

# A new species of *Silene* sect. *Dipterosperma* (Caryophyllaceae) from Sicily

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## Abstract

Brullo, C., Brullo, S., Giusso del Galdo, G., Ilardi, V. & Sciandrello, S. 2012. A new species of *Silene* sect. *Dipterosperma* (Caryophyllaceae) from Sicily. *Anales Jard. Bot. Madrid* 69(2): 209-216.

*Silene kemoniana*, a new species of the section *Dipterosperma* from NW Sicily, is described and illustrated. It is a therophyte that occurs in mountains near Palermo, where it grows on Mesozoic limestones in xerophilous garigues. Its relationships with *S. colorata* and allied species are also examined. A key of the species belonging to sect. *Dipterosperma* is provided.

**Keywords:** Caryophyllaceae, *Silene kemoniana* sp. nov., taxonomy, chorology, ecology, morphology, Sicily.

## Resumen

Brullo C., Brullo S., Giusso del Galdo G., Ilardi V. & Sciandrello, S. 2012. Una nueva especie de *Silene* sect. *Dipterosperma* (Caryophyllaceae) de Sicilia. *Anales Jard. Bot. Madrid* 69(2): 209-216 (en inglés).

Se describe e ilustra *Silene kemoniana*, una nueva especie del NW de Sicilia perteneciente a la sección *Dipterosperma*. Se trata de un terófito que habita en algunas montañas próximas a Palermo, donde crece sobre calizas mesozoicas entre matorrales mediterráneos xerófilos. Se estudian sus relaciones con *S. colorata* y otras especies próximas. Se ofrece una clave para todas las especies pertenecientes a la sect. *Dipterosperma*.

**Palabras clave:** Caryophyllaceae, *Silene kemoniana* sp. nov., taxonomía, corología, ecología, morfología, Sicilia.

## INTRODUCTION

*Silene* L. is the largest genus of the *Caryophyllaceae* with about 700 species distributed throughout the northern hemisphere, mostly in Europe, Asia and North Africa (Greuter, 1995). A rather critical group within this genus is represented by the annual populations usually grouped under *Silene colorata* Poiret s.l., that are widely distributed across the Mediterranean and Irano-Turanian regions. Previous authors (Maire, 1963; Pignatti, 1982; Talavera, 1990; Chater & al., 1993; Valsecchi, 1995; Greuter, 1997) have considered *S. colorata* to be a very variable species, encompassing differences in leaf shape, calyx indumentum, petals, capsule, carpophore and seeds. It is included in the sect. *Dipterosperma* (Rohrb.) Chowdhuri, which groups taxa with the following characters: annual and eglandular herbs, with hermaphrodite, erect flowers, arranged in monochasia or dichasia, the calyx hairy, not inflated, with 10 nerves, anthophore pubescent, petals with the limb deeply bifid and claw not or slightly auriculate, coronal scales present, seeds orbicular-reniform, with flat surfaces that are dorsally furrowed between 2 undulate wings. To treat this variability, several taxa at specific or infraspecific levels have been described within this critical group, and some of these still require further study.

During field work carried out in northern Sicily, an odd population of plants closely related to the *Silene colorata* group was encountered. After a revision of the taxonomic literature and herbarium specimens, it became evident that these plants were quite different from the hitherto known taxa of this group. The most marked diagnostic characters include its small habit, the stem that is branched only at the base and is prostrate-ascending, the few-flowered inflorescence, and petals with very narrow lobes. We believe that such morphological features deserve the recognition of the Sicilian

plant as a new species, namely *Silene kemoniana*. The specific epithet refers to Kemonia, a small river that originates in the mountains near Palermo.

## MATERIAL AND METHODS

Morphometric analyses were carried out on living plants at the original population site. For the taxonomic comparison with *Silene colorata* and allied species, herbarium material at CAT, and in some cases, living plants cultivated in the Botanical Garden of Catania, were used.

The micromorphology of the seed testa was studied on dried material with the aid of a scanning electron microscope (SEM) Zeiss EVO LS10, according to the Huttunen and Laine (1983) protocol.

