

## Some remarks on *Silene oliveriana* Otth (*Caryophyllaceae*)

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Abstract. – Cyprus is one of the few areas in the E Mediterranean where the distribution areas of *Silene colorata* s. str. and *S. oliveriana* overlap. Opinion about taxonomy and rank of the latter is much divided. Our field observations in Cyprus as well as literature and herbarium studies support the view to treat the latter taxon at species rank. Additionally, it is more widespread in Cyprus than previously assumed.

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### Introduction

Traditionally, the widespread Mediterranean species *Silene colorata* Poir. is treated as comprising three varieties in Cyprus (Meikle 1977). Apart from the nominal variety, which is recorded from sea-level to medium altitudes, *S. colorata* var. *decumbens* (Biv.) Rohrb. is known to occur on sands of the coastal area. It has been classified as a “maritime form ..., usually easy to recognize, but intergrading with the typical var. *colorata* in some areas”. It is a plant with spreading or decumbent stems and frequently with rather fleshy leaves, representing weakly differentiated maritime forms, which is typical of many Cypriot species. According to our own observations, var. *decumbens* seems to be the more common taxon if both are differentiated. The third variety, *S. colorata* var. *oliveriana* (Otth) Durand & Barratte, is the most controversial one. It was described by Otth (in Candolle 1824) from today’s Syria and Iraq (“circa Alep et Mossul”). Meikle (1977) listed only two specimens collected in Cyprus. Its correct rank, ranging from variety to subspecies or even species requires a closer discussion. Cyprus belongs to the part of the distribution area of *S. colorata* s. l. where both *S. colorata* s. str. (incl. var. *decumbens*) and *S. oliveriana* coexist. Hence, the situation on the island is predestined for a comparative study.

### Material and Methods

Our morphometric analyses were carried out on specimens collected in Cyprus and the material of the *S. colorata* species group kept at the herbarium of the Botanic Garden and Botanical Museum Berlin, Germany (B) plus the digital collection of the Muséum national d’Histoire naturelle, Paris (France) (2017). In addition to that are our own observations made in the field in Cyprus.

Plants grown from seeds in greenhouses at B were cultivated under identical conditions to test the variability of characters (plants marked with an asterisk \* in the list of specimens).

## Results

Comparison of the material from Cyprus fully confirms morphological descriptions based on studies in neighbouring countries. A selection of important and diagnostic characters is listed in Tab. 1

Our field observations in Cyprus did not reveal any signs of intermediacy between *S. colorata* s. str. and *S. oliveriana*. Both taxa are clearly distinct.

In the common garden experiment (albeit based on low sample size) characters were more or less retained. Leaves were considerably larger than in the wild origin but showed the typical shape. However, the uppermost leaves in *S. oliveriana* kept the almost sub-ulate structure. Flower structure and coloration were identical to the original state

Obviously, *S. oliveriana* is underrecorded in Cyprus as regards documentation of herbarium specimens in collections. In this respect we have added a few specimens (see list of selected specimens below). However, there are additional observational data from 2017 and 2018 confirming that the taxon does occur widespread and scattered in various parts of Cyprus: Lysos, Mesogi (Div. 1), Kapedes (Div. 2), Trimiklini (Div. 3), Kavos Pyla, Protaras, Potamos Liopetriou (Div. 4), Koutrafas, Agios Epifanios (Div. 6), Platanissos, Koilanemos (Div. 8). It should also be mentioned that Unger & Kotschy (1865) described occurrences from the vicinity of Larnaka, which was not mentioned by Meikle (1977). The latter listed the specimens *Kotschy 95* and *Kotschy 132* under the typical variety *colorata*

The habitats of both taxa differ in that *S. colorata* is mostly a plant of coastal sands. More rarely it can be found in rocky places with phrygana and similar habitats in the coastal area. On the other hand, the strong link to coastal habitats is less pronounced in other parts of the Mediterranean (see cited floras and list of selected specimens). *S. oliveriana* has also been observed on coastal sands in Cyprus but most data come from lower and medium altitudes, and some from coastal zones where both taxa coexist. *S. oliveriana* prefers seminatural habitats such as rocky slopes (e.g. among *Juniperus phoenicea*) as well as more anthropogenic habitats such as fields (as a weed), fallow land and roadsides, which confirms habitat descriptions from outside Cyprus.

