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A taxonomic revision of *Silene nocturna* species complex (Caryophyllaceae) in Italy

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Abstract

The taxonomy of the closely related *Silene capraria*, *S. neglecta* and *S. nocturna* in Italy is investigated, by means of morphometric and karyological analyses. The chromosome numbers of *S. capraria* and *S. neglecta* (both diploid with 2*n* = 24) are here reported for the first time. On the basis of the morphological results, we propose the species rank for *S. neglecta*, and to consider *S. capraria* as a vicariant narrow endemic subspecies of the widespread *S. nocturna*. The name *S. neglecta* is lectotypified on a specimen preserved in the Herbarium Tenore at NAP. With the aim to distinguish these taxa, the useful qualitative and quantitative morphological characters are highligthed.

Key words: diagnostic key, Italian flora, Mediterranean, *Silene* sect. *Scorpioideae*

Introduction

Silene Linnaeus (1753: 416) is one of the largest genera in Caryophyllaceae, including about 450 species (Chowdari 1957), despite recently several genera were segregated from it (Oxelman *et al.* 2001). This genus is of particular interest in evolutionary and ecological studies, as highlighted by Bernasconi *et al.* (2009). The Mediterranean region hosts the majority of the species (Talavera & Muñoz Garmendia 1989) and includes the sect. *Scorpioideae* (Rohrbach 1868: 96) Chowduri (1957: 247). *Silene nocturna* Linnaeus (1753: 416) species complex is included in this section.

In *Flora Europaea*, two taxa are recognized within this complex (Chater *et al.* 1993): *S. nocturna* subsp. *nocturna* and *S. nocturna* subsp. *neglecta* (Tenore 1826: 13) Arcangeli (1882: 88). The same taxa were treated at specific level for Italy by Pignatti (1982), but more recently, Conti *et al.* (2005) followed the taxonomic treatment by Chater *et al.* (1993), also adding *S. capraria* Sommier (1898: 113), on the basis of Foggi *et al.* (2001) (this latter taxon was previously synonymized with *S. nocturna*). *S. nocturna* was typified by Ghafoor (1978) on a Linnaean specimen in LINN! and the same choice was done later by Talavera & Muñoz Garmendia (1989: 421). This specimen was collected in Pennsylvania (United States), where the plant was introduced by Pursh (Rohrbach 1868). *S. capraria* was typified by Foggi *et al.* (2001) on a specimen in FI!, while *S. neglecta* is yet untypified, as far as we are aware.

The characters usually used to distinguish *S. neglecta* from *S. nocturna* are (Pignatti 1982, Chater *et al.* 1993): a) basal portion of the stem, hirsute vs. glabrous/pubescent, b) position of the lower leaves, patent to deflexed vs. erect, c) lower pedicels patent to pendulous vs. erect, d) shape of calyx teeth linear vs. triangular-lanceolate, e) filament with hairs at base vs. glabrous, f) seed diameter, 0.8–0.9 vs. 0.5–0.7 mm. Concerning the seed colour, there is no agreement among the authors: blackish in *S. nocturna* and reddish-brown in *S. neglecta* (Chater *et al.* 1993), or the reverse according to Tenore (1830: 217) and Fiori (1923). *S. capraria* was described as a dwarf cleistogamous variant of *S. nocturna* (Sommier 1896, Foggi *et al.* 2001), but the study of available specimens collected from Capraia and observed in a field survey in April 2012 reveals a higher variability. Besides morphometric studies (Stuessy 2009), chromosome analyses are important and widely used

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for taxonomic purpose also within group of related taxa (Siljak-Yakovlev & Peruzzi 2012). Moreover, seed morphology has been successfully used for the identification of taxa belongin to the family Caryophyllaceae because of their variously sculptured seed testa (Bittrich 1993; Minuto *et al.* 2006; Fawzi *et al.* 2010).

Accordingly, in the framework of taxonomic studies carried out on Tuscan Archipelago endemics (Peruzzi & Carta, 2011), the aims of this study are: a) to typify the name *S. neglecta*; b) to verify the taxonomic value of *S. capraria* and c) to clarify the taxonomic relationships between *S. capraria*, *S. nocturna* and *S. neglecta*, both on morphological and karyological data.

Material and Methods

Quantitative morphological investigation are performed on 51 herbarium specimens of *S. capraria,* 43 of *S. neglecta* and 81 of *S. nocturna*; the lectotypes of the taxa are included (Appendix 1). The herbaria checked were FI, LINN, NAP and PI (codes according to Thiers, 2011). The following eight characters were examined: plant size (cm), flower number, inclination of the lowest flower's pedicel [from 0° (erect and adpressed to peduncle upwards), to 180° (completely reflexed)], length of the lowest flower's pedicel (mm), calyx length (mm), carpophore length (mm), calyx teeth length and width (mm). The variables were processed singularly by means and T-test for independent samples comparing the same variable among pairs of species (*S. capraria* vs. *S. neglecta*; *S. capraria* vs. *S. nocturna*; *S. neglecta* vs. *S. nocturna*) with R software (www.r-project.org). The data matrix (175 cases x 8 characters) was analyzed using PCA (Principal Component Analysis) method, after standardization of data, with the software of statistical and multivariate analysis Data Desk 6.1.