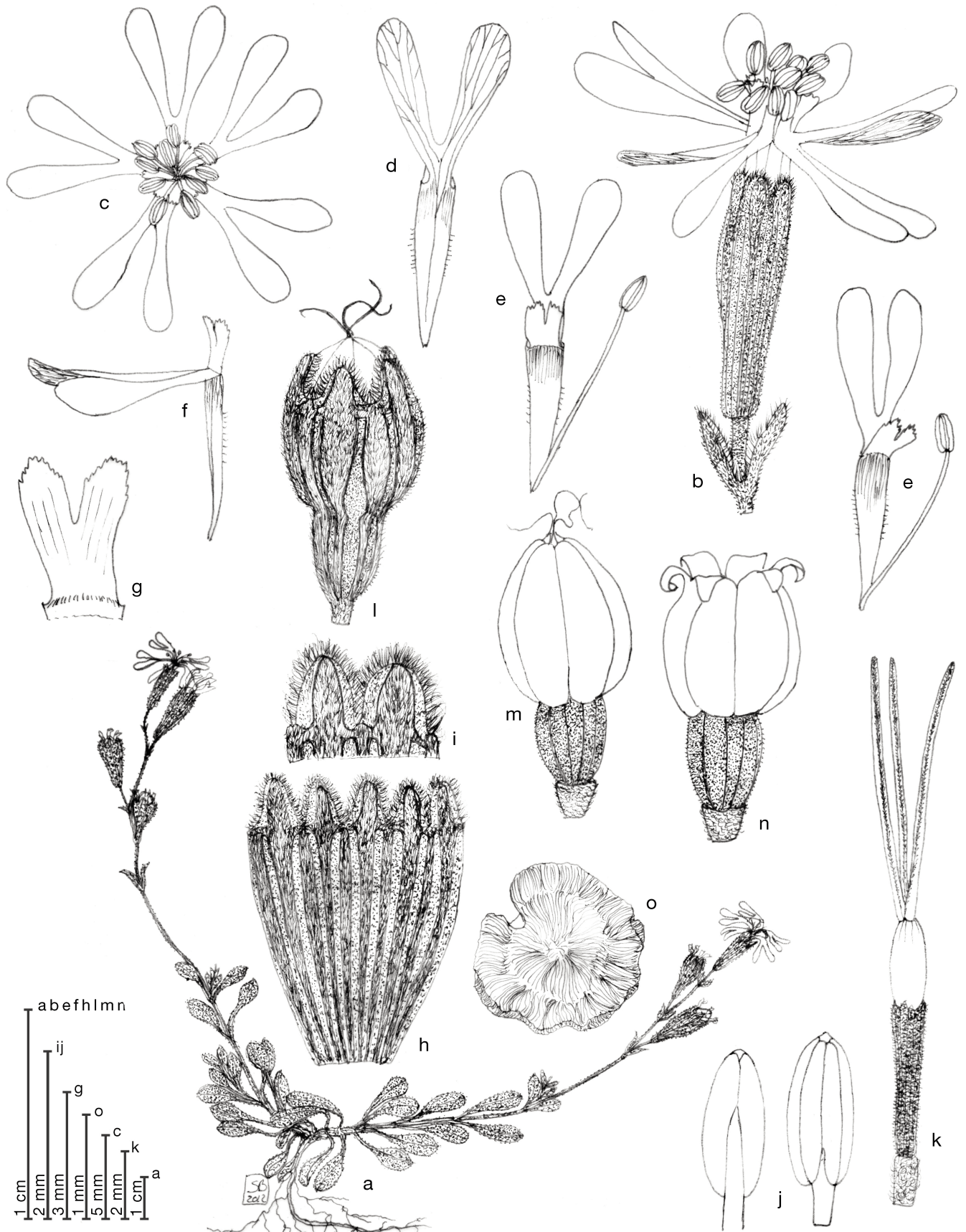
## RESULTS AND DISCUSSION

***Silene kemoniana*** C. Brullo, Brullo, Giusso, Ilardi & Sciandrello, sp. nov. (Figs. 1, 2A, 2B)

*A Silene colorata* differt habito prostrato-ascendente, prope basim ramoso, caulibus simplicibus, 5-15(20) cm longis, articulis usque ad 4 cm long, inflorescentia (1)2-4(5)-floribus, in monochasio dispositis, pedunculis usque ad 15 mm longis, calice 11-13 mm longo, dentibus oblongis, brevioribus, petalo breviorre, lobis lineari-spathulatis, brevioribus, subtilibus. 1.5-2 mm latis, squamis coronulae eroso-incisis, longioribus, ungue glabro dorsaliter, antheris roseis, capsula longiore, carpophoro breviorre, semina latiore.

Type: Sicilia, Palermo, monti presso San Martino delle Scale, in garighe su substrati carbonatici, 17.IV.2012, C. Brullo, S. Brullo, G. Giusso del Galdo & V. Ilardi s.n. (holotype, CAT; isotypes, CAT, FI, MA, PAL).

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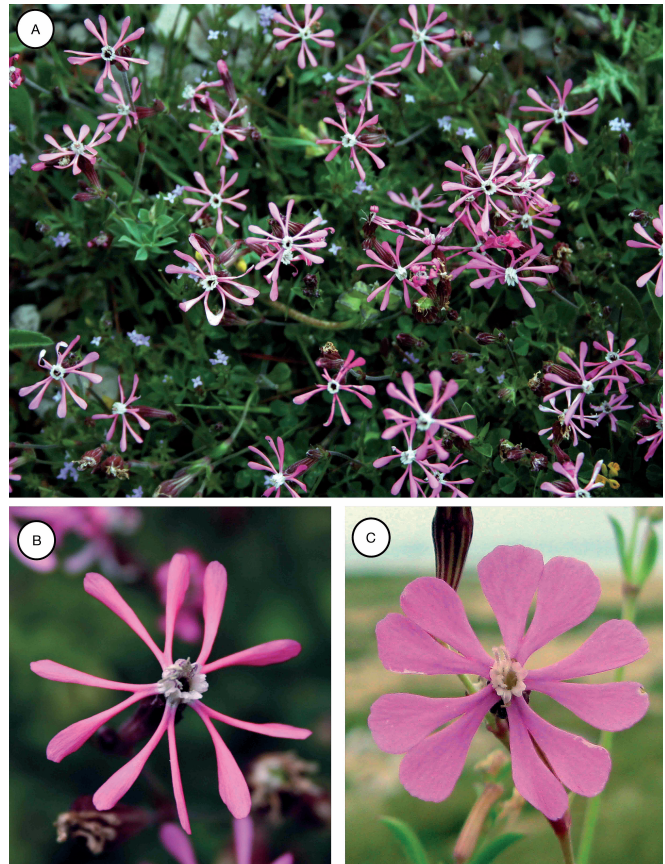


**Fig. 1.** *Silene kemoniana*: **a**, habit; **b**, flower (lateral view); **c**, flower (upper view); **d**, petal (dorsal view); **e**, petal (ventral view); **f**, petal (lateral view); **g**, coronal scale; **h**, open calyx; **i**, calyx lobes; **j**, stamens; **k**, carpophore and pistil; **l**, calyx and capsule; **m**, carpophore and closed capsule; **n**, carpophore and open capsule; **o**, seed (lateral view). Based on C. Brullo & al. s.n. (CAT).

Annual herb 5-15(20) cm, stem branched only at the base, prostrate-ascending, pilose-pubescent, green-purplish. Ascending branches undivided, with internodes 5-40 mm long. Leaves 8-20 × 2-6 mm, flat, 1-nerved, spatulate, green to green-purplish. Inflorescence lax, (1)2-4(5) flowered. Bracts ovate (in particular those of the lower flowers). Flowers erect, in terminal helicoid monochasia. Pedicels 3-15 mm. Calyx 11-13 mm, minutely pubescent, subtubulose, green-purplish, umbilicate at the base, 10-nerved, without anastomosis; teeth 1.8-2.2 × 1.2-1.5 mm, rounded, oblong, with margin membranous, densely ciliate. Petals 15-16 mm; limb 8-8.5 mm, deeply two-lobed, pink, with lobes 6-6.5 × 1.5-2 mm, linear-spathulate, rounded, and coronal scales 2.5-3 mm, fused, re-tuse, erose-incised; claw 7-8 mm, white, glabrous, often with few cilia at margin. Stamens shorter than petals; filament 9-10 mm, white; anthers 1.6-1.8 mm, pink. Ovary 2.4-2.6 mm, glabrous, green. Styles 3, filiform. Capsule 8-10 mm, ellipsoid-ovoid. Carpophore 4-5 mm, pubescent. Seeds 1.6-1.7 mm in diameter, orbicular-reniform, flat-concave laterally, alate and deeply canaliculate dorsally, with wings undulate, dark brown.

**Seed morphology.** According to studies by Esau (1977), Barthlott (1984) and Gontcharova & al. (2009), the seed coat morphology is a constant character in many groups of plants, and it can permit good differentiation between species, and so is an important diagnostic taxonomic feature. Furthermore, the testa micromorphology can be a character that is so unequivocal that it may also have a phylogenetic value, as indicated by some recent studies (Johnson & al., 2004; Attar & al., 2007; Moazzeni & al., 2007).

In the genus *Silene*, several authors have investigated the seed morphology of many species, and have emphasized the remarkable interspecific variability in shape, size and microsculptures (Berggren, 1981; El-Oqlah & Karim, 1990; Hosny & Zareh, 1993; Villa, 1995; Yildiz & Cirpici, 1998; Hong & al., 1999; Zareh, 2005; Yildiz, 2006; Yildiz & Minareci, 2008; Perveen, 2009; Fawzi & al., 2010; Ocaña & al., 2011). In order to compare *S. kemoniana* and *S. colorata*, the micro-morphology of their seed testa was also investigated (Fig. 3). Our results show that seeds of both species are orbicular-reniform, flat-concave laterally, alate and deeply canaliculate dorsally, with wings more or less undulate. From the micro-morphological viewpoint, the seed-coat of both species is characterized by very elongated and granulate epidermal cells that are short near the hilum and longer towards the periphery, with a colliculate outer periclinal wall provided with showy tubercles that are arranged in rows, and a more or less undulate anticlinal wall. However, several important differences, mostly concerning the primary and secondary sculptures of seed coat, can be observed when comparing *S. kemoniana* and *S. colorata*. In particular, *S. kemoniana* (Fig. 3A) has epidermal cells 65-140 × 13-19 µm, an outer periclinal wall that is roughly and loosely granulate, and anticlinal wall boundaries that are irregularly incise-undulate, canaliculate, with lacerate sutures, while *S. colorata* (Fig. 3B) has cells 65-110 × 22-30 µm, an outer periclinal wall that is minutely and densely granulate, and anticlinal wall boundaries that are more regularly undulate, flattened, with entire sutures. Other notable

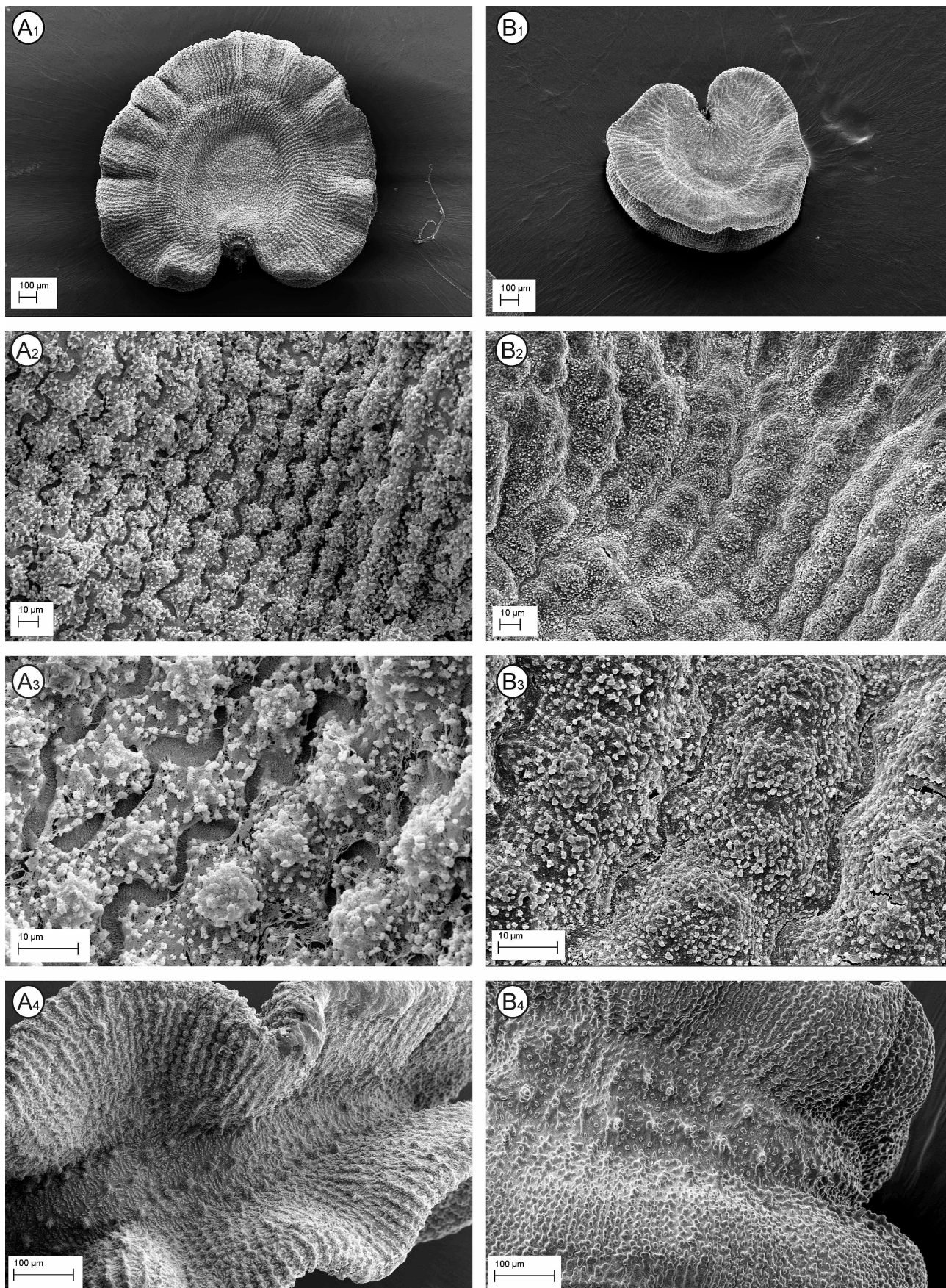


**Fig. 2.** *Silene kemoniana*: **A**, wild population; **B**, flower detail. *S. colorata*: **C**, flower detail.

differences can be observed at the bottom of the dorsal furrow, since *S. kemoniana* is characterized by several irregularly arranged papillae, interspersed with numerous minute wrinkles, whereas *S. colorata* has papillae that are regularly arranged in two rows mixed to minute dots.

**Distribution and habitat.** *Silene kemoniana* was found near San Martino delle Scale, a small village close to Palermo (N Sicily), where it occurs at an altitude of 600-900 m. Plants occur in the clearings of xerophilous garigues on calcareous (including dolomites and limestones) substrates, chiefly represented by Mesozoic limestones and dolomites. The plant community where *S. kemoniana* was found is also characterized by several dwarf shrubs, such as *Erica multiflora* L., *Rosmarinus officinalis* L., *Fumana thymifolia* (L.) Spach ex Webb, *Cistus salvifolius* L., *Cistus eriocephalus* Viv., *Thymbra capitata* (L.) Cav., *Hippocrepis glauca* Ten., *Matthiola fruticulosa* (L.) Maire, etc. This vegetation also hosts some rare Sicilian endemics, such as *Polygala preslii* Spreng., *Helichrysum preslianum* C. Brullo & Brullo, *Onosma canescens* C. Presl, and *Dianthus graminifolius* C. Presl.

**Taxonomic remarks.** Within sect. *Dipterosperma*, from a macropmorphological perspective, *Silene kemoniana* shows close relationships with *S. colorata* mainly in having bracts of the lower flowers ovate, calyx ribs without anastomoses, and with rounded teeth, the carpophore more than 4 mm, and seeds up to 1.7 mm in diameter. The most relevant differences between the two species are in the habit, inflorescence, calyx,



**Fig. 3.** SEM micrographs of seed outer coat: **A**, *Silene kemoniana*; **B**, *S. colorata*. **1**, entire seed; **2-3**, seed coat details of lateral surface (at different magnification); **4**, seed coat details of dorsal surface.



**Fig. 4.** *Silene colorata*: **a**, habit; **b**, flower (lateral view); **c**, flower (upper view); **d**, petal (ventral view); **e**, petal (lateral view); **f**, open calyx; **g**, calyx lobes; **h**, coronal scale; **i**, carpophore and pistil; **j**, stamen; **k**, calyx and capsule; **l**, carpophore and open capsule; **m**, seed (lateral view). Based on living plants from Gela (southern Sicily), *Brullo & Sciandrello* s.n. (CAT).

corolla, coronal scales, claw indumentum, capsule, carpophore and seeds. In particular, *S. colorata* (Fig. 4) has erect stems, 20-30 cm, that are very branched, with internodes up to 7 cm, the inflorescence with 4-10 flowers arranged in dichasia, calyx 14-15 mm, with teeth triangular-ovate, 2.5-4 mm long, petal limb 9-11 mm, with lobes 3.5-4.5 mm wide, coronal scales entire, 1.6-2 mm, claw dorsally hairy along the midrib, capsule 7-8 mm, carpophore 5-6 mm long, seeds 1-1.5 mm in diameter, while *S. kemoniana* is characterized by stems that are branched only at the base, prostrate-ascending, 5-15 mm, with internodes up to 4 cm, inflorescence with (1)2-4(5) flowers in monochasia arranged, calyx 11-13 mm, with teeth oblong, 1.8-2.2 mm, petal limb 8-8.5 mm, with lobes 1.5-2 mm wide, coronal scales erose-incised, 2.5-3 mm, claw glabrous or scattered ciliate at margin, capsule 8-10 mm, carpophore 4-5 mm, seeds 1.6-1.7 mm in diameter. Further differences concern the micro-morphology of seed coat, as already noted above.

Besides these morphological differences, these species are also ecologically distinct: since *S. colorata* is a psammophyte, growing on sandy soils of coastal and inland sands, whilst *S. kemoniana* is found in submontane garigues occurring on carbonatic substrates. In its small size and prostrate-ascending stems that are only basally branched, *S. kemoniana* is similar to *S. nummica* described by Valsecchi (1995) from the Central Mediterranean area. However, the latter is easily distinguished from the new species in having leaves that are thickened and with dense long hairs, solitary flowers, the calyx tomentose-hirsute, corolla lobes 4-5 mm wide, the capsule 5-6 mm, with teeth at maturity not reflexed, and seeds 1 mm in diameter, with wings that are flat and very short. Besides, the habitat of *S. nummica* is also different, since it is a species found in sandy or rocky coastal habitats.

According to literature (Talavera, 1990; Chater, 1993; Valsecchi, 1995; Greuter, 1997), besides *S. colorata* and *S. nummica*, the sect. *Dipterosperma* includes also *S. apetala* Willd. (= *S. decipiens* Barc.), *S. secundiflora* Otth, *S. gracilis* DC. (= *S. longicaulis* Pourret ex Lag.), *S. sericea* All., *S. morisiana* Bég. & Rav., *S. canescens* Ten., *S. arghireica* Vals. and *S. beguinotii* Vals. For identification of these species the following key is provided.

#### IDENTIFICATION KEY TO THE SPECIES OF *SILENE* SECT. *DIPTEROSPERMA*

1. Carpophore < 4 mm ..... 2
1. Carpophore > 4 mm ..... 3
2. Carpophore 0.5-1.5(2.5) mm; calyx 6-9 mm long; petal rudimentary or absent, rarely with limb up to 3 mm ..... ***S. apetala***
2. Carpophore 1.5-4 mm; calyx 10-13 mm long; petal well-developed with limb 6-10 mm ..... ***S. gracilis***
3. Calyx with markedly anastomosing nerves ..... ***S. secundiflora***
3. Calyx nerves not anastomosed ..... 4
4. Calyx 18-22 mm ..... 5
4. Calyx 10-15 mm ..... 6
5. Flowers solitary; leaves lanceolate, sericeous; capsule 10-11mm; carpophore 12-14 mm ..... ***S. sericea***
5. Flowers in monochasia; leaves spatulate, setose; capsule 8-9 mm; carpophore 7-8 mm ..... ***S. morisiana***
6. Petal with limb lobes 1.5-2 mm wide ..... ***S. kemoniana***
6. Petal with limb lobes more than 2 mm wide ..... 7
7. Stem prostrate-ascending; flowers solitary; capsule globose, 5-6 mm; seed with wings only slightly developed, flat..... ***S. nummica***

7. Stem erect to erect-ascending; flowers in dichasia or monochasia; capsule ovoid to ellipsoid 6-8 mm; seed with wings well-developed, more or less undulate ..... 8
8. Leaves ovate to spatulate ..... ***S. colorata***
8. Leaves lanceolate to linear ..... 9
9. Leaves linear to linear-lanceolate; calyx 10-12 mm; capsule ovoid, 5-6 mm ..... ***S. beguinotii***
9. Leaves lanceolate; calyx 12-14 mm; capsule ellipsoid, 6-8 mm ..... 10
10. Petals 16-17 mm, deeply bifid; carpophore 5-6 mm .... ***S. canescens***
10. Petals 18-20 mm, shortly bifid; carpophore 7-8 mm .... ***S. arghireica***

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