

Nomenclatural and taxonomic notes on some *Centaurea* taxa (Asteraceae) from southern Italy

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Abstract: We studied the application of the neglected name *Centaurea leucolepis* DC., concluding, by examination of the literature and original material, that the associated taxon is *C. corensis* Vals. et Filig., endemic to Campania region (southern Italy) and introduced into Sardinia. The name by Candolle is legitimate and it is here lectotypified by a specimen kept at G. In addition, after field surveys and herbarium searches, we suggest that this taxon should be considered as a subspecies of *C. deusta* Ten., a very polymorphic species of south-eastern Europe, proposing a new combination and providing a detailed description. In addition, we provide the validation of the name *C. cineraria* subsp. *sirenium*, endemic to Sirenuse islands (province of Salerno). Finally, a new natural hybrid within *C. sect. Centaurea* (*C. montaltensis* × *C. deusta* subsp. *deusta*) is described on the basis of the diagnosis and a specimen at PI by Michele Guadagno.

Key words: Bay of Naples, Centaurinae, endemic plants, Lacaita, Mediterranean flora, Tenore

1. Introduction

Centaurea L. (Asteraceae, Centaureinae, Cardueae) is a complex genus, the systematics of which has dramatically changed during time (e.g., Susanna et al., 1995; Hilpold et al., 2014b; Garcia-Jacas et al., 2000, 2019). Even within the current circumscription, the genus is one of the largest in Asteraceae and includes about 250 species, mainly distributed in the Mediterranean region and SW-Asia with a high degree of endemism (López-Alvarado, 2011).

According to Hilpold et al. (2014b) *Centaurea* can be classified into 3 subgenera [subgen. *Centaurea*, subgen. *Cyanus* (Mill.) Cass. ex Hayek, and subgen. *Lopholoma* (Cass.) Dobrocz.], each 1 including sections and subsections. Subgen. *Centaurea* comprises 3 different informal groups: the so-called “Eastern Mediterranean Clade”, the “Western Mediterranean Clade”, and the “Circum Mediterranean Clade”. The Sect. *Centaurea*, which belongs to the “Western Mediterranean Clade” and has the highest species number in Balkans and Italy, was further divided into 3 subsections. Those of our interest are subsect. *Centaurea* and subsect. *Phalolepis* (Cass.) Garcia-Jacas, Hilpold, Susanna & Vilatersana, including

in Italy 37 and 15 native species, respectively [re-elaborated from Hilpold et al. (2014b) and PFI (2020)].

According to our data (unpublished), the subsection *Centaurea* is represented in Campania region (south-western Italy) by *C. ambigua* Guss. subsp. *ambigua*, *C. cineraria* L. (within 2 subspecies, see below), and the *C. tenorei* group [including *C. tenorei* Guss. ex Lacaita, *C. lacaitae* Peruzzi, and *C. montaltensis* (Fiori) Peruzzi]; while the subsection *Phalolepis* is represented by *C. corensis* Vals. & Filig., and *C. deusta* Ten., the only 1 in these subsections not endemic to Italy. In the framework of the study of the endemic units of this area, and in the context of the “Italian loci classici census” project (Del Guacchio, 2009; Vallariello et al., 2016; Del Guacchio et al., 2017; Iamónico et al., 2017; Gargiulo et al., 2019; Peruzzi et al., 2019), we present a second nomenclatural and taxonomic contribution for the genus *Centaurea* (Santangelo et al., 2017). In particular, we studied the little known *C. corensis*, the Campanian endemic *C. cineraria* L. subsp. *cineraria* var. *sirenium* Lacaita, and, in addition, a new intersubsectional hybrid between *C. montaltensis* and *C. deusta* Ten., all belonging to intensely studied groups (Raimondo & Spadaro, 2008; Caruso et al., 2013; Guarino et al., 2013; Domina et al., 2016, 2017).

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2. Materials and methods

This contribution moves from a review of old literature dealing with the flora of Campania [see Del Guacchio and Gargiulo (2006) for a detailed list of references]. The observations reported here are based both on field and herbarium researches. In particular, we consulted CAT, G, NAP, P, PI (herbarium codes according to Thiers, 2020), and the private herbarium of the first author (EDG), consultable at NAP. The article of the ICN cited below are referred to Turland et al. (2018). For nomenclatural purposes, we searched the following extensive databases: Euro+Med Checklist (Greuter, 2006), The Plant List (2013), and IPNI (2019). Original material and protologues of the names were also examined. For the interpretation of the handwritings, we used *Auxilium ad botanicorum graphicem* by Burdet (<http://www.ville-ge.ch/musinfo/bd/cjb/auxilium/index.php>).

The information is organized in 3 paragraphs according to the chronological order of the publication dates of the treated names, with a taxonomic overview, a description, a typification of the name (if necessary), the distribution and the proposed taxonomic treatment. The description of *C. leucolepis* is based on plants both collected in the field and cultivated near Salerno (Campania) in clay and rocky soil, at 80 m a.s.l.

3. Results and discussions

3.1. *Centaurea corensis*, *C. leucolepis*

Valsecchi and Filigheddu (1991) described *Centaurea corensis* as a narrow endemic to north-western Sardinia. However, these authors added that possibly further Mediterranean populations, previously included in *C. alba* L., could be ascribed to it. Recently, the interesting results by Hilpold et al. (2015) showed that: (a) *C. corensis* occurs not only in Sardinia, but also in Campania, in the island of Procida (Bay of Naples); (b) probably the taxon had been accidentally introduced into Sardinia by trade; (c) the species is strictly related to *C. deusta* Ten., as already stated by Valsecchi and Filigheddu (1991); (d) contrary to most representatives of subsect. *Phalolepis* (*C. deusta* included), *Centaurea corensis* is not diploid, but tetraploid ($2n = 36$).

The identification of the Procida population with *Centaurea corensis*, carried on by the latter authors by morphological, molecular, and chromosomic analyses, does not leave any doubt.