Seed general morphology was studied with binocular lens and calliper on 10 seeds from each sample (Table 1). Besides, two to four seeds per each sample were studied using SEM (the material was coated by a gold thin layer, then observed and photographed at 10 kV). According to the criteria and terminology used by Fawzi *et al.* (2010), the following characters were considered: seed shape, seed colour, seed length and width (mm), testa cell outline, lateral and dorsal surfaces, number of cell rows in dorsal testa, outline of cells in dorsal testa, anticlinal and periclinal walls of cells in dorsal testa. After verifying no interpopulational (samples) variability, seed length and width data were processed by means and T-test among pairs of species.
As regards the chromosome analysis, squash preparations were made from root-tips of germinating seeds collected *in situ* (Table 1), according to the following schedule: pretreatment in 0.4% colchicine solution for 4 hours; Carnoy fixing for 45 min; hydrolisis in HCl 1N for 9 minutes at 60°C; staining with leuco-basic fuchsin for 3 hours. At least ten plates were used in order to establish the chromosome numbers. For *S. capraria* and *S. neglecta*, five plates were measured in order to build the idiograms. M_{CA} (Mean Centromeric Asymmetry) and CV_{CL} (Coefficient of Variation of Chromosome Length) karyotype asymmetry parameters were calculated according to the methodology proposed by Peruzzi & Eroğlu (2013). The same parameters were also calculated for three metaphasic plates of *S. nocturna* available in literature (Talavera & Bocquet 1975, Colombo & Trapani 1991, Díaz Lifante *et al.* 1992).

TABLE 1. Populations sampled for seed morphology and karyological analysis. Seeds were collected from fully ripening capsules in the first half of April 2012.

	locality	coordinates	collector(s)
S. capraria	Tuscany: Capraia Island, Tuscan Archipelago (Livorno)	43°03'N 09°49'E	*L. Peruzzi, G. Gestri*
S. capraria	Tuscany: Capraia Island,Tuscan Archipelago (Livorno)	43°01'N 09°49'E	*A. Carta*
S. neglecta	Tuscany: Elba Island, Tuscan Archipelago (Livorno)	42°44'N 10°07'E	*B. Pierini*
S. neglecta	Tuscany: Montecristo Island, Tuscan Archipelago (Livorno)	42°20'N 10°19'E	*A. Carta*
S. nocturna	Emilia-Romagna	44°42'N 10°40'E	*S. Sturloni*
S. nocturna	Puglia	41°33'N 15°52'E	*L. Rignanese*
S. nocturna	Tuscany: Monte Pisano, Vicopisano (Pisa)	43°41'N 10°30'E	*B. Pierini*

FIGURE 1. Lectotype of *Silene neglecta* in Herbarium Tenore, NAP!, designated here (plant on the left side, linked with the bottom label).

Typification of *Silene neglecta*

Tenore's protologue consists of a diagnosis, referring also to "*Silene nocturna* A" as described in his previous works (Tenore 1811–1815: 235, Tenore 1822: 350), concerning the unnamed var. "A". Unnamed varieties "B" and "C" are also described, and var. "B" refers to "*Silene nocturna* B" as described in Tenore (1811–1815: 235, Tenore 1822: 350). Later, Tenore (1830: 216) excluded the var. "B" from his species concept (and referred it again to *S. nocturna*). In Herbarium Tenore conserved at NAP we have been able to find the following specimens: "Astroni" and "Persano" (both the localities cited by the author under var. "A") and "Capri" (cited under var. "C"). These specimens can be considered as original material, despite the absence of explicit collection dates (a constant in Herbarium Tenore, see also Di Pietro et al. 2012, Peruzzi et al. 2012, 2013): indeed, they were originarily labelled as "*Silene nocturna*" (exactly as in Tenore's previous publications) and then corrected by the author as "*neglecta nob.*". Among them, the most complete and well developed specimen from "Persano" (Fig. 1), matching well with the protologue, is here selected as the lectotype. This specimen corresponds to the currenct concept of *S. neglecta* (Chater *et al.* 1993).