## Discussion

No flora for the Near East and the E Mediterranean doubts that *S. colorata* s. str. and *S. oliveriana* are closely related taxa.

Zohary (1966) characterised *S. oliveriana*, ranked by him as *S. colorata* subsp. *oliveriana* (Otth) Rohrb., as "Mainly Saharo-Arabian, slightly extending into arid parts or the Mediterranean region". According to Rohrbach (1868), Mouterde (1966), Meikle (1977), Chamberlain (1996), Boulos (1999) and Townsend & al. (2016), the taxon has been found in S Turkey, Syria, Lebanon, Israel, Palestine, Jordan, Iraq, Iran, Saudi Arabia, Yemen and Egypt (incl. Sinai). Further to the west, the taxon has also been recorded from Libya and Tunisia (see, e.g., Pampanini 1930, Pottier-Alapetite 1979), which for unknown reasons is not mentioned in the above-cited sources. *S. oliveriana* var. *tripolitana*, described from Libya by Bornmüller (1934) with a very short diagnosis, represents plants with extremely linear leaves, lies within the variability of the species and possibly does not merit recognition.

Tab. 1: Characters of *Silene colorata* and *S. oliveriana* in comparison; based on our own results as well as Mouterde 1966, Meikle 1977, Zohary 1966, Townsend & al. 2016. Most important characters in bold; they should be checked in several individuals of a population.

	<i>Silene colorata</i>	<i>Silene oliveriana</i>
<b>Leaves</b>	<b>spatulate or oblanceolate</b> , at least towards base of stem, obtuse	<b>basal leaves narrowly obovate, cauline leaves linear, lanceolate or sub-spatulate, becoming almost subulate in upper parts of stem</b> , acute
<b>Calyx</b>	usually reddish-nerved (outside Cyprus sometimes green-nerved), with appressed hairs, sometimes with crisp hairs or glabrescent, hair length variable, but long, multicellular hairs (> 1 mm) only in this taxon; <b>teeth</b> 2–4 mm long, oblong, <b>obtuse</b>	often green-nerved, but sometimes with reddish nerves, with short, crisp hairs or glabrescent, often teeth with longer hairs, multicellular hairs rarely found; <b>teeth</b> 2–3 mm long, lanceolate, <b>acute</b> , but variably obtuse to acute in some populations
<b>Petals</b> (see Fig. 1–2)	<b>bright pink</b> , rarely white by albinism, sometimes dark pink and nearly purplish (lower side often darker); <b>lobes cuneate-oblong</b> , rarely linear-oblong (in depauperate plants?)	<b>whitish or pale pink</b> (lower side often darker); <b>lobes linear or strap-shaped</b>
<b>Coronal scales</b>	oblong-lanceolate, more or less acute	obovate, obtuse or rarely retuse
<b>Capsules</b>	as long or up to twice as long as carpophore	as long or somewhat shorter or longer than carpophore

In sum, the distribution areas of *S. colorata* and *S. oliveriana* overlap considerably in parts of N Africa and in the E Mediterranean.

In the literature dealing with *S. colorata* s. l. from regions where both taxa coexist, no references could be found that indicate transitional populations. Obviously, no clear-cut differences in habitat preferences exist. *S. colorata* s. str. seems to be somewhat more psammophytic by preferring coastal sands but this is only a tendency in some parts of the overlapping distribution area.

There are additional indications that seed structure may also differ to a certain extent: Valsecchi (1995) mentioned that *S. oliveriana* shows more or less undulate seed margins (wings) compared to *S. colorata*. On the other hand, Townsend & al. (2016) described both characteristics, flat and undulate, for Iraqi provenances of *S. oliveriana*. But this seed character needs further corroboration by a more systematic approach considering material from the whole distribution area. Our limited sample speaks against a clear separation. Brullo & al. (2012) also mentioned that seed wings in *S. colorata* are “more or less undulate”, which can be confirmed by our own results. However, clearly defining seed wing undulation is a difficult challenge.

