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Limonium artelariae (*Plumbaginaceae*), a new endemic species and further taxonomic and floristic notes on the genus in the island of Crete

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Abstract: Some amendments of our knowledge of the taxonomically complex genus *Limonium* (*Plumbaginaceae*) in Crete, Greece are presented, based on field work and morphological study of herbarium specimens, including types. The circumscriptions of the closely related Cretan endemics *L. cornarianum* and *L. hierapetrae* are clarified. The former species is actually restricted to the type population in Moni Kapsa (SE Crete) and a newly found population in Pacheia Ammos (NE Crete). The latter species comprises populations in SE Crete that extend from Moni Kapsa to Dermatos, and also includes the populations previously assigned to *L. chrisianum* and *L. minoicum* that are found to be conspecific. *Limonium artelariae* from SE Crete, similar and related to *L. cornarianum* and *L. hierapetrae*, is described as a new species. It is rather unique among Greek *Limonium* species for its height (up to 110 cm tall) and its large, broadly spathulate leaves. *Limonium cythereum* previously known from the islands of Kythira and Antikythira is newly recorded for Crete, represented by two populations in NW Crete. The report of *L. fragile* from Crete is found to be erroneous, based on misidentified material of *L. virgatum*. All accepted taxa are described, and their types, chromosome number or ploidy level, distribution and ecology are also indicated. Photographs, distribution maps and an identification key are added to facilitate further identification.

Keywords: Aegean, Crete, Greece, *Limonium*, *Limonium artelariae*, *Limonium cornarianum*, *Limonium cythereum*, *Limonium hierapetrae*, Mediterranean endemics, new species, *Plumbaginaceae*, species circumscriptions, taxonomy

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Introduction

Limonium Mill., comprising c. 600 species (Koutroumpa & al. 2018) is distributed worldwide (except Antarctica) and is by far the most species-rich and widespread genus in *Plumbaginaceae*. Its centre of diversity is the Mediterranean region, where c. 70% of the species occur, most of them local endemics of coastal habitats. The high species diversification of *Limonium* in the Mediterranean has been attributed to the combined effects of geoclimatic changes (i.e. the Messinian Salinity Crisis, the onset of the Mediterranean climate and the Plio-Pleistocene sea-level fluctuations) and its asexual reproduction via apomixis, according to recent macroevolutionary analyses (Koutroumpa & al. 2021). The occurrence of sexual and asexual reproduction and the ubiquity of hybridization and polyploidy in the Mediterranean species account for the notorious taxonomic complexity in *Limonium* (Pignatti 1971, 1972; Erben 1979; Cowan 1998; Lledó & al. 2005, 2011). In such a genus, the clarification of species boundaries is often a very difficult task (Richards & al. 1996; Lledó & al. 2011).

Greece, with 86 currently accepted species (Valli & Artelari 2015; Brullo & Erben 2016), is the second most species-rich country for *Limonium* after Spain (c. 100 species, excluding Baleares; Domina 2011+). Most of the Greek *Limonium* species, namely 79 out of 86, are endemics. Over the past 45 years, several studies have considerably increased the number of species reported for the country (e.g. Papatsou & Phitos 1975; Artelari 1989a; Kypriotakis & Artelari 1998; Artelari & Kamari 1995, 2000; Artelari & Georgiou 1999; Brullo & Guarino 2000; Crespo & Pena-Martín 2013; Valli & Artelari 2015; Brullo & Erben 2016). In their review of the genus in Greece, Brullo & Erben (2016) alone almost doubled the number of previously known species by adding 39 species new to science, mostly from the Aegean archipelago. The Aegean species are characterized by high ploidy levels (e.g. tetraploidy, pentaploidy and hexaploidy) and apomictic reproduction (Artelari 1989a, 1989b, 1989c, 1992; Artelari & Georgiou 1999, 2000, 2003; Crespo & Pena-Martín 2013).

Crete is the island with the highest number of *Limonium* species in the entire E Mediterranean (see, e.g.,

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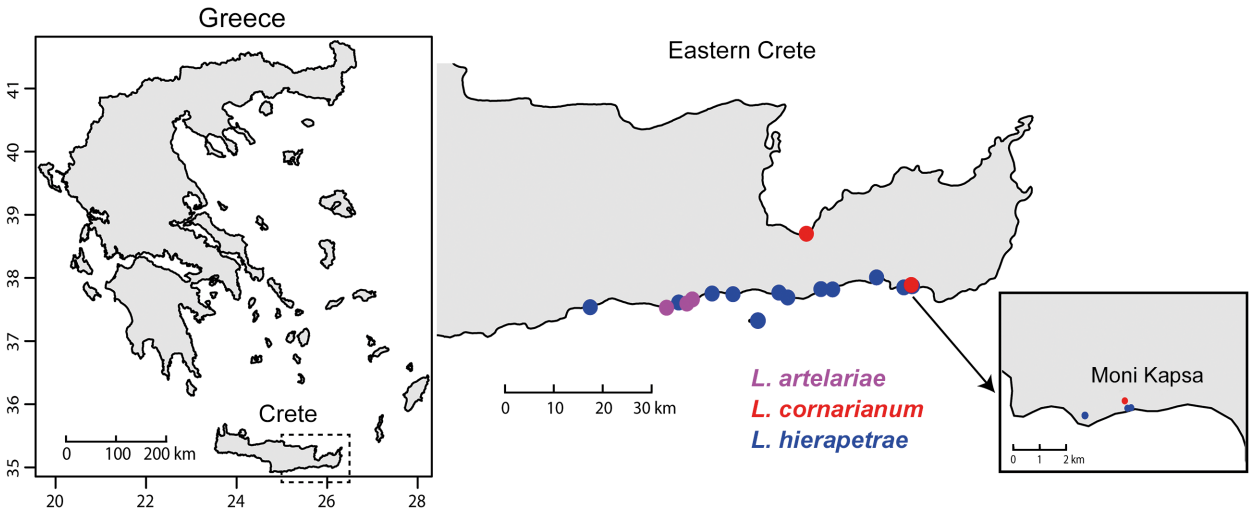

Fig. 1. Distribution map of the closely related studied *Limonium* species in E Crete: *L. artelariae*, *L. cornarianum* and *L. hierapetrae*.

Kouzali & al. 2012; Brullo & Erben 2016). It is home to 26 *Limonium* species, 11 of which are narrow endemics restricted to the Cretan coast and its offshore islets (Brullo & Erben 2016). As part of a systematics study of *Limonium* focusing on Crete and adjacent islands (S Aegean island arc), extensive field surveys (2014–2018) were conducted, and the material evaluated. The resulting new insights into the taxonomy of the genus in Crete are provided here, including the description of a species new for science.

Material and methods

Fieldwork was conducted in Crete and adjacent islands (Chrysi, Gavdos, Karpathos, Kythira and Antikythira) during three visits from 2014 to 2018, and populations of *Limonium* species were recorded and collected. The field survey was particularly intensive on the island of Crete in order to cover the taxonomic and morphological variability of the genus. Herbarium specimens are deposited in the herbarium Z and duplicates in B (herbarium codes after Thiers 2023+). The current study is based on the investigation of the herbarium specimens from that fieldwork and other specimens in the herbaria B, C, FR, M, MSB and UPA, including type specimens. Fieldwork observations and detailed morphological studies of specimens informed species circumscriptions and taxonomic classifications, which were further backed up by the results of a phylogenomic study by Koutroumpa (2020).

Distribution maps were created using the R package "maps" (Becker & al. 2018; R Development Core Team 2019). Pollen and stigma type combinations of eight individuals of *Limonium* from two localities (Vatos and Kallikovrechtis) were examined in distilled water under an Olympus CX31 microscope (Olympus, Germany). Whether the population is monomorphic or dimorphic in terms of stigma-pollen floral types and whether the stigma-pollen combinations are self-incompatible (combinations A and B sensu Erben 1978) or self-compatible (combinations C and D sensu Erben 1978) could indicate the reproductive system (i.e. sexual [outcrossing or selfing] or asexual [apomictic]) of *Limonium* in the two aforementioned localities. In addition, a preliminary flow cytometry analysis (protocol by Temsch & al. 2010 with minor adjustments) was performed to estimate the genome sizes of *L. cornarianum* Kypr. & R. Artelari and the morphologically distinct *Limonium* in Vatos and Kallikovrechtis and compare them to the genome-size estimates of the triploid *L. virgatum* (Willd.) Fourr. ($2n$ = 3x = 27; Artelari & Georgiou 2003), the tetraploid *L. aegaeum* Erben & Brullo ($2n$ = 4x = 34; Brullo & Erben 2016), the pentaploid *L. sitiacum* Rech. f. ($2n$ = 5x = 43; Brullo & Erben 2016) and the hexaploid *L. creticum* R. Artelari ($2n$ = 6x = 61; Artelari 1989b), aiming at inferring their ploidy level. One plant per species collected from the wild and grown at the greenhouse of the Botanical Garden of Zurich was measured, except for the morphologically distinct *Limonium* in Vatos and Kallikovrechtis for which two plants grown from seeds of wild origin, one plant from each locality, were measured. *Pisum sativum* "Kleine Rheinländerin" (1C = 4.42 pg; Greilhuber & Ebert 1994) was used as reference, and all measurements were done in a Cyflow Space (Sysmex-Partec) flow cytometer.

Results and Discussion

The extensive fieldwork in Crete, combined with the morphological examination of several *Limonium* specimens and a comprehensive literature survey, highlighted some issues in the current classification of morphologically related *Limonium* species in SE Crete, and revealed the existence of a new undescribed endemic species. In addition, few species records for *Limonium* in Crete are updated.

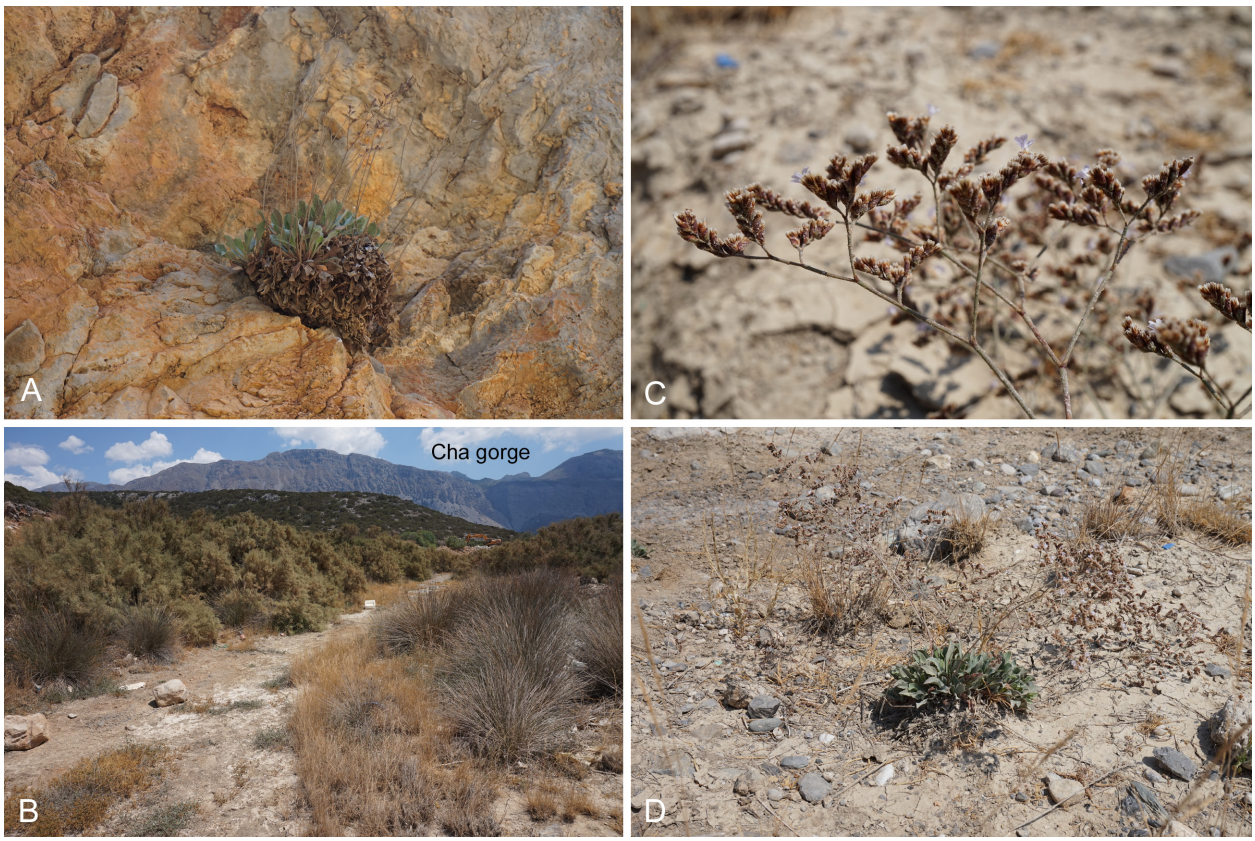

Fig. 2. *Limonium cornarianum* – A: individual growing on steep calcareous cliffs at the gorge of Moni Kapsa (locus classicus); B: habitat in Pacheia Ammos (new locality) with the Cha gorge in the background; C, D: inflorescence and habit of an individual in Pacheia Ammos. – All photographs taken by and © Konstantina Koutroumpa.

The circumscription and distribution of *Limonium cornarianum*

In the area of Moni Kapsa (Fig. 1), the narrow endemic *Limonium cornarianum* was originally described by Kypriotakis & Artelari (1998) from the calcareous rocks below the Kapsa monastery and the nearby gorge (named Moni Kapsa or Perivolakia gorge) that has an opening to the coast. Along the gorge, the species grows in crevices of steep cliffs (Fig. 2A) up to a distance of 1.5 km from the seashore (Kypriotakis & Artelari 1998). Later collectors (see e.g. specimens in Brullo & Erben 2016 and photos in Kypriotakis & Artelari 2009) have assigned also *Limonium* plants from the coastal habitats of Moni Kapsa to *L. cornarianum*. During our fieldwork, we observed that the individuals growing along the coast (Fig. 3) were morphologically different from the ones inside the gorge. The coastal populations fit the description of *L. hierapetrae* Rech. f. that has a wider distribution in SE Crete (Rechinger 1943; Artelari 1989c). These observations were verified by (1) morphologically examining and comparing specimens from Moni Kapsa and the surrounding areas, including the type material of *L. cornarianum* and *L. hierapetrae*, and (2) analysing samples from the Moni Kapsa gorge and the coast (Kapsa beach) in a phylogenomic study that revealed their placement in different highly supported clades (Koutroumpa 2020). The sample representing the coastal population is nested in the well-supported *L. hierapetrae* clade (Koutroumpa 2020). The confusion of the *L. hierapetrae* samples from Kapsa beach with *L. cornarianum* explains the significant differences between the species description given by Brullo & Erben (2016: 101) and the protologue of *L. cornarianum* by Kypriotakis & Artelari (1998: 144). Brullo & Erben (2016) did not see the holotype of *L. cornarianum* and assigned further populations growing along the coast from Ierapetra to Moni Kapsa to *L. cornarianum* (see, e.g., B [B 10 1189131]), which explains the much wider geographical distribution given by these authors for *L. cornarianum* that clearly overlaps with the known range of *L. hierapetrae*. In addition, the chromosome number $2n = 43$ given for *L. cornarianum* (Brullo & Erben 2016) from material collected in Moni Kapsa matches the chromosome number of the pentaploid *L. hierapetrae* ($2n = 43$, Artelari 1989c), whereas *L. cornarianum* is triploid according to our initial studies (see below). The material used for the chromosome counts by Brullo & Erben (2016) was most probably collected from the coast and belongs to *L. hierapetrae* (see B [B 10 1132915]). Taken together, in the area of Moni Kapsa both *L. cornarianum* and *L. hierapetrae* co-occur (Fig. 1) but occupy rather distinct habitats: *L. cornarianum* is restricted to crevices

Fig. 3. *Limonium hierapetrae* growing on gravely soil at the coastal area of Moni Kapsa (Crete), habit and inflorescence. – All photographs taken by and © Konstantina Koutroumpa.

of calcareous rocks (Fig. 2A) and *L. hierapetrae* grows on the nearby pebbly beach (Fig. 3) and in the maritime calcareous cliffs next to the beach. The two species can be easily distinguished by their different leaf shape (Fig. 4B, C) and the smaller spikelets, spikelet bracts and calyces of *L. cornarianum* compared to *L. hierapetrae* (Table 1).

Until now, *Limonium cornarianum* was known only from its locus classicus (Moni Kapsa) in SE Crete, where it is rare, comprising only few individuals (Kypriotakis & Artelari 1998, 2009). The fieldwork in Crete revealed a new population of *L. cornarianum* in the NE part of the island (Fig. 1, 2B–D). The population is geographically and ecologically distinct from the one in Moni Kapsa and located at the E edge of Pacheia Ammos cove in a dry salt-marsh habitat (Fig. 1, 2B). Only few individuals (c. 10) were found, occupying a small area that seems to be seasonally flooded and is the mouth of a stream that runs through the gorge of Cha, which is located about three kilometres from the seashore (Fig. 2B). Because *L. cornarianum* is a chasmophyte of steep, usually inaccessible cliffs free of other vegetation in its locus classicus, it could be assumed that the species might also occur inside the Cha gorge and that the population in Pacheia Ammos was formed by seeds washed down the stream that runs through the gorge. Cha is a narrow inaccessible gorge with high vertical cliffs and chasmophytic vegetation that is botanically not well explored because its passage requires canyoning expertise. The individuals of the newly found population in Pacheia Ammos undoubtfully represent *L. cornarianum* (Fig. 2C, D). They are morphologically indistinguishable and form a well-supported monophyletic group in the phylogeny with individuals from the type locality (Koutroumpa 2020). In addition, preliminary flow cytometric data of *L. cornarianum* from Pacheia Ammos indicate that the species is likely a triploid. Specifically, the 1C genome size of *L. cornarianum* is 2.37 pg, which is comparable to the genome size of the triploid *L. virgatum* (1C = 2.61 pg) and considerably smaller than the tetraploid *L. aegaeum* Erben & Brullo (1C = 3.15 pg) and the pentaploid *L. sitiacum* Rech. f. (1C = 3.52 pg). A triploid chromosome count is also found in *L. aphroditae* R. Artelari & Georgiou, an endemic in Kythira island that represents the closest morphological relative of *L. cornarianum* (Artelari & Georgiou 1999). Both species constitute a distinct morphological group compared to the other Aegean *Limonium* species, characterized by its small spikelet traits and sharing similarities with the C Mediterranean *L. minutiflorum* group that includes triploid and tetraploid taxa (Artelari & Georgiou 1999). The close relationship of *L. cornarianum* and *L. aphroditae* was further supported by phylogenomic data (Koutroumpa 2020).

The circumscription of *Limonium hierapetrae*

Limonium hierapetrae was described by Rechinger (1943) from a sandy beach next to Ierapetra in SE Crete. This endemic species was later found in a further five localities between Makrygialos and Nea Myrtos in the same wider area by Artelari (1989c), who studied the bio-

systematics of the species, recorded its morphological variation and provided a detailed species description. Brullo & Erben (2016) described *L. minoicum* Erben & Brullo as a new species from SE Crete occurring between Tertsa and Tsoutsouros, a few kilometres W of the then known distribution of *L. hierapetrae*. According to the authors, the new species differs from *L. hierapetrae* by its shorter floral spikelets, inner bracts and calyces. However, Brullo & Erben (2016) gave a different description for *L. hierapetrae* than the one previously published by Artelari (1989c). Specifically, the measurements given for the sizes of leaves, spikes, spikelets, bracts and calyces by Brullo & Erben (2016) were only a subset of the size ranges given for *L. hierapetrae* by Artelari (1989c), namely the upper size ranges were assigned to *L. hierapetrae* and the lower size ranges were assigned to the newly described *L. minoicum*, for all the characters mentioned above. When Brullo & Erben's (2016) descriptions were employed to identify specimens collected along the coast between Moni Kapsa and Dermatos-Tsoutsouros (representing the entire range of *L. hierapetrae* and *L. minoicum*), several of them belonging to previously identified *L. hierapetrae* populations were assigned to *L. minoicum* or *L. cornarianum* sensu Brullo & Erben (2016), and many other specimens could not be unambiguously identified with either of them, but all perfectly match Artelari's (1989c) concept of *L. hierapetrae*. The phylogenomic analysis confirms that samples of *L. hierapetrae* and *L. minoicum* form one well-supported lineage, with *L. minoicum* specimens from the type locality and the population in Dermatos (bank of the river Anapodaris) intermingled with *L. hierapetrae* individuals from Moni Kapsa beach, Ferma and Ierapetra (i.e. the two species were not reciprocally monophyletic; Koutroumpa 2020). Additionally, chromosome counts of *L. minoicum* material with provenance from its locus classicus, *M. Erben Li-1708* (FR [FR-0128958], B [B 10 1009652]), share the same chromosome number ($2n = 43$) with *L. hierapetrae* (Brullo & Erben 2016). Combining the morphological, molecular and chromosomal evidence, it becomes clear that *L. minoicum* is conspecific with *L. hierapetrae*. Also, *L. chrisianum* Brullo & Guarino, described from the islet of Chrysi S of Ierapetra, is conspecific with *L. hierapetrae* and represents just a small form of it, because the morphological features previously used to differentiate it from *L. hierapetrae* (e.g. smaller size and leaf length, dense arrangement of spikelets and larger middle bract width, Brullo & Guarino 2000) clearly fall within the range of variation of the latter species.

Fig. 4. Leaf shapes of the three closely related *Limonium* species in SE Crete – A: *L. artelariae* (*K. Koutroumpa 299*, UPA); B: *L. cornarianum* (*K. Koutroumpa 751*, Z [Z-000278454]); C: *L. hierapetrae* (*K. Koutroumpa 269*, Z [Z-000278465]). – Scale bar = 10 mm.

A new endemic *Limonium* species in SE Crete

During the fieldwork in summer of 2014, an impressive population of *Limonium* was found in SE Crete, in the area between Myrtos and Tertsa, comprising tall plants up to 110 cm, bearing large, broadly spathulate rosette leaves (Fig. 5). Resembling *L. hierapetrae* in terms of habit and inflorescence, its leaves are of a different shape, resembling more those of *L. cornarianum* (Fig. 4A, B). However, plants of such height and with leaves of such size found in that population are unique among the *Limonium* species in Greece belonging to the "Mediterranean lineage", i.e. all Greek *Limonium* species apart from eight belonging to the morphologically and phylogenetically distinct *L.* sect. *Limonium* (*L. vulgare* group), *L.* sect. *Nephrophyllum* Rech. f. s.l. and *L.* sect. *Pterocladus* (Spach) Bokhari (Koutroumpa & al. 2018). Three representatives sampled in a phylogenomic study formed a well-supported monophyletic group in close evolution-

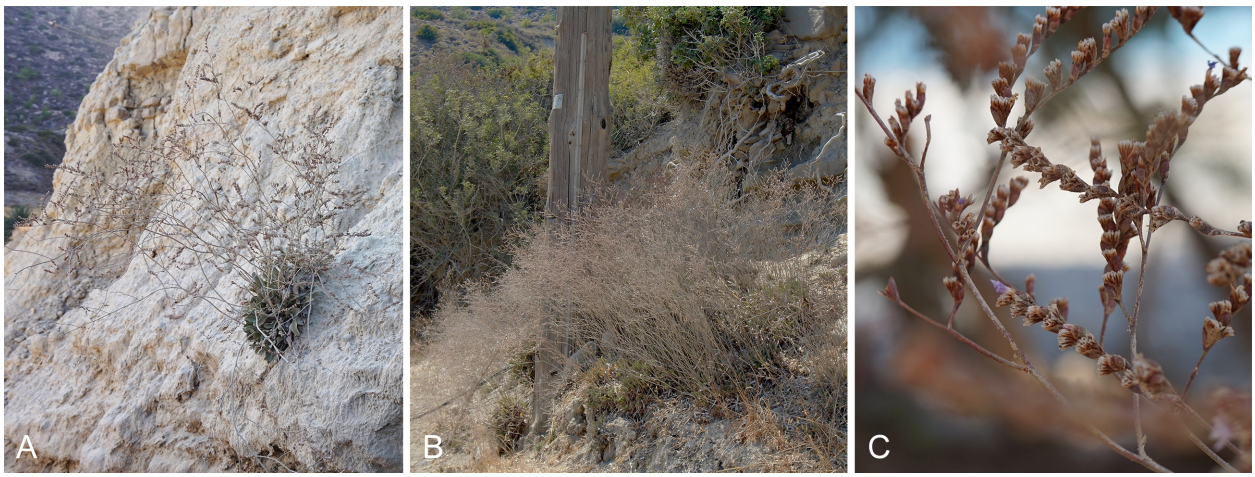

Fig. 5. *Limonium artelariae* growing on fine marls of coastal cliffs (A), habit (B) and inflorescence (C). – All photographs taken by and © Konstantina Koutroumpa.

ary relationship with *L. cornarianum* and *L. hierapetrae* but clearly distinct from them (Koutroumpa 2020). Apart from the large population found during the fieldwork, a careful study of previously collected herbarium specimens revealed that material collected from Cape Theophilos (*Brullo & Giusso s.n.*, herb. Erben) at the E edge of Sidonia beach, which is located to the W of Tertsa, also belong to the new species. In addition, plants grown from seeds of the Cape Theophilos collection were studied karyologically by M. Erben (Li-1721) who counted the pentaploid chromosome number $2n = 43$ in a cultivated individual (voucher deposited in FR [FR-0128957]). The pentaploid chromosome number of the new species agrees with the preliminary flow cytometric analysis of material collected from Vatos and Kallikovrechtis, two localities between Myrtos and Tertsa. Specifically, the 1C genome size of the new species is 3.67–3.69 pg, which is comparable to the genome size of the pentaploid ($2n = 43$) *L. sitiacum* (1C = 3.52 pg) but larger than the genome sizes of the tetraploid ($2n = 34$) *L. aegaeum* (1C = 3.15 pg) and the triploid ($2n = 27$) *L. virgatum* (1C = 2.61 pg) and smaller than the genome size of the hexaploid *L. creticum* (1C = c. 4 pg; this an approximate count because this genome size was partially overlapping with the *Pisum sativum* reference genome, 1C = 4.42 pg). In the Taxonomic treatment below, the new species is described and compared with the closely related *L. cornarianum* and *L. hierapetrae*, for which emended species descriptions are provided based on the plethora of material seen and examined, including the type specimens.

Limonium cythereum newly recorded for Crete

The endemic *Limonium cythereum* R. Artelari & Georgiou was until now known only from the islands of Kythira and Antikythira (Artelari & Georgiou 1999; Brullo & Erben 2016), which are located SE of Peloponnese and between Kythira and NW Crete, respectively (Fig. 6). Apart from the three known populations of *L. cythereum* on the S and E coasts of Kythira (Chalkos, Vrouleas, and Avlemon) and the single population on the N coast of Antikythira (Potamos), the fieldwork revealed the occurrence of *L. cythereum* in two localities in NW Crete (briefly mentioned in Koutroumpa 2020). The species was recorded from a small port at the E edge of the city of Chania (see, e.g., B [B 10 1163863]) and Kalathas beach, which is few kilometres NE of Chania (see, e.g., B [B 10 1163868]). *Limonium cythereum* is easily distinguished from the closely related *L. sieberi* Kuntze, which also occurs in NW Crete and co-occurs with *L. cythereum* at Kalathas beach, by its shorter spikelets, the hairy and shorter inner spikelet bracts and the shorter calyces