Morphological Results

S. capraria results intermediate between *S. neglecta* and *S. nocturna* concerning the inclination of lowest flower's pedicels, while their length show the highest values; regarding the calyx and carpophore dimensions, *S. capraria* shows instead the lowest values (Table 2). However, all these morphological features taken together (PCA analysis) do not guarantee a clear morphological discrimination among the three taxa (data not shown). The T-test comparison of characters for pairs of systematic units, shows that *S. capraria* is distinct from *S. neglecta* in having less inclinated and longer lowest pedicels, smaller calyces and carpophores (Table 3). *S. capraria* is also distinct from *S. nocturna*, in having a smaller size, more inclinated and longer lowest pedicels, and smaller calyces (Table 4). Finally, *S. neglecta* is distinct from *S. nocturna* in having more inclinated and longer lowest pedicels, larger calyces and carpophores (Table 5).

TABLE 2. Morphological comparison of *Silene capraria, S. neglecta* and *S. nocturna*. Quantitative values are expressed as 10–90 percentile intervals, with minimum and/or maximum in brackets, and as mean ± standard deviation.

	S. capraria	***S. neglecta***	***S. nocturna***
plant size (cm)	(2–)4–22(–38)	(3–)8–29(–41)	(5–)7–33(–37)
	12 ± 8	15 ± 9	17.1 ± 9.8
flower number	1–8(–11)	(1)2–6(–9)	1–7(–10)
	3.8 ± 2.6	3.3 ± 1.8	3.7 ± 2.2
inclination of the lowest flower's pedicel (°)	0–30(–40)	(0–)5–45(–90)	0–5(–20)
	7.6 ± 10.5	19.1 ± 20.6	2.2 ± 3.6
length of the lowest flower's pedicel (mm)	(2–)4–20(–35)	(1–)3–13.6(–19)	(1–)2–7(–10)
	11.3 ± 7.1	6.2 ± 4.4	3.7 ± 2.2
calyx length (mm)	5–10(–10.5)	(7.5–)9–11(–12)	(6.5–)8–10.5(–12)
	7.4 ± 1.6	9.9 ± 1	9.3 ± 1
carpophore length (mm)	0.5–1(–1.5)	(1–)1.2–2(–2.1)	(0.5–)0.8–1.2(–1.5)
	0.8 ± 0.2	1.6 ± 0.3	0.9 ± 0.2
calyx teeth length (mm)	(0.8–)1–1.7(–2)	(0.8–)1–2.5(–3.5)	(0.8–)1–1.6(–2)
	1.2 ± 0.3	1.7 ± 0.6	1.2 ± 0.3
calyx teeth width (mm)	0.5–1.5	(0.5–)0.7–1.5(–2)	(0.5–)0.7–1(–1.5)
	0.9 ± 0.3	1 ± 0.4	0.9 ± 0.2

TABLE 3. Mean differences between *S. capraria* and *S. neglecta* studied specimens, according to T-test. Those characters with df = 94 were assumed with equal variances (after Levene statistics); the others were not assumed with equal variances. Significant differences are evidenced in bold.

	t	df	p	difference
plant size	-2.033	94	0.045	-3.59333 cm
flower number	1.053	88.942	0.295	0.476
inclination of the lowest flower's pedicel	-3.260	64.173	0.002	**-10.987°**
length of the lowest flower's pedicel	4.119	85.936	0.000	**4.96667 mm**
calyx length	-9.439	82.636	0.000	**-2.56824 mm**
carpophore length	-12.230	78.392	0.000	**-0.73412 mm**
calyx teeth length	-4.247	64.004	0.000	**-0.44810 mm**
calyx teeth width	-1.628	94	0.107	-0.10627 mm

TABLE 4. Mean differences between *S. capraria* and *S. nocturna* studied specimens, according to T-test. Those characters with df = 130 were assumed with equal variances (after Levene statistics); the others were not assumed with equal variances. Significant differences are evidenced in bold.

	t	df	p	difference
plant size	-2.984	130	0.003	**-4.90123 cm**
flower number	0.086	130	0.932	0.036
inclination of the lowest flower's pedicel	3.536	57.494	0.001	**5.408°**
length of the lowest flower's pedicel	7.457	56.193	0.000	**7.66667 mm**
calyx length	-7.310	74.603	0.000	**-1.87836 mm**
carpophore length	-2.469	130	0.015	-0.09165 mm
calyx teeth length	0.089	130	0.929	0.00523 mm
calyx teeth width	0.831	130	0.408	0.03224 mm

TABLE 5. Mean differences between *S. neglecta* and *S. nocturna* studied specimens, according to T-test. Those characters with df = 124 were assumed with equal variances (after Levene statistics); the others were not assumed with equal variances. Significant differences are evidenced in bold.

	t	df	p	difference
plant size	-0.729	124	0.467	-1.30790 cm
flower number	-1.138	124	0.257	-0.440
inclination of the lowest flower's pedicel	5.363	45.554	0.000	**16.395°**
length of the lowest flower's pedicel	3.746	55.966	0.000	**2.7 mm**
calyx length	3.689	124	0.000	**0.68988 mm**
carpophore length	11.898	59.426	0.000	**0.64247 mm**
calyx teeth length	4.456	57.325	0.000	**0.45333 mm**
calyx teeth width	2.436	54.852	0.018	0.13852 mm