Furthermore, based on field observations, Thiébaud (1934) classified *S. oliveriana* as a nocturnal species ("les fleurs se flétrissent aux premiers rayons du soleil"), whereas *S. colorata* (sub *S. bipartita* Desf.) proved to be a diurnal species. No details about pollinators seem to exist but these observations from the Levant support the assumption that both taxa are reproductively more isolated than has been presumed. This considerable observation on the biology of the two taxa has not yet found much attention. First results from Cyprus confirm the differences in biology but need a more systematic comparative approach.

In summary, currently available data speak against treating both taxa as geographically defined subspecies. On the other hand, the morphological differences are too pronounced to treat both taxa as varieties only. Unfortunately, the most reliable characters, such as coloration of the petals, are difficult to consider in herbarium material. Depauperate specimens of *S. colorata*, e.g. from very poor soils, sometimes show untypical characters, which affect determination. However, we recommend to treat both taxa as species following Mouterde (1966) for Syria and Lebanon. It was not the intention of the current study to present a revision of the *S. colorata* group but this note may help to inspire future comparisons of both taxa in and outside Cyprus.

## Selected specimens

### *Silene oliveriana*

**Cyprus:** Div. 1: Pafos, between amphitheatre and "cape", pasture, 9.4.1998, *R. Hand* 2145 (B). – Pafos, c. 400 m SSW of lighthouse, pasture, c. 10 m, 15.3.1999, *R. Hand* 2572 (B). – Pafos, c. 500 m ENE of Tombs of the Kings, fields, c. 10 m, 14.3.1999, *R. Hand* 2566 (B). – Neo Chorio, track c. 500 m SW of the magnesium mine, c. 310 m, 19.4.1998, *R. Hand* 2234 (B).

Div. 3: Akrotiri, SE edge of salt lake, sand dunes, 0 m, 26.4.2017, *R. Hand* 8206 & al. (B).

Div. 4: Cape Kiti (Larnaca), cultures abandonées, 13.4.1991, *G. Alziar & al.*, *Iter Med. IV*, 0298 (B). – Kavos Gkreko, 4.4.2015 (seeds), *C. Makris*, cult. at B, 2.7.2015, *M. Cubr* 50124 (B\*). – Cape Greco (Larnaca), calcaires coralliens du Miocène inférieur, et sables, 10–20 m, 12.4.1991, *G. Alziar & al.*, *Iter Med. IV*, 0160 (B).

**Syria:** Alep, 10.5.1929, *Gombault* (P 05436619).

**Libya:** Tripolitanien, auf Sand b[e]i Tripolis, 4.1932, *Baschant* (B).

### *Silene colorata*

**Cyprus:** Div. 3: Agios Tychon, sand dunes SE of the village between coastal road and beach, c. 3 m, var. *decumbens*, 15.3.2005, *R. Hand* 4321 (B). – Agios Tychon, dunes at the coast c. 1.2 km E of Amathus, open sands, c. 5 m, 7.5.1999, *R. Hand* 3112 (B). – Pentakomo, coast c. 600 m W of Akrotirio Dolos, small sand dunes above rocky coast, c. 20 m, var. *decumbens*, 25.3.2005, *R. Hand* 4433 (B). – Akrotiri peninsula, between Fassouri reedbeds and the sea, 5.4.2015 (seeds), *C. Makris*, cult. at B, 14.7.2015, *M. Cubr* 50158 (B\*).

Div. 4: Périvolia (Larnaca), sables maritimes et décombres sableux, 0–5 m, 10.4.1991, *G. Alziar & al.*, *Iter Med. IV*, 0026 (B). – Perivolia, at Akrotirio Kiti, rocky phrygana, c. 10 m, var. *colorata*, 8.3.2005, *R. Hand* 4256 (B). – Pyla, S of village at coast, near turn-off to sewage works, sandy ground, 5 m, var. *decumbens*, 11.4.2014, *R. Hand* 6416 (B).

**Portugal:** Rio Degebe, am Straßenrand, 27.3.1983, *A. Pircher* 47 (B).

**Spain:** Jerez del Marquesado, Arroyo de Alcázar, Prov. Granada, hillside and banks of stream, 1600 m, 16.6.1988, *B. Valdés & al.*, *Iter Med. I*, 336/88 (B). – Prov. Caceres, Tajo-Tal bei Garrovillas, 1.5.1967, *H. Scholz & P. Hiepkö*, *Pl. Hisp.* 791 (B).

**Italy:** Apulien, Monte Gargano, Küste südlich Manfredonia, zwischen Sciale Bórgia und der Mündung des Torrente Cervaro (12–14 km südlich Manfredonia), 22.5.1972, *B. Hein* (B). – Sicily, Zingaro, near Monte Sparagio, calcareous cliff, 100–200 m, 30.5.1990, *F. M. Raimondo & al.*, *Iter Med. III*, 179 (B).

**Malta:** Qawra, along sea shore, Qawra Coast Road, east facing, eroded limestone rocks [...], 14.3.2005, *L. J. G. van der Maesen* 7944 (B).

**Greece:** Evvia, NW Artemisi, Sand-Kiesstrand, 1 m, *E. Willing & R. Willing* 216.866 (B). – Viotia, NW Davlia, Felsige Krautfluren, *Q. coccifera*-Gebüsch, 435 m, *E. Willing & R. Willing* 218.218 (B).

**Turkey:** Smyrne, dans les sables maritimes, 20.4.1854, *B. Balansa*, *Pl. Orient.* 97 (B).

**Lebanon:** In den Felsen bei Ghazir, c. 400 m, 13.3.1934, *P. Busujan* (B). – Sables au Sud et près d'Ahacouh[?], env[irons] de Saïda, 10.3.1853, *Blanche*, *Reliq. Maillanae* 923 (B).

**Israel:** Philistean Plain, 1 km S of Ashdod, stable sand dunes, 20 m, 21.3.1989, *A. Danin & al.*, *Iter Med. II*, 04.003 (B).

**Morocco:** Province of Oujda, Monts des Beni-Snassen, N-facing slopes of Djebel Foughal, surroundings of the Maison forestière Aïn-Almou, *Pinus* woodland, 1270 m, 16.5.1995, *R. Vogt* 15231 & *C. Oberprieler* 9540 (B).

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## References

- Bornmüller J. 1934: Zur Flora Tripolitaniens. – *Magyar Bot. Lapok* 33: 83–94.
- 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: 209–216.
- Candolle A. P. de 1824: *Prodromus systematis naturalis regni vegetabilis* 1. – Parisiis.
- Chamberlain D. F. 1996: Family 37. *Caryophyllaceae*. Pp. 174–233. – In: Miller A. G. & Cope T. A. (ed.), *Flora of the Arabian peninsula and Socotra* 1. – Edinburgh & Kew.

- Meikle R. D. 1977: Flora of Cyprus 1. – Kew.
- Mouterde P. 1966: Nouvelle flore du Liban et de la Syrie 1. – Beyrouth.
- Muséum national d'Histoire naturelle, Paris (France) 2017: Collection: Vascular plants (P). *Silene oliveriana*. Published at <http://coldb.mnhn.fr/catalognumber/mnhn/p/p03212527>; accessed 28.11.2017.
- Pampanini R. 1930: Prodrómo della Flora Cirenaica. – Forlì.
- Pottier-Alapetite G. 1979: Flore de la Tunisie 1. – Tunis.
- Rohrbach P. 1868: Monographie der Gattung *Silene*. – Leipzig.
- Thiébaud J. 1934: Notes sur quelques plantes de la flore libano-syrienne. – Bull. Soc. Bot. France 81: 113–121.
- Townsend C. C., Melzheimer V., Kandemir A., Ghazanfar S. A. & Haloob A. 2016: 90. *Caryophyllaceae* A. L. de Jussieu. Pp. 6–123. – In: Ghazanfar S. A. & Edmondson J. R. (ed.), Flora of Iraq 5(1). – Bagdad & Kew.
- Valsecchi F. 1995: Indagini sistematiche, tassonomiche e corologiche nel gruppo "*Silene colorata* Poir. – *S. sericea* All. – *S. canescens* Ten.". – Boll. Soc. Sarda Sci. Nat. 30: 447–476.
- Zohary M. 1966: Flora Palaestina 1. – Jerusalem.



Fig. 1: *Silene oliveriana*, Cyprus, Trimiklini, 2.4.2007. – Christodoulos Makris.



Fig. 2: *Silene colorata* s. str., Cyprus, Kourion, 1.2.2014. – Christodoulos Makris.