Founding on literature, we should conclude that *Centaurea corensis* is strictly endemic to Procida island, where it is indeed sympatric with *C. deusta* (Hilpold et al., 2015; pers. obs.). Nevertheless, we have evidence that the same taxon occurs in Campania also on mainland.

In fact, even if in recent times all the populations of *Centaurea* subsect. *Phalolepis* from the northern Bay of Naples have been included in the remarkable variability of *C. deusta* (Caputo, 1968; De Natale and La Valva, 2000; De Natale, 2003; Motti and Ricciardi, 2005), previous authors often reported a distinct white-flowered taxon for this area, under the misapplied names *C. alba* L. and *C. splendens* L. (Tenore, 1820; Bertoloni, 1854; Gussone, 1855; Terracciano, 1910; Lacaïta, 1922), and even *C. aplolepa* (Terracciano, 1917) (Del Guacchio et al., 2019). After examining living and dried material, we conclude that these white-flowered populations are to be referred to *C. corensis*. Their individuals, both in the wild and in cultivation, are typically erect, shortly-lived perennial herbs (sometimes biennial); but, in the most vigorous individuals, their habit becomes suffruticose, and therefore, undistinguishable from that typical of *C. corensis*. All the other diagnostic features completely concur with *C. corensis*: ovate-cylindrical heads of medium size (within the *C. deusta* group), bracts greenish, appendage with a pale or silvery spot and rounded widely scarios margins, obtuse-rounded, mucicous or with a short mucro (the upper ones), flower white rarely pinkish shaded, short pappus (Figure 1). The occurrence of the taxon on the mainland better supports the hypothesis by Hilpold et al. (2015), about the introduction into Sardinia by maritime transportation of volcanic rocks, as exchange of materials with Sardinia is well documented from the Phlaegrean Fields (Terracciano, 1917), but not from Procida island.

In addition to the above cited misapplied names, we found also a relevant binomial by Candolle (1838) indicating the plants of our interest, i.e. *Centaurea leucolepis* (Bertoloni, 1854). Candolle (1838) validly published the name providing a brief Latin description, localities (transl.: “in the countryside of Naples, Trieste, etc.”), and adding “Cent. splendens Linn. Sp. 1293 ex phrasi. Ten. fl. nap. ex specim. 1831. All. fl. ped. non Bieb.” [transl.: “[It corresponds to] *C. splendens* of Linnaeus (1763)¹, according to [his diagnostic] phrase; [to] *C. splendens* [as applied] by Tenore (1820)², according to herbarium material; [to] *C. splendens* [as applied] by Allioni (1785), [but] not by Marschall von Bieberstein (1808)]. In addition, he clarified that it was widespread in herbaria and botanical gardens under the names *C. alba* and *C. splendens*.

According to Greuter (2006), *Centaurea leucolepis* would be a synonym of *C. margaritacea* Ten., and in addition, an illegitimate name. Probably this author alludes to the inclusion by Candolle of the prior *C. splendens* among the synonyms of *C. leucolepis*, intending to apply Art. 52.2(e).

¹ The protologue of the name, however, was already published in the first edition of *Species plantarum* (Linnaeus 1753).

² It is not clear whether, with “1831”, Candolle alluded to the publication date of the 4th volume of *Flora napolitana*, including the *Sylloge*, or to the mailing date of a pertinent sample kept in his herbarium.



Figure 1. *Centaurea deusta* subsp. *leucolepis*: flowering heads (Naples, Bagnoli). Further detailed photographs at https://www.naturamediterraneo.com/forum/topic.asp?TOPIC_ID=288380

We have a different view on the matter. The most relevant passages by Candolle (1838) are: (1) at p. 568, he regarded *C. splendens* as a possible synonym of *C. leucolepis* [transl: “*Centaurea splendens*, basing on the diagnostic phrase”]; (2) at p. 569, he reported that *C. leucolepis* specimens were distributed under the names *C. alba* and *C. splendens*; (3) soon after, he hypothesized that the illustration by Clusius (1601, “*Stoebe salmantica* III”) – which is cited in the protologue of *C. splendens* (Linnaeus, 1753) and therefore, original material for the Linnaean name could be referred to *C. leucolepis*; (4) among the varieties of *C. alba*, he specified that the polynomial “*Stoebe calyculis argenteis*” by Bahuin – also cited as a further synonym of *C. splendens* by Linnaeus (1753) – is to be referred to *C. alba* var. *angustifolia* Guss.; (5) he stated that several authors, and perhaps Linnaeus himself, intended to refer to this latter plant by the name *C. splendens*; and finally (6) that the above cited illustration by Clusius could possibly refer to it. From this examination, it is rather clear that Candolle, who reliably did not see any Linnaean specimen of *C. splendens*, thought that Linnaeus included different taxa under that name (as, in fact, he did). Thus, Candolle proposed a partial identification of *C. splendens* with *C. leucolepis*, relying on the Linnaean diagnosis and tentatively on the illustration by Celsius, but dubitatively and not conclusively (cf. also at p. 612 about *Carthamus tinctorius* L.). For these reasons, we prefer to rely on Art. 52.2 – Note 1, and to regard the name by Candolle as not superfluous.

Candolle (1838) vaguely cited as syntypes of *Centaurea leucolepis* some specimens from the Kingdom of Naples. Bertoloni (1854) supposed that these specimens were sent by Tenore [cf. Candolle (1838), “Ten. fl. nap. ex specim. 1831”], but this is not really specified in the protologue. At G-DC, 2 pertinent sheets are preserved infolded under