Seeds of the *S. nocturna* species complex are reniform in outline, with polygonal testa cells and lateral surface concave. The distinctive macroscopic characters of *S. neglecta* are the dark colour and especially the greater dimension of the seeds (Table 6). Observation of testa micromorphology reveals further differences from one taxon to another (Fig. 2) and a summary of seed characteristics are reported in Table 6. The testa in all species appears to be made by cells having inter-digitated walls (sinuated cell margins), but *S. neglecta* is characterized by polygonal (star-shaped) tubercolate dorsal cells which occupy the dorsal ditch, instead of obovate slightly tubercolate cells. The ditch gives a concave groove on the dorsal surface of the seeds and it is deeper in *S. neglecta*. *S. capraria* may be distinguished from *S. nocturna* by its smaller seeds (Table 7) and the presence of two dorsal cell rows (Fig. 2, a). No significant interpopulational variability was found within *S. capraria*, *S. neglecta* and *S. nocturna* accessions (data not shown).

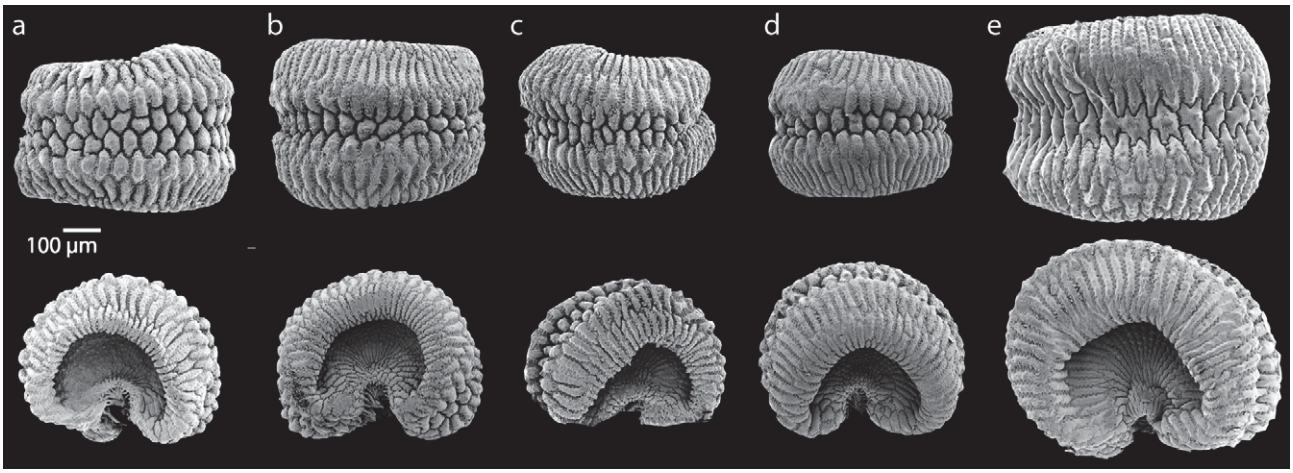

FIGURE 2. Seed micromorphology on SEM for the taxa studied here. For each taxon dorsal and lateral views are shown. (a) *Silene capraria*; (b) *S. nocturna* from Emilia-Romagna; (c) *S. nocturna* from Tuscany; (d) *S. nocturna* from Puglia; (e) *S. neglecta*.

TABLE 6. Micromorphological comparison between seeds of *Silene capraria, S. neglecta* and *S. nocturna*. Quantitative values are expressed as 10–90 percentile intervals, with minimum and/or maximum in brackets, and as mean ± standard deviation.

	S. capraria	***S. neglecta***	***S. nocturna***
seed shape	reniform	reniform	reniform
seed colour	usually brown to blackish	usually black	usually brown to blackish
seed length (mm)	(0.6–)0.63–0.71(–0.73)	(0.82–)0.86–1.02(–1.04)	0.68–0.73(–0.74)
	0.67±0.04	0.94±0.06	0.71±0.02
seed width (mm)	(0.43–)0.45–0.53(–0.54)	(0.63–)0.67–0.74	(0.48–)0.8–0.54(–0.55)
	0.47±0.04	0.7±0.03	0.51±0.03
testa cell outline	elongated polygonal	elongated polygonal	elongated polygonal
lateral surface	concave	concave	concave
dorsal surcace	concave-grooved	strongly concave-grooved	concave-grooved
number of cell rows in dorsal testa	2	1	1 (rarely, and incompletely, 2; cfr. Fig. 2c)
outline of cells in dorsal testa	obovate-polygonal	polygonal	obovate-polygonal
anticlinal walls of cells in dorsal testa	U-undulated	V-undulated	U-undulated
periclinal walls of cells in dorsal testa	slightly tubercolate	tubercolate	slightly tubercolate

TABLE 7. Mean differences in seed dimensions between pairs of species, according to T-test. Significant differences are evidenced in bold.

	t	**df**	**p**	**difference (mm)**
Seed lenght				
S. capraria–S. neglecta	-17.4114	19	0.000	**-0.273**
S. capraria–S. nocturna	-4.6326	19	0.000	**-0.044**
S. neglecta–S. nocturna	-14.0201	19	0.000	**-0.229**
Seed width				
S. capraria–S. neglecta	-19.3067	19	0.000	**-0.2295**
S. capraria–S. nocturna	-3.7353	19	0.001	**-0.0395**
S. neglecta–S. nocturna	-17.7379	19	0.000	**-0.19**

Karyological Results

All the studied samples (Table 1) revealed a diploid chromosome number $2n = 24$ (Fig. 3; data not shown for *S. nocturna*). Chromosome size ranges from 0.5 to 2.5 µm. Concerning karyotype asymmetry (Fig. 4), *S. capraria* shows the highest CV_{CL} values and intermediate values of MCA. *S. neglecta* shows instead intermediate values in both parameters, respect with *S. capraria* and *S. nocturna*.

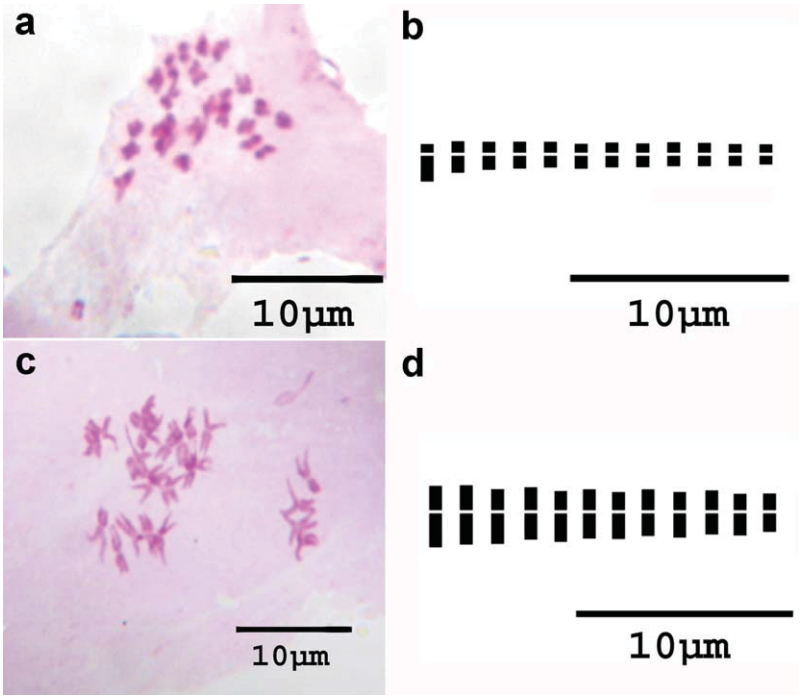

FIGURE 3. Examples of metaphasic plates of *Silene capraria* (a) and *S. neglecta* (c). Mean haploid idiogram of *Silene capraria* (b) and *S. neglecta* (d).

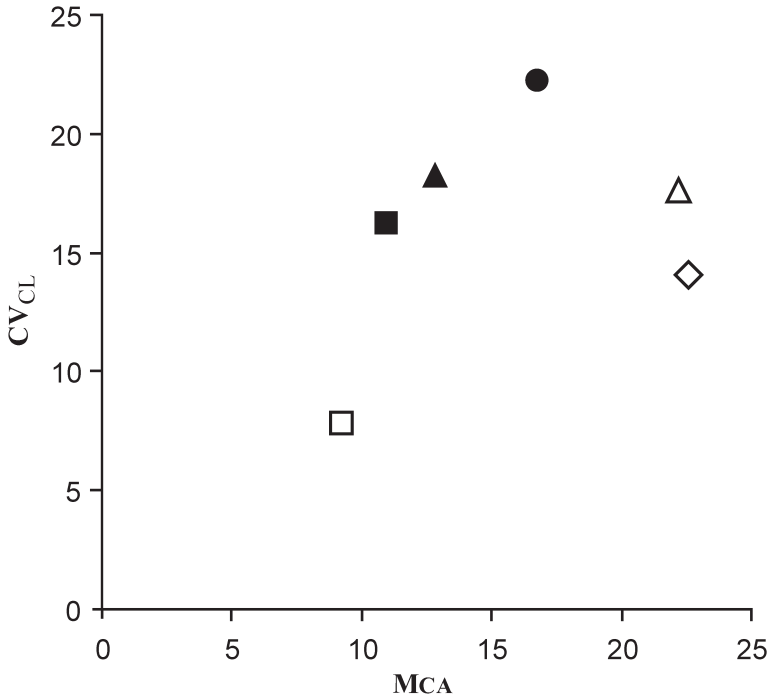

FIGURE 4. Analysis of karyotype asymmetry among *S. capraria* (circle), *S. neglecta* (dark triangle: Elba; dark square: Montecristo) and three *S. nocturna* karyotypes (white symbols): Spain (square), Sicily (rhombus) and Israel (triangle). Coefficient of variation of chromosome length (CV_{CL}) and Mean Centromeric Asymmetry (MCA) were plotted for each species studied. Increasing karyotype asymmetry is reflected in increasing values of CV_{CL} and/or MCA.

Discussion

Our study proved that there is some macromorphological distinctiveness between the three taxa, albeit with evident overlappings. On the contrary, the micromorphological data (seeds) highlighted new and more reliable diagnostic characters. Indeed, although all seeds of the studied taxa are similar from the macromorphology point of view, the taxa may be further distinguished based on testa cells shape and sculpturing, as previously reported for other groups of *Silene* (Hong et al., 1999). The data on *S. capraria* and *S. neglecta* are new, while those on *S. nocturna* are congruent with the only information available in literature (plants from Egypt in Fawzi *et al.* 2010). In Caryophyllaceae, testa is often variously sculptured (Bittrich 1993), and we confirm that seed morphology of *Silene* has a great diagnostic value at the species level (Bittrich 1993; Fawzy et al. 2010). The structure of the seed testa is closely related to the protection, dissemination and water absorption of a seed; therefore, ecological adaptation may have played an important evolutionary role. Although *S. neglecta* seeds have been found to be generally black, we found a large variation in color of seeds in all samples (brown, grey and black), that might be related to environmental conditions during development (Hong et al., 1999; Mira et al., 2011). Therefore, we notify that this parameter may not be reliable as good diagnostic character.

The chromosome numbers for *S. capraria* and *S. neglecta* are here reported for the first time. Their diploid 2n = 24 status is shared with *S. nocturna*, as shown by many authors (Löve & Kjellqvist 1974, Degraeve 1980, Colombo & Trapani 1991, Luque & Lifante 1991, Díaz Lifante *et al.* 1992, Diosdado *et al.* 1993, Runemark 1996, Valdés & Parra 1997) and confirmed by our own data. Concerning karyotype asymmetry, the three species seem to show some degree of distinction, with *S. nocturna* showing lower CV_{CL} values respect with *S. capraria*. The three accessions for *S. nocturna*, obtained from literature, document some heterogeneity in this species and can be considered as somehow representative of the whole Mediterranean area: Iberian peninsula (Talavera & Bocquet 1975), Sicily (Colombo & Trapani 1991) and Israel (Díaz Lifante *et al.* 1992).

All things considered, and given that there is no clear geographical and/or ecological separation between *S. neglecta* and *S. nocturna* despite their evident morphological distinctiveness, we deem opportune to keep *S. neglecta* separate at species level, as already suggested by Pignatti (1982). On the contrary, concerning *S. capraria*, our data suggest that a distintion at species level, as favoured by Foggi *et al.* (2001) and Conti *et al.* (2005), is an overestimation of its taxonomic value. Thanks to some degree of morphological distinction from *S. nocturna* and its geographical isolation, we propose here to consider it at subspecies level: *S. nocturna* subsp. *capraria*. According to the criteria recently reviewed by Siljak-Yakovlev & Peruzzi (2012), this unit can be considered as a schizoendemic to Capraia Island, at risk of extinction (Foggi et al. 2013). Future studies aimed at comparing *S. nocturna* subsp. *capraria* with other microtaxa of the *S. nocturna* species complex [e.g. *S. nocturna* subsp. *boullui* (Rouy & Foucaud 1896: 114) Gamisans in Gamisans & Jeanmonod (1993: 243), seemingly endemic to Corsica or *S. valsecchiae* Bocchieri (1988: 305), seemingly endemic to Sardinia (Arrigoni 2010)] would be desirable, as well as nomenclatural and taxonomic studied aimed at claryfying the correct application of important Linnaean names – connected with the species complex – such as *S. mutabilis* Linnaeus (1756: 16) and *S. reflexa* (Linnaeus 1753: 416) Aiton (1811: 86) (Jarvis 2007).

Taxonomic treatment

Silene neglecta Tenore (1826: 13) subsp. ***neglecta***

Type (lectotype here designated):—ITALY. Campania: Persano, s.d., *Tenore s.n.* (NAP!).

Silene nocturna Linnaeus (1753: 416) subsp. ***nocturna***

Type (lectotype designated by Ghafoor 1978: 91):—U.S.A. Pennsylvania. [*Silene*] *nocturna* 4 HU [Horto Upsaliensis] [on verso:] e semine D. Kalmii ex America, Herb. Linn. No. 583.8 (LINN!).

Silene nocturna L. subsp. ***capraria*** (Sommier) Peruzzi & Carta, *comb. & stat. nov.*

Bas.:—*Silene capraria* Sommier (1898: 113). Type (lectotype designated by Foggi *et al.* 2001: 13):—ITALY. Tuscany: Insula Capraria (Capraja), Punta del Trattoio, 6 April 1896, *Sommier s.n.* (FI!)

Identification key for the *Silene nocturna* species complex in Italy

1. Seeds ≥ 0.8 mm long, usually black, with cells of dorsal testa polygonal (star-shaped) in outline; carpophore (1–)1.2–2(–2.1) mm long; inclination of the lowest flower's pedicel (in fruit) up to 90°; basal portion of stem usually with hairs longer than 1 mm..... ***S. neglecta*** Ten.
- Seeds up to 0.8 mm long, usually brown-blackish, with cells of dorsal testa not star-shaped in outline; carpophore (0.5–)1–1.2(–1.5) mm long; inclination of the lowest flower's pedicel (in fruit) up to 40°; basal portion of stem glabrous or pubescent with hairs less than 1 mm long. 2
2. Seeds (0.6–)0.63–0.71(–0.73) mm long, with cells of dorsal testa arranged in two complete rows; calyx 5–10(–10.5) mm long; length of the lowest flower's pedicel (in fruit) (2–)4–20(–35) mm long..... ..... ***S. nocturna*** subsp. ***capraria*** (Sommier) Peruzzi & Carta
- Seeds 0.68–0.73(–0.74) mm long, with cells of dorsal testa arranged in one (or, rarely, two incomplete) row; calyx (6.5–)8–10(–12) mm long; length of the lowest flower's pedicel (in fruit) (1–)2–7(–10) mm long..... ..... ***S. nocturna*** L. subsp. ***nocturna***

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APPENDIX 1. Specimens of *S. capraria*, *S. neglecta* and *S. nocturna* studied.

S. capraria:—ITALY. **Toscana**: Insula Capraria (Capraja), ad viam juxta portum (prope ecclesiam), 22 May 1898, *Sommier s.n.* (FI); fiorita nell'Orto Botanico di Firenze da semi raccolti il 20 maggio 1898 al M.te Castello nell'Isola di Capraia, 30 June 1899, *s.n.* (FI); fiorita nell'Orto Botanico di Firenze da semi raccolti il 22 maggio 1898 nell'Isola di Capraia al Porto, 30 June 1899, *s.n.* (FI); Insula Capraria (Capraja), in cacumine montis "Castello", 20 May 1898, *Sommier s.n.* (FI); Insula Capraria (Capraja), 27 May 1898, *Sommier s.n.* (FI); Insula Capraria (Capraja), 29 May 1898, *Sommier s.n.* (FI); Insula Capraria (Capraja), punta del Trattoio, 6 April 1896, *Sommier s.n.* (FI, lectotype); Insula Capraria (Capraja), Punta dello Zenobito, in clivis maritimis aridis, 6 April 1896, *Sommier s.n.* (FI); Insula Capraria (Capraja), punta dello Zenobito, pendici marine aride, 6 April 1896, *Sommier s.n.* (FI); Isola di Capraia (Livorno), ex Colonia Penale (UTM: 32T NN 67.67), 242 m s.l.m., 1 April 2012, *L. Peruzzi, G. Gestri s.n.* (PI).

S. neglecta:—ITALY. **Campania**: in arvis maritimis circa Persano, s.d., *Tenore s.n.* (FI, lectotype); in collibus siccis apricis...., s.d., *Tenore s.n.* (FI); Capri, s.d., *Tenore s.n.* (NAP, sub *S. neglecta* var. C); arene di Bagnoli, s.d., *Tenore s.n.* (NAP, sub *S. neglecta* var. C); *Silene neglecta* nob., s.d., *Tenore s.n.* (NAP); Astroni, s.d., Tenore *s.n.* (NAP, sub *S. neglecta* var. A); Persano, s.d., Tenore *s.n.* (NAP, sub *S. neglecta* var. A; lectotype); Portici, s.d., *Tenore s.n.* (NAP, sub *S. neglecta* var. C); **Toscana**: Toscana (Grosseto), Isola del Giglio. Cala di Pietrabona, lungo la mulattiera fino a 100 m dalla riva del mare, 20 May 1996, *Baldini s.n.* (FI); Toscana: Isola di Pianosa (Livorno), nel paese, presso il campo da tennis; procedendo verso la battigia, 22 May 1998, *Baldini s.n.* (FI); Toscana: Isola di Pianosa (Livorno), Cala Giovanna presso l'Obelisco, 25 May 1999, *Baldini s.n.* (FI); Isola di Montecristo, Vallone di Cala Maestra, versante N sotto il Colle del Segnale, 4 June 1965, *Fabbri, Bavazzano & Contardo s.n.* (FI); Isola di Montecristo, Vallone di Cala Maestra, versante N sotto il Colle del Segnale, 30 May 1965, *Fabbri, Bavazzano & Contardo s.n.* (FI); Isola di Montecristo, Poggio del Portale, rocce a NO, 30 March 1965, *Fabbri, Bavazzano & Contardo s.n.* (FI); Isola di Montecristo, spiaggia di Cala Maestra, 26 May 1964, *Fabbri, Bavazzano & Contardo s.n.* (FI); Arcipelago Toscano, Isola di Montecristo, Vallone di Cala Maestra, lungo il sentiero La Villa–Le Vasche, m. 29-100, 24 April 1974, *Paoli & Bavazzano s.n.* (FI); Vallone di Cala Maestra, sentiero tra la vigna ed il Collo dei Lecci, alt. 50-530, 2 April 1965, *Fabbri, Bavazzano, Contardo s.n.* (FI); Isola di Montecristo, parete Nord di Monte della Fortezza in una nicchia esposta a Est, 6 May 1966, *Fabbri & Tardelli s.n.* (FI); Arcipelago Toscano–Isola di Montecristo, il Belvedere, m 165 ca., 23, 27 April 1974, *Paoli & Bavazzano s.n.* (FI); Arcipelago Toscano–Isola di Montecristo, Segnale, m 100-115, 1 May 1974, *Paoli & Bavazzano s.n.* (FI); Isola di Montecristo, Vallone di Cala Maestra: nel fosso presso la villa, 1 April 1965, *Fabbri, Bavazzano & Contardo s.n.* (FI); Arcipelago Toscano–Isola di Montecristo, Colle dei Lecci m. 241-456 s.l.m., 7 May 1957, *Chiarugi & Bavazzano s.n.* (FI); Isola Montecristo (olim Oglasa), vulgata, 5 May 1898, *Sommier s.n.* (FI).

***S. nocturna*:**—ITALY. **Toscana**: Isola di Pianosa (Livorno), punta del Marchese-Porto Romano, 23 May 1998, *Baldini s.n.* (FI); Insula "Topi", 15 May 1898, *Sommier s.n.* (FI); tra Castello e la Castellina al piede de Monte Morello, presso Firenze, 24June 1890, *Sommier s.n.* (FI); ad acqueductum inter Pisa et Asciano, 3 July 1875, *Levier s.n.* (FI); Insula Elba (olim Ilva vel Aetalia), andando al Romitorio di Mon Serrato presso Porto Longone, 8 May 1898, *Sommier s.n.* (FI); Insula Elba (olim Ilva vel Aetalia), Capo della Vite, 20 June 1900, *Sommier s.n.* (FI); Insula Elba (olim Ilva vel Aetalia), Forte Falcone-Porto Terrai: haud rara, 1 May 1900, *Sommier s.n.* (FI); Insula Elba (olim Ilva vel Aetalia), colle sopra la Tonnara d'Enfola, 4 May 1900, *Sommier s.n.* (FI); Insula Elba (olim Ilva vel Aetalia), sopra Mola, sopra il tetto di una capanna abbandonata, 30 March 1900, *Sommier s.n.* (FI); Insula Gorgona (olim Urgo vel Gorgon), 1 April 1899, *Sommier s.n.* (FI); Insula Gorgona (olim Urgo vel Gorgon), 14 May 1899, *Sommier s.n.* (FI); Monte Pisano, Vicopisano (Pisa), loc. SS. Annunziata (UTM: 32T PP 21.39), sentiero roccioso, ca. 25 m s.l.m., 14 May 2010, *L. Peruzzi, B. Pierini, G. Bedini s.n.* (PI); **Lazio**: Ponza, Zannone, 5 May 1900, *Béguinot s.n.* (FI); **Calabria**: Calabria, presso Nicastro, 12 Junr 1899, *Fiori s.n.* (FI); prope Pizzo in Calabria ult., May 1877, *Biondi s.n.* (FI); in herbidis prope Pizzo in Calabria ult. prim., 2 May 1877, *Arcangeli s.n.* (FI); in herbidis secus viam prope "Scilla" in Calabria utl. 1°, 26 May 1877, *Arcangeli s.n.* (FI); Calabtia I occid. in arvis ad vias etc. circa Rhegium Julium (Reggio), 14 April 1877, *Huter, Porta & Rigo s.n.* (FI); **Sardegna**: Baunei, gariga su calcare con roccia affiorante nell'Altipiano sopra Baunei m 650, 29 May 1982, *Arrigoni & Di Tommaso s.n.* (FI); Sardegna, Cagliari Nuxis; pendici rocciose calcaree in loc. Tamaratricu, calcare paleozoico, 27 April 1985, *Arrigoni s.n.* (FI); UNKNOWN ORIGIN. Herb. Linn. No. 583.8 (LINN; lectotype).