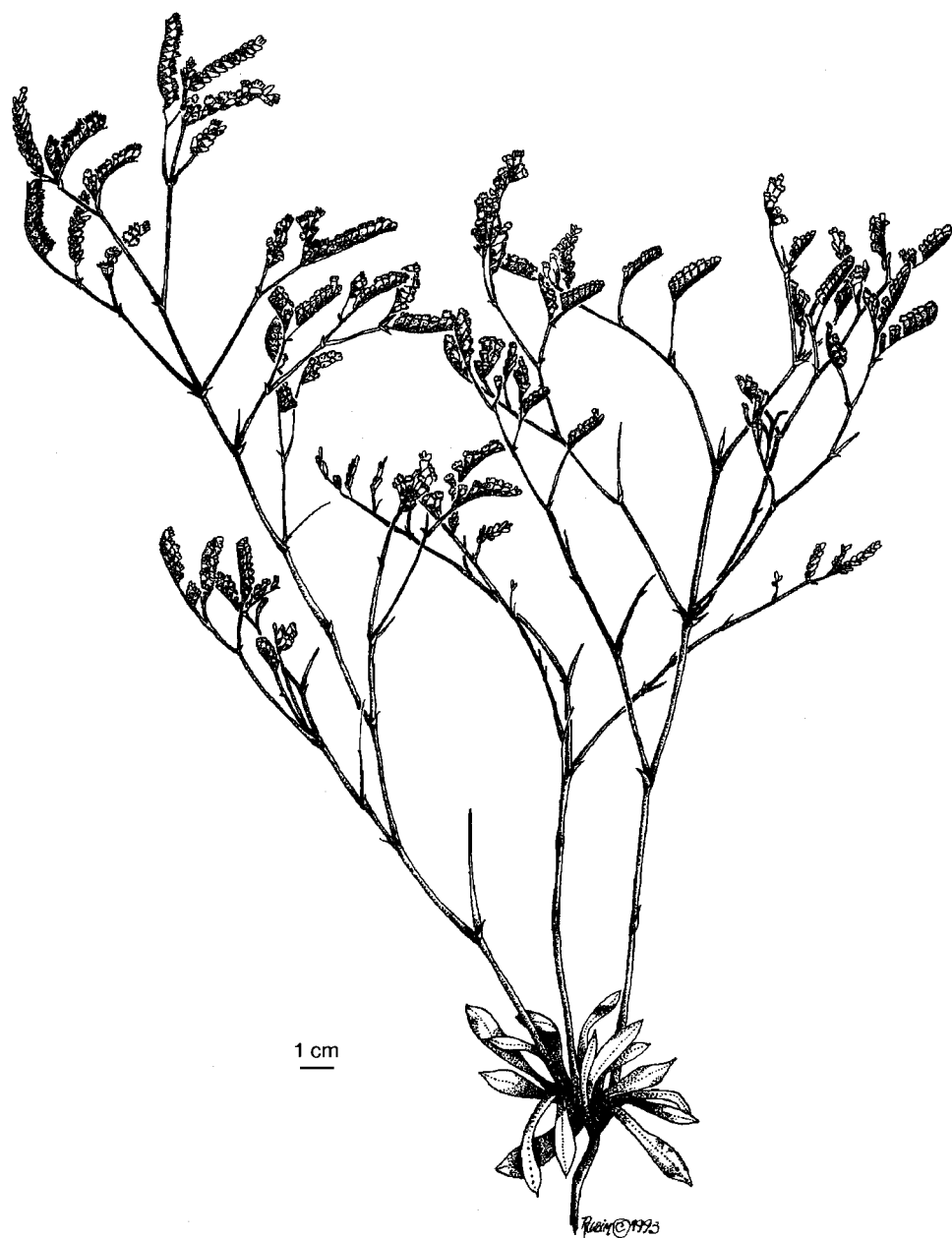


Fig. 2.—*Limonium interjectum*: Habit.

ca. 0.8-1 mm, semielliptic to triangular-ovate; midrib usually reaching the calyx lobes. Corolla funnel-shaped. Petals  $9 \times 3$  mm, cuneate, violet. Flowering: July-September

#### *Material examined*

SPAIN. ALICANTE: Denia, Palmar del Pi, VI-1897, Pau, MA 92085. Xàbia, 17-VII-1973, Segura, MA 310850. Xàbia, Montanyar, 1-VII-1990, Soler, VAB; ibídem, 2-VIII-1993, Soler, VAB. Xàbia, Montanyar, 2-VII-1990, Soler, VAB; ibídem, 2-VIII-1993, Soler, VAB. Xàbia, Montanyar de Baix, 15-VII-1992, Barber, ABH 1972, 1973, 1974, 1975, 1976, 1977. Xàbia, Arenal, VII-1990, Soler, VAB; ibídem, 2-VIII-1993, Soler, VAB. Xàbia, Cala Blanca, 2-VIII-1991, Laguna & al., ABH 301.

#### *Pollen-stigma combination and fertility*

All individuals from the three sampled populations of *L. interjectum* had a reduced fertility. Pollen fertility from 32 individuals ranged from 0 to 5.1% (mean = 0.6%;  $n = 3.206$  pollen grains) as determined by the staining method used. Shape and length irregularities were very frequent and also involved variation in the number of colpi. The few stained pollen grains which could be found in some individuals have a greater length and are presumed to be of diploid or polyploid nature. The only pollen/stigma combination found in *L. interjectum* is the B type. The surrounding populations of *L. virgatum* so far studied also present pollen abnormalities and have the same pollen-stigma combination, which agrees with data from other distant localities (LLORENS, 1986; Rosselló, unpublished data). On the other hand, *Limonium girardianum* has a pollen/stigma combination of the A type (Rosselló, unpublished data).

#### *Ecology and distribution*

The new species grows on calcarenites of quaternary fossil sand beaches which are located near to the sea. Associate species includes *Limonium delicatulum* (Girard) Kuntze, *L. virgatum* (Willd.) Fourr., *Crithmum maritimum* L., *Halimione portulacoides* (L.) Aellen, *Juncus maritimus* L., *Inula crithmoides* L. and *Salicornia ramosissima* J. Woods. *Limonium inter-*

*jectum* is restricted to very few populations scattered through the Xàbia Bay (North of Alicante Province). There is herbarium evidence that this species occurred at one locality (Palmar del Pi) situated 15 km apart from the extant populations, but an intensive search for these plants at that site was not successful. In the last decades, urbanistic development affecting the eastern coastal environments has dramatically changed most of the main saltshore communities, so it is possible that the distribution of *L. interjectum* was broader in the past. As far as we are aware, over 400 individuals of *L. interjectum* are currently known. This, together with the fact that some of the populations are located at sites where urbanistic alterations are planned, render *L. interjectum* an endangered species.

#### DISCUSSION

*Limonium interjectum* has striking similarities with *L. virgatum*, with which it has been confused in the past. Despite this, the lack of non-flowering branches, the smoothness and glaucous leaves, the smaller spikes and outer bracts, easily separate both taxa (table 1). However, both species have similar sized inner bracts and calyx tubes, as well as similarly shaped leaves. The characters of *L. interjectum* not present in *L. virgatum* are reminiscent of those of a *L. girardianum*-like plant. *Limonium virgatum* and *L. interjectum* occur together and *L. girardianum* also grows in the vicinity (Soler, unpublished data) so it is conceivable to interpret *L. interjectum* as having arisen by a cross between the other two taxa. Although the morphological and chorological data do not conflict, this evidence alone is by no means conclusive and molecular data need to be obtained before the origin of *L. interjectum* can be firmly established. *Limonium virgatum* and *L. girardianum* belong to different subsections of section *Limonium* as currently circumscribed (BOISSIER, 1848). This taxonomic divergence does not threaten the proposed origin of *L. interjectum*, since the available pattern of reticulation in the

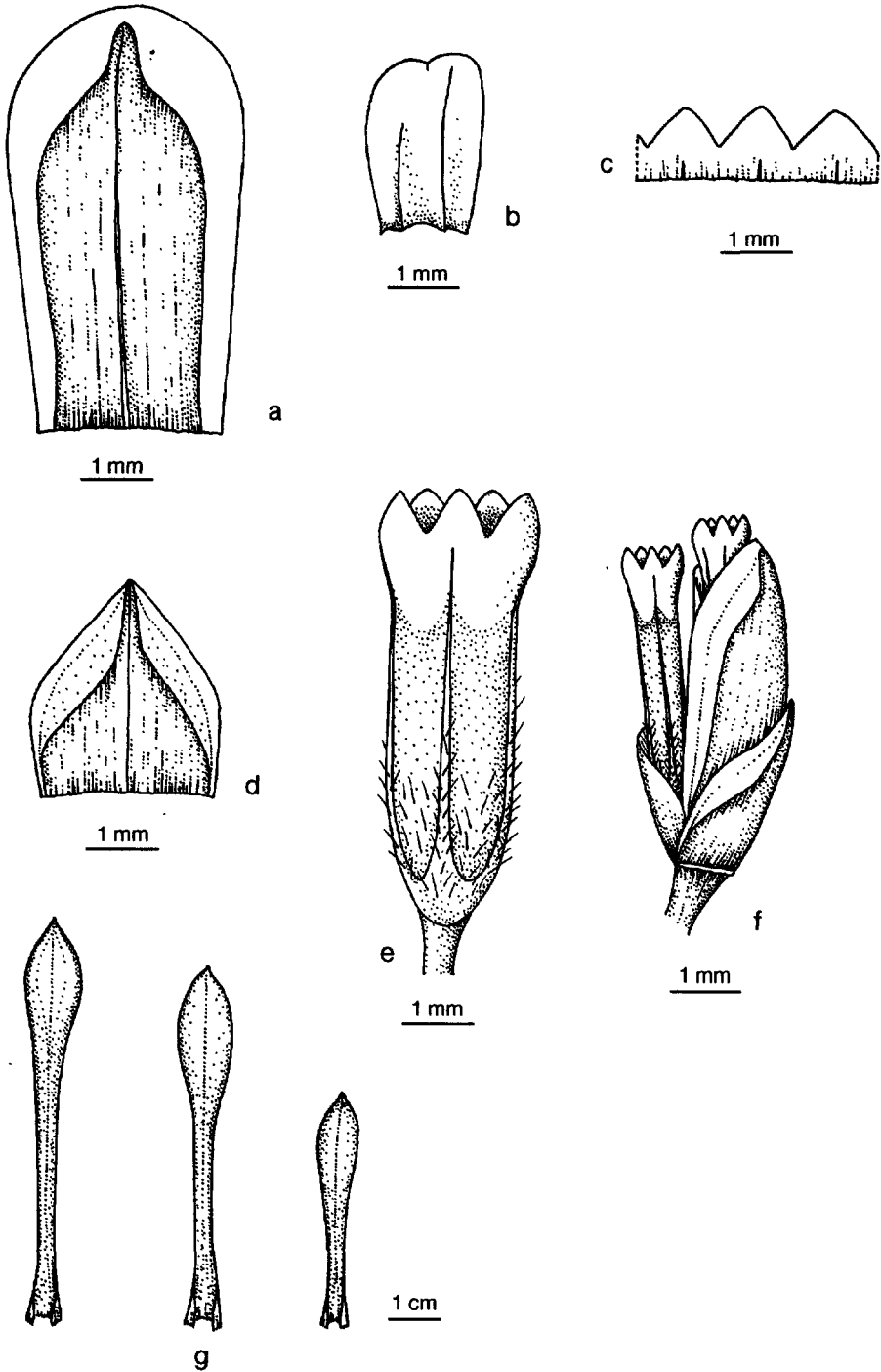


Fig. 3.—*Limonium interjectum*: a, inner bract; b, middle bract; c, teeth of calyx; d, outer bract; e, calyx; f, spikelet; g, leaves.

TABLE 1

MORPHOLOGICAL FEATURES ON *LIMONIUM INTERJECTUM*, *L. VIRGATUM* AND *L. GIRARDIANUM*  
 [Data of *L. virgatum* and *L. girardianum* are taken from ERBEN (1993)]

|                  | <i>L. virgatum</i>   | <i>L. interjectum</i>               | <i>L. girardianum</i>  |
|------------------|----------------------|-------------------------------------|------------------------|
| Leaves:          |                      |                                     |                        |
| blade            | lanceolate           | narrowly lanceolate to oblanceolate | oblanceolate-spatulate |
| apex             | variable             | acute                               | acute                  |
| roughness        | verrucate            | smooth                              | smooth                 |
| colour           | deep green           | green-glaucous                      | green-glaucous         |
| Sterile branches | many                 | absent (rarely 1-2)                 | absent                 |
| Spikes           | 20-80(120) mm        | 10-30 mm                            | 8-16                   |
| Outer bract      | 1.9-2.8 × 1.9-2.5 mm | 2.9-3.4 × 2-2.3 mm                  | 1.8-2.3 × 2-2.6 mm     |
| Inner bract      | 5.1-6.5 × 2.9-4 mm   | 5.2-6 × 3-3.6 mm                    | 3.8-4.6 × 3.8-4.4 mm   |
| Calyx            | 5.3-6.1 mm           | 5.5-6.5 mm                          | 4.1-4.8 mm             |

genus, at least in the western Mediterranean Basin, is not only intrasectional but also intersectional (ERBEN, 1993). On the other hand, since the proposed parents of *L. interjectum* are apomictic and have severe pollen irregularities it must be shown that such biological barriers could be effectively overcome to allow gene flow between them. Records of gene flow between apomictic or between sexual and apomictic *Limonium* taxa are not rare (ERBEN, 1993; Rosselló & Sáez, unpublished data), but unfortunately only morphological data support this reproductive avenue. Molecular work is now in progress to assess i) the proposed parentage of *L. interjectum*, ii) the ovule and pollen donor of the cross, and iii) whether multiple events are involved in the origin of *L. interjectum*.

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#### REFERENCES

- ARRIGONI, P.V. & S. DIANA (1993). Contribution à la connaissance du genre *Limonium* en Corse. *Candollea* 48: 631-677.
- BOISSIER, E. (1848). Plumbaginaceae. In: A.P. de Candolle, *Prodromus systematis naturalis regni vegetabilis*. Vol. 12: 617-696. Paris.
- ERBEN, M. (1991). Bemerkungen zur Taxonomie der Gattung *Limonium* VI. *Mitt. Bot. Staatssamml. München* 30: 459-478.
- ERBEN, M. (1993). *Limonium*. In: S. Castroviejo & al. (eds.), *Flora iberica*. Vol. 3: 2-143. Madrid.
- GREUTER, W., H.M. BURDET & G. LONG (1989). *Med-Check List 4: Dicotyledones (Lauraceae-Rhamnaceae)*. Ed. Conserv. Jard. Bot. Genève.
- LLORENS, L. (1986). Revisión sistemático-taximétrica del género *Limonium* Miller en la isla de Mallorca (I). *Lazaroa* 8: 11-68.
- PAU, C. (1898). Noticia de algunas plantas curiosas o nuevas. *Actas Soc. Esp. Hist. Nat.* 27: 196-200.
- PIGNATTI, S. (1972). *Limonium*. In: T.G. Tutin & al. (eds.), *Flora Europaea*. Vol. 3: 38-50. Cambridge University Press.
- PIGNATTI, S. (1982). *Flora d'Italia*. Vol. 2. Ed. Edagricole. Bologna.

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