“*Centaurea leucolepis*”: barcodes G00487254, sent by J. F. Schouw in 1832 (<https://www.villege.ch/musinfo/bd/cjb/chg/adetail.php?id=337166etbase=imgetlang=fr>), and G00487255 (<https://www.ville-ge.ch/musinfo/bd/cjb/chg/adetail.php?id=337162etbase=imgetlang=fr>), sent by G. Gussone in 1831. G00487254 is represented by a complete individual with the separate basal rosette, heads with flowers and cypselae, and an opened head. The original label, handwritten by Schouw, reports: “*Centaurea alba?* \prope Neapolim [near Naples]”. On the same label, it is annotated “M. Schouw. 1832”. G00487255 includes a single branched stem with flowers, with an opened head bearing a few cypselae and separate leaf fragments. The original label by Gussone reports “*Centaurea splendens* \Napoli | Caserta”. On the same label, the sender and the date of expedition (1831) were annotated. On another label, Candolle himself wrote “*Centaurea leucolepis* Candolle”. Both the specimens fully match the protologue and are identifiable with the same taxon of our interest, especially by their ramification, the pinnatisect cauline leaves with linear and entire lobes, the heads ovate with pale bracts and mucous, scarious appendages, the ratio between pappus and cypselae; in addition, the colour of flowers was arguably whitish or yellowish in vivo. We choose the specimen sent by Schouw, because (a) it is more complete and rich, as it includes also the basal leaves and several stems, (b) its indumentum is more typical, because the other specimen is much arachnoid-lanose and therefore whitish-green, (c) Gussone reported 2 distinct localities for a single individual, and 1 of them (“Caserta”), even if belonging to the *Ager neapolitanus* in a broad sense, is out of the presently known native range of the taxon.

Further considerations are necessary about the taxonomic rank of *Centaurea leucolepis*. On one hand, according to recent literature (Valsecchi and Filigheddu,

1991; Hilpold et al., 2015) and our observations, it can be regarded as morphologically distinct from *C. deusta*, described from Naples as well; on the other hand, individuals with intermediate features can be found, for example in Procida island, where the 2 taxa are in contact. These latter could be regarded as hybrids between 2 different species: for example, it is possible that in the past *C. deusta* and *C. leucolepis* were completely distinct and their native ranges did not overlap, before human interference, which is very heavy in these places: Motti and Ricciardi, 2005). However, it is also possible, on the contrary, that the segregation of *C. leucolepis* from *C. deusta* is still ongoing and not complete (see below). In terms of morphology, none of the diagnostic features of *C. leucolepis* seems autapomorphic. The presumed diagnostic character concerning the different indumentum, as outlined by Valsecchi and Filigheddu (1991), has not been confirmed by us in Campanian populations, where *C. deusta* s.s. shows scabrous leaves covered by short hooked trichomes, with the same sessile glands observed in *C. leucolepis*, in addition to the flexuous whitish hairs. The shape and size of capitula is notoriously very variable, whereas white-flowered individuals are not rare in *C. deusta*. The most convincing peculiar features of *C. leucolepis* are the perennial or even suffruticose habit (but see what stated above), and the combination of its usually whitish flowers with pale involucral bracts, which are also muticous or weakly mucronate. In this respect, it is to be considered that, for example, that populations near Trieste (north-eastern Italy, also included by Candolle in the protologue of *C. leucolepis*) show the same colour of phyllaries and flowers, but usually aristate bracts (P!), while other populations from Pisa (Central Italy) bear aristate bracts and purple flowers (P!), and are to be included in *C. deusta*, eventually within var. *concolor*. Note, however, that, as far as we know from his protologue and herbarium, Candolle (1838) did not personally examine other samples of *C. leucolepis* than those collected near Naples.

The tetraploid chromosome number, which could reasonably explain also the robustness and perennial habit of typical *Centaurea leucolepis*, represents an additional and relevant element to keep the 2 taxa separate. However, even if the diploid status is the rule within *C. deusta* group, some exceptions are known: for example, the endemic *C. poeltiana* Puntillo shows both diploid and tetraploid chromosome numbers (Bedini et al., 2010). Indeed, further chromosome counts in the studied area are desirable. In addition, molecular analysis by ITS sequencing fails in discriminating *C. deusta* and *C. leucolepis*, being aware that plastid heredity is not informative (Hilpold et al., 2014a, 2015). This uncertainty might possibly be caused by a too comprehensive taxonomic concept of *C. deusta*, which

indeed may encompass several taxa, but an incomplete lineage sorting is likely a better explanation (cf. Hilpold et al., 2014a). Moreover, the recent molecular results by Garcia-Jacas et al. (2019) do not support a segregation of many microspecies from a “widely defined” *C. deusta*.

In conclusion, at the present status of knowledge, it seems to us more prudent to recognize the subspecific rank for this taxon. Against this proposal, a reasonable doubt arises from the hypothesis by Hilpold et al. (2015) themselves, who regard *Centaurea leucolepis* as an allotetraploid, but detecting only one parent, i.e. *C. deusta*. However, we think that the ITS results presented by these scholars are also compatible with an autopolyploid origin of the taxon, eventually from individuals with different ribotypes.

Centaurea deusta subsp. *leucolepis* (DC.) Del Guacchio, Cennamo et P. Caputo, **comb. et stat. nov.** ≡ *C. leucolepis* DC., Prodr. 6: 568. 1838 (basion.) ≡ *C. alba* L. var. *leucolepis* (DC.) Nyman, Consp. 2: 420. 1879³.

Lectotype (designated here): Italy, Campania, “prope Neapolim”, s.d., *F.J.F. Schouw s.n.* (G-DC, barcode G00487254 [Digital image! <https://www.ville-ge.ch/musinfo/bd/cjb/chg/adetail.php?id=337166et.base=imget.lang=fr>]).

= *C. corensis* Vals. et Filigh., *Webbia* 45: 235. 1991. Holotype: Italy, Sardinia, Ossi (Sassari), Colline lungo la strada dalla Stazione di Scala di Giocca al Paese, nei pressi del bivio per Muros, calcari miocenici, 5 Nov 1988, *F. Valsecchi et R. Filigheddu* (SS).

Diagnosis-*Habitu perenni, foliis basalibus saepe crassiusculis, caulibus lineari-laciniatis, floribus albis, bracteis muticis aut breviter aristulatis, obtusis, sine macula castanea a typo valde differt.*

Description-A scapose, short-lived *perennial herb* (sometimes woody at the base or even biennial), 80–100(120) cm tall, greyish-green, scabrous, and dull especially on leaves, on account of short and hooked trichomes mixed with dark orange, sessile, deepened small glands, and some long and flexuous whitish hairs, sometimes forming a weak arachnoid indumentum. Roots thick and woody, with stem emerging from a basal rosette, withering after the fructification and substituted by a new one in autumn. Basal leaves often rather fleshy (especially near the sea), oblanceolate in outline, 25–40 cm long, more or less entire or lyrate and remotely toothed, to irregularly 2-pinnatifid, with segments from ovate-lanceolate to lacinate-linear, with angulate sinuses, apically often obtuse but with a hyaline short mucro; cauline leaves similar, but usually 1-pinnatifid and shorter with narrower segments, the upper more or less progressively entire and reduced, the uppermost ones almost surrounding the heads. Stem angulate, furrowed, much divaricately branched, especially

³ Curiously, IPNI (2019) reports for the same page; both “*Centaurea leucolepis* Ledeb. ex Nyman”, and “*Centaurea leucolepis* Ten. ex Nyman”.

in the upper half. Heads numerous, ovate or ovate-cylindrical, 10–12.5(16) mm long \times 8–14(17) mm wide, solitary or arranged in small, mostly terminal panicles of 2–3(4) elements per branch with involucre bracts first greenish and herbaceous, pubescent and glandular, with 3–5(7) somehow raised longitudinal veins, with or without a very light brown central spot, usually becoming stramineous after blooming, with lesiniform and light brownish appendage, sometimes elongated into a weak and setaceous mucro (spine) up to 1.2 mm, but laterally expanded in decurrent, scarios wings, often lacerate and inflated after anthesis, so that the appendage is overall rounded and mostly obtuse. Median bracts ovate, up to 9 \times 3.5 mm, with appendage wings decurrent up to half of its length, so that the appendage is twice as large as the bract itself or more; the upper bracts linear-lanceolate, up to 15 \times 3 mm, the inner ones narrowly linear, up to 22 \times 1 mm, with wings progressively less decurrent and wide. Flowers whitish or rarely pinkish-blushed, the radial ones (sterile) up to 30(40) mm, bilateral, with the 2 longest lobes 8–10 mm and the other 3, 4–5.5 mm, with tube 14.5–18 mm, sometimes papillose; the central (fertile) flowers with similar lobes 4.5–5 mm long and tube 11.5–12.5 mm long, swollen distally for 3.5–4.5 mm, with anthers white or less frequently pinkish and sometimes bluish-faded, ca. 10 mm long (including the apical appendages 3–4 mm long), hairy filaments ca. 1.5 mm, and style much exerted with a tuft of hairs below the stigma. *Cypselae* oblong-truncate,

laterally slightly compressed, asymmetrical, greyish and longitudinally striped on the angles, notched at one side of the base (elaiosome reduced), smooth or sometimes puberulent, 3.5–4 mm long, with a pappus of bristles, 1/3 or slightly more in length as the cypselae (Valsecchi and Filigheddu, 1991; Hilpold et al., 2015; pers. obs.).

Comparing this description with that provided by Valsecchi and Filigheddu (1991), we note that a discrepancy can be found in the head width (5–6 mm according to them); our measurements concur with those by Hilpold et al. (2015), even if late flowering heads are consistently smaller.

Chromosome number- $2n = 36$ (Hilpold et al., 2015).

Etymology-The epithet has been compounded from 2 Greek words and it means “with white bracts”, alluding to the pale colour of the phyllaries.

Distribution-Bay of Naples (Campania) from Puteoli to Naples, including Procida island. Correctly identified by Michele Guadagno (in his card index, NAP), who indicated it for some localities of the Peninsula of Sorrento (Scrajo, Agerola) as well. Probably only accidentally introduced into Sardinia and naturalized there. The known native distribution is outlined in Figure 2.

Habitat-Grassy rocky slopes, bases of rocks, sandy soils at the top of maritime cliffs (trachytic or tufaceous), hedges, usually near the sea, 0–300 m a.s.l.; found also in anthropized habitats, along track-ballasts, roadsides, and uncultivated lands.

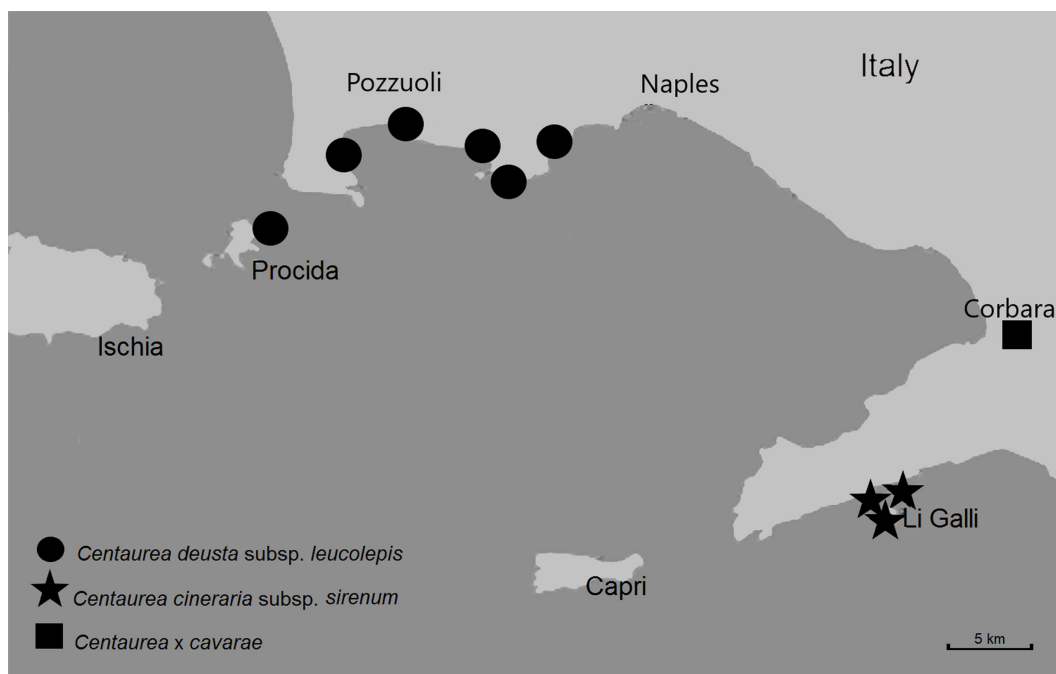


Figure 2. Distribution of *Centaurea deusta* subsp. *leucolepis* (circles), *C. cineraria* subsp. *sirenum* (star), and *C. x cavarae* (square).

Additional specimens-Italy, Campania, Naples, Bagnoli sul Covone di S. Lavisia presso il ponte, Jun 1917, *N. Terracciano s.n.* (NAP, Herb. Campi Flegrei!, sub *C. aplolepa* Moretti var. *bb*); Naples, Bagnoli alla Starza sul terrapieno della direttissima, Aug 1908, *N. Terracciano s.n.* (NAP, Herb. Campi Flegrei!, sub *C. aplolepa* Moretti var. *b*); *Ibidem*, Aug 1918, *N. Terracciano s.n.* (NAP, Herb. Campi Flegrei!, sub *C. aplolepa* Moretti var. *b*); [Naples] Fuorigrotta, *s.d.*, *N. Terracciano s.n.* (NAP, Herb. Campi Flegrei!, sub *C. aplolepa* Moretti); Napoli a Posillipo, *s.d.*, G. Gussone (P barcode P02472900 [Digital image! <http://mediaphoto.mnhn.fr/media/14413433007847uti8wTuFe fleuXY>], sub *C. splendens*); Pozzuoli, *s.d.*, M. Tenore *s.n.* (P barcode P02472887 [Digital image! <http://mediaphoto.mnhn.fr/media/14413433005419nslSc81oH7jGb2f>], sub *C. splendens*); *Ibidem*, via Italia, alla base delle tupi tufacee assolate e in ambienti ruderali, 21 Aug 2013, E. Del Guacchio et V. Fiorillo *s.n.* (*Herb. Del Guacchio!*).

Key to the subspecies of *Centaurea deusta*:

1. Usually biennial, flowers typically purple, bracts acute and mucronate, with a darker spot subsp. *deusta*

1. Short-lived perennial, flowers typically whitish, bract muticous or weakly mucronate and without a darker spot subsp. *leucolepis*

3.2. *Centaurea cineraria* var. *sirenium*

Guadagno (1913), who first visited the small Li Galli archipelago (or Sirenuse islands) facing the Coast of Amalfi (province of Salerno, Campania), gathered a remarkable morph of *Centaurea cineraria*, which was considered by him as intermediate between *C. cineraria* f. *erecta* Sommier (= *C. cineraria* subsp. *cineraria*), and *C. cineraria* var. *circae* Sommier (reported as “*C. circae* Sommier”) [= *C. cineraria* subsp. *circae* (Sommier) Cela Renz. et Viegi]. This identification was confirmed by Sommier himself (Guadagno, 1913). However, we know from Guadagno’s card index, now kept at NAP, that Guadagno later referred this population to *C. cineraria* var. *circae* (Caputo, 1962). In his reassessment of the *C. cineraria* group, Lacaita (1915) first described *C. cineraria* var. *sirenium* on plants collected by himself and Guadagno (1913), stating that it replaces the typical variety in Li Galli islands. However, he added that plants probably identifiable with *C. cineraria* var. *circae* also occur in both the archipelago and the closest mainland, together with intermediate forms between them, and between them and var. *cineraria*. Béguinot and Landi (1931), who however never collected plants in the archipelago, reported for the same area (Gallo Lungo island) both *C. cineraria* var. *circae* (“very typical”, according to some specimens examined by them), and also *C. cineraria* var. *sirenium* (this latter possibly on the basis of Lacaita, 1915). Also Caputo (1962) reported both var. *circae*, and var. *sirenium* for Li Galli. Cela Renzoni and Viegi (1974), in their comprehensive work on the

group, mentioned Lacaita’s variety, better defining some diagnostic characters, and adding that it would deserve further study (see also Viegi and Cela Renzoni, 1990). Later, Pignatti (1982) reported the taxon following the treatment by Lacaita. Pignatti and Iamonico (in Pignatti, 2018) proposed the subspecific rank for this taxon, adding that it would be doubtful according to Greuter and von Raab-Straube (2008). However, these latter authors did not mention it, mentioning instead *C. cineraria* subsp. *circae*.

The combination by Iamonico and Pignatti (Pignatti, 2018) is not validly published according to Art. 41.5 and Art. 7.11. After a detailed consultation of relevant literature, we could not find any proposed valid combination for Lacaita’s variety. For this reason, the combination is again formally proposed below. Interestingly, as already noted for other taxa described by Lacaita (Santangelo et al., 2017), the epithet appearing on Lacaita’s sheet is slightly different from the one published: in this case, we found “sirenarum” (= of the sirens) in his herbarium, based on the late Latin “*sirēna*”. Also, for this reason, we have no doubt that Lacaita intended to use the plural genitive with the capitalized initial, as already Sommier did for the similar *C. cineraria* var. *circae* (= of the witch Circe). Later, Lacaita decided to adopt the classic Latin “*sirēn*”, the plural genitive of which, however, is “*sirēnum*”, not “*sirenium*”. The related adjective “*sirēnius -a -um*” would sound “*sirenia*”, to make it agree in sex, number, and case with *Centaurea*. Therefore, according to Art. 60.1, the epithet must be corrected into “*sirenium*”.

Lacaita (1915) published the name *Centaurea cineraria* var. “*sirenium*” with a detailed Latin diagnosis, a taxonomic discussion in Italian, and the indication of some localities. In addition, he contextually published a photograph of a pertinent specimen from his herbarium, so simultaneously providing an illustration, which is original material, and indicating a syntype, i.e. the specimen itself, which is preferred material for lectotypification (Art. 9.12). This syntype is preserved at BM (barcode BM001043186) (Figure 3), together with other original material collected by Lacaita in the same year (barcodes BM001043184, BM001043185, BM001043187, BM001043188). Obviously, the syntype, which is represented by a complete individual with overripen heads, perfectly concurs with the protologue in terms of gathering data and morphology. In detail, we can observe the reduced height of the plant, the marked heterophylly and the weakly lanuginose indumentum, which are all typical features of the taxon.

This taxon appears to be morphologically similar to both *Centaurea cineraria* subsp. *cineraria* and *C. cineraria* subsp. *circae*. However, as pointed out by Cela Renzoni and Viegi (1974), the basal leaves can be pinnatifid, pinnately lobate or lyrate. On the other hand, the cauline leaves are



Figure 3. Lectotype of *Centaurea cineraria* subsp. *sirenum* (BM001043186, by permission of the curator).

remarkably 2- or 3-pinnatifid in the type material, and Lacaita (1915) gave a great importance to this feature (see also Pignatti, 2018). In this way, the frequent sympatric individuals with upper pinnate leaves, not evidently heteromorphic, were attributed to *C. cineraria* subsp. *circae* by almost all the previous authors (Guadagno, 1913; Béguinot and Landi, 1931; Caputo, 1962), including Lacaita (1915, 1917) himself. However, as already noticed by this latter author, the segments of *C. cineraria* subsp. *circae* are more rounded and larger (see Lacaita, 1915; Sommier, 1894). Cela Renzoni and Viegi (1974) observed that the ciliate appendages of the phyllaries are long-ciliate and darker in *C. cineraria* subsp. *circae*, but narrow and pale-brownish in *C. cineraria* var. *sirenium*. However, we suspect that these features might be determined by the late season, as flowering individuals of the latter taxon are not available in herbaria, not even that reported by Viegi and Cela Renzoni (1990). For this reason, we did not report the appendages of bracts as a diagnostic character.

According to Cela Renzoni and Viegi (1974), the indumentum would be very similar to that of *Centaurea cineraria* subsp. *circae*, but our observations concur with those by Lacaita (1915). Indeed, *C. cineraria* subsp. *cineraria* is typically niveo-tomentose but often less hairy individuals occur; *C. cineraria* subsp. *circae* is niveo-tomentose, while *C. cineraria* subsp. *sirenium* is less densely hairy and greyish-tomentose. However, also this character somehow varies seasonally (obs.). Therefore, we prefer not to include either this or the previous character in the key or diagnosis.

We agree with Cela Renzoni and Viegi (1974) in stating that the 2 taxa were often confused, and therefore, we reassess that *C. cineraria* subsp. *circae* is limited to southern coasts of Latium (see e.g., Pignatti, 2018), while the taxon of our interest is endemic to Li Galli (with similar individuals on the nearby coast).

For the purpose of consistency, we repropose the treatment by Pignatti (2018) and formally raise *Centaurea cineraria* var. *sirenium* to the same rank of *C. cineraria* subsp. *circae*. Our treatment provides a more convincing biogeographic repartition of infraspecific taxa of *C. cineraria*, with *C. cineraria* subsp. *sirenium* not directly connected to *C. cineraria* subsp. *circae*, both weakly differentiated as local races from *C. cineraria* subsp. *cineraria*. Otherwise, a presumed intermediate between *C. cineraria* subsp. *circae* and *C. cineraria* var. *sirenium* would be difficult to explain. According to Del Guacchio et al. (2003), neoteny may have played an important role in differentiating isolate populations in rather recent times, in our opinion especially in very selective habitats.

Centaurea cineraria* subsp. *sirenium (Lacaita) Pignatti & Iamonico ex Iamonico et Del Guacchio, **comb. et st. nov.** \equiv *C. cineraria* var. *sirenium* Lacaita, Nuovo Giorn. Bot. Ital., n. s. 22: 242. 1915 (as "*Sirenium*") (basion.)

Lectotype (designated here): Italy, Campania, Salerno Province, Isola del Gallo Lungo, 08 Oct 1909, *C. Lacaita 12210* (BM barcode BM001043186 [Digital image! <https://data.nhm.ac.uk/dataset/collection-specimens/resource/05ff2255-c38a-40c9-b657-4ccb55ab2feb/record/1987803>]; isoelectotypes BM barcodes BM001043184 [Digital image! <https://data.nhm.ac.uk/object/27cb2031-d273-4660-88f8-ae38e0b1bd02/1574640000000>], BM001043185 [Digital image! <https://data.nhm.ac.uk/object/9d4b4fd8-56f0-4ba1-a200-440a49c7fd8a/1574640000000>], BM001043187 (3 basal rosettes) [Digital images! <https://data.nhm.ac.uk/object/b7025ccf-5c5b-448d-9d3a-d1e144392d2f/1574640000000>], and BM001043188 (1 basal rosette) [Digital image! <https://data.nhm.ac.uk/object/b6666627-25d5-47b0-abf6-a319f5ed141d/1574640000000>]).

Diagnosis—*A typo statura nonnihilo minore, foliis inferioribus simpliciter pinnatis non duplo-pinnatifidis differt. A subspecie circae laciniis remotis linearibus apice obtusis non ovatis differt.*

Description—Scapose, erect-ascending *perennial herb*, 30–35 cm tall, grey-tomentose, branched. Basal leaves whitish arachnoid-tomentose on the abaxial surface, sparsely floccose and therefore, more or less greyish-green on the adaxial surface, lanceolate or oblanceolate in outline, often lyrate, up to 20 cm long and 5–6(–10) cm wide, 1-pinnatisect or pinnatifid, not overlapping, with narrow ovate-lanceolate segments, sometimes lobed, rounded at the apex; the cauline leaves similar to the basal ones but gradually or abruptly reduced and with lateral segments linear-lanceolate, 1- or 2-pinnatifid. Branches of the stem angled, acutely divergent, simple, about 10 cm long, usually leafless, each bearing a single terminal head subtended by 2–4 small and simple leaves. Heads ovate, cup-shaped in fruiting time, glabrous, 20–25 mm wide, the outer ones ovate, up to 7 mm long and 4–5 mm wide, the other increasingly longer (up to 10 mm long), with appendage about 1.5–2 mm long, decurrent, brown, with cilia up to 0.8 mm long). *Cypselae* oblong, about 2 mm long, with a pappus of bristles, about as long as the cypselae.

Notes on the description: The description is only based on plants gathered in autumn.

Chromosome number— $2n = 18$ (Viegi and Cela Renzoni, 1990).

Etymology—The epithet alludes to the alternative and more ancient name of the archipelago where the plant occurs, i.e. "Sirenuse", connected by Strabo and Vergilius to the myth of the sirens.

Habitat—Maritime calcareous cliffs up to 50 m a.s.l.

Distribution—Taxon exclusive to the islets of Li Galli (Gallo Lungo, Rotonda, Castelluccia), with similar forms on the facing Coast of Amalfi (Conca de' Marini!) (Figure

2). (See Cela Renzoni and Viegi (1974) for the distribution of the 3 subspecies of *C. cineraria*).

Additional specimens-Italy, Campania, Salerno Province, “Insula il Gallo Lungo dicta”, Isola del Gallo Lungo dicto” (Gruppo delle Sirene), Jul 1914, *C. Lacaita* s.n. (P barcode P04095669 [Digital image! <https://science.mnhn.fr/institution/mnhn/collection/p/item/p04095669>, sub var. *circae*); Campania, Bay of Salerno: “in Sirenarum insula il Gallo lungo dictam in rupibus calcarei maritimis, 21 July 1914, *C. Lacaita* (PI!, sub var. *circae*); dupl.: CAT barcode 000988 [Digital image!].

Key to the subspecies of *Centaurea cineraria*

1. Basal leaves 2-pinnatifida subsp. *cineraria*

1. Basal leaves simply pinnatifide 2

2. Cauline leaves always 1-pinnatifida, with ovate-rounded and overlapping segments. Endemic to the Gulf of Gaeta (Latium) subsp. *circae*

2. Cauline leaves 1- or 2-pinnatifida, with segments not overlapping and linear, with obtuse apex. Endemic to Sirenuse islands (Campania) subsp. *sirenium*

3.3. *Centaurea* × *cavarae*

In a recent paper, Santangelo et al. (2017) treated the nomenclature of the taxonomically difficult group of *Centaurea tenorei* Guss. ex Lacaita (1922) (Asteraceae), endemic to the Peninsula of Sorrento (Campania, southern Italy) and nowadays regarded as constituted by 3 microspecies: *C. tenorei*, *C. montaltensis*, and *C. lacaitae* (Peruzzi, 2008). On the basis of morphological, cytological, and distributive elements, the authors speculated that part of the variability observed in the group could be attributed to complex hybridation phenomena involving *C. cineraria* L., and, at a minor extent, *C. deusta* Ten. (cf. also Lacaita, 1922). During the researches carried on to better elucidate the systematics of the group, we actually found evidence of a cross between a population attributable to *C. montaltensis* and *C. deusta*, in some individuals sympatric with both parents. These plants with obvious intermediate features were found in the southern versant of the Peninsula (Salerno province) by Guadagno (1932). This scholar, in fact, reported some intermediates between “*C. dissecta*” (a misapplied name for *C. tenorei* s.l.) and *C. deusta*, intending to describe it later in his comprehensive work on the flora of the Peninsula of Sorrento. Unfortunately, only the first parts of this valuable monography were actually published (A. Béguinot in Guadagno, 1931), but the data serving for its preparation were annotated by Guadagno in his card-index, where we found useful information.

As the Compositae were to be treated in the successive parts of the *Flora*, Guadagno did not have time to validly publish the name of the nothotaxon. In fact, Guadagno (1932) merely provided the hybrid formula, which does not constitute a valid publication of a nothospecies name (Art. H.10: Turland et al., 2018). However, an inedited name

can be found in Guadagno’s herbarium, preserved at PI. In this collection, we found 2 relevant specimens. Guadagno compiled detailed labels with several study notes, also indicating the inedited name that we would like to employ for this hybrid. Both sheets bear a mature individual and are stamped with an inventory number associated to the herbarium of Guadagno, i.e. “2922”. On the sheet of the first specimen, Guadagno reported “Credo ibrido tra *Centaurea deusta* Ten. [...] e *dissecta* Ten. [...] | *Centaurea cavarae* mihi nominanda” (transl.: “I believe [that this is] a hybrid between *C. deusta* Ten. [...] and *C. dissecta* Ten. [...], to be named by me *C. cavarae*”). Only the second specimen shows also a few flowers. In addition, it bears a label with the details of the gathering. Guadagno reported in pen: “*Centaurea* | Torre di Chiunzo | 7.VI.1908”.

This hybrid can be identified on account of its heads, whose phyllaries are mostly ciliate, but sometimes partly or completely entire with a central spine and large scarious wings (Figure 4); its hairiness and leaf consistence are very similar to that of *Centaurea deusta* subsp. *deusta*, but the habit resembles the *C. tenorei* group. The presumed hybridation between *C. cineraria* and *C. tenorei* group would result in a complex scenario of introgression and very local isolation, considering that the morphological features continuously intergrade and independently segregate within the various populations (Santangelo et al., 2017). On the contrary, the hybrids between *C. deusta* and *C. tenorei* group appear as rather “rough” intermediates, bearing on the same individual, and even in the same heads, involucre bracts similar to those of *C. deusta*, or to those of *C. tenorei* group, as already observed by Guadagno (1932). This would suggest that these are possibly F1, and therefore, introgressive crosses should be improbable events, as otherwise suggested by the fact that most of the heads are sterile. In addition, we only once were able to find again this natural hybrid in our field-surveys. Actually, while *C. cineraria* and *C. tenorei* s.l. are regarded as belonging to the same subsect, *Centaurea*, *C. deusta* is included in subsect. *Phalolepis*. Thus, the poor parental affinity could explain the rarity of the cross and therefore of *C. ×cavarae*, which is, obviously, geographically restricted to the native range of *C. montaltensis*, endemic to the Peninsula of Sorrento. In fact, *C. deusta* is essentially an amphi-Adriatic taxon (Greuter, 2006). However, we suppose that hybrids with *C. tenorei* group may be more frequent than expected, considering that *C. deusta* frequently occurs in the area. In terms of ecology, *C. deusta* in Campania grows from the sea level up to 1700 m of elevation in several open and sometimes disturbed habitats, preferring arid pastures, rocky meadows, and the base of the cliffs. On the contrary, *C. tenorei* group is limited to rocky calcareous places, especially dolomitic cliffs. In the *locus classicus*, both parents are common (*C. montaltensis* on the cliffs; *C. deusta*



Figure 4. Head of *Centaurea* × *cavarae* with heteromorphic bracts (NAP, by permission of the director). Left below: head of *C. montaltensis* (BM, barcode BM001043207, by permission of the curator). Right below: head of a specimen of *C. deusta* gathered in the Peninsula of Sorrento (PI, by permission of the curator). Bar equals to 5 mm.

at their base, on roadsides, and slopes) and their blooming time overlap; the hybrid was found on rocky slopes in late June. Finally, it is interesting to note that one of the hypothesized parents, i.e. the tetraploid *C. montaltensis*, is very likely a taxon of hybrid origin itself (*C. cineraria* × *C. tenorei*), and further studies could reduce it and *C. lacaitae* in synonymy.

Centaurea × *cavarae* Guadagno ex Del Guacchio, Cennamo et P.Caputo (= *C. deusta* × *C. montaltensis*), **nothosp. nov.** – Figures. 4, 5

Holotype: Italy, Salerno, Corbara, Valico di Chiunzi, “Torre di Chiunzo”, 7 Jun 1908, *M. Guadagno* 2922 (PI!).

Diagnosis-A *Centaurea montaltensis* capitulis partim cum bractearum appendicibus scariosis sine ciliis, foliolis



Figure 5. Holotype of *Centaurea* × *cavarae* (PI, by permission of the director).

lanceolato-ovatis, indumento lanuginoso destituito recedit; a C. deusta capitulis partim albescentibus aut brunneis ciliatis, atque habitu suffruticoso differt (see Table 1).

Description-Scapose, ascending perennial herb, 35–50 cm tall, green-greyish, glabrescent, scabrous, loosely, and

divaricately branched from the woody base. Basal leaves lanceolate in outline, up to 15 cm long and 4–7 cm wide, 1-2-pinnatisect, with lanceolate-ovate segments, rounded or shortly mucronate at the apex, and usually ovate sinuses, mostly withered at the anthesis; the cauline leaves gradually

Table 1. Morphological comparison between *C. montaltensis* (Fiori) Peruzzi, *C. deusta* Ten. subsp. *deusta*, and *C. × cavarae* hybr. nov.

	<i>Centaurea montaltensis</i>	<i>Centaurea deusta</i> s.s.	<i>Centaurea × cavarae</i>
Habitus	Perennial, suffruticose	Biennial	Perennial, somehow woody below
Leaf surface	Greyish and weakly tomentose	Green or greyish-green	Greyish-green
Basal leaf segments	Mostly linear-lanceolate	Variable, but mostly ovate-lanceolate	Ovate-lanceolate
Bract appendages	Divided into long whitish cilia	Entire or lacerate after anthesis but without cilia	With distinct whitish cilia in many heads, otherwise only entire or lacerate

reduced and normally simply pinnate with segments divergent at 90°. Branches of the stem angled, acutely divergent, simple or with a lateral branch in turn, up to 20 cm long, scarcely leaved, each bearing a head subtended by 0–3 small and almost simple leaves. The branches are slightly enlarged above the heads after anthesis. Heads ovate, cup-shaped when in fruit, and glabrous, 14–18 (27) mm wide, with stramineous and parallelinerved phyllaries (the outer ones ovate, up to 3 mm long and 2 mm wide, the other increasingly narrower up to linear, 5 mm long and up to 2 mm wide), with hyaline wings and ending in a decurrent and black spotted appendage. The appendage can be entire to lacerate, or completely fimbriate with whitish to brownish cilia longer than the width of the bract and apex less developed (often the 2 types occur in the same head). Flowers pink-purple, 10–14 mm long, divided in limbs up to the half with linear tube, the radial ones (sterile) up to 20 (25) mm, bilateral, with the 2 longest lobes, 7–9 mm and the other 3, 5–5.5 mm; the central (fertile) flowers with similar lobes 3.5–5 mm long and tube 8–10 mm long, swollen distally for 2–2.5 mm, with anthers white 8–10 mm long (including the apical appendages lilac and ca. 3–4 mm long), hairy filaments ca. 1.5 mm, and style hidden in the anther tube, with a tuft of hairs 0.8–1 mm below the stigma. *Cypselae* oblong-truncate, laterally slightly compressed, asymmetrical, greenish to grey, longitudinally striped

on the angles, notched at one side of the base (elaiosome reduced), smooth, 3 mm long, with a pappus of bristles, approx. 1/2 in length as the cypselae; anthers 3 mm long.

Chromosome number-Unknown. One of the parents, i.e. *C. montaltensis*, was found to be tetraploid ($2n = 36$) (Peruzzi, 2008), while the other one, i.e. *C. deusta* is normally diploid (see above).

Etymology-Dedicated by Michele Guadagno to his friend Fridiano Cavara (1857–1929), director of the Botanical Garden of Naples at that time.

Habitat-Grassy, rocky slopes at 600–650 m a.s.l.

Distribution-Valico di Chiunzi (Lattari Mounts, Campania) (Figure 2). This hybrid is at present detected only in its *locus classicus*, but very likely occurs elsewhere. However, as one of the parents, i.e. *C. montaltensis*, is endemic to the Peninsula of Sorrento (Santangelo et al., 2017), it presumably cannot be found outside this area.

Additional specimens-Italy, Salerno, Corbara, Valico di Chiunzi, near the road, grassy slopes, 600 m a.s.l., 15 June 2016, E. Del Guacchio et P. Cennamo s.n. (NAP!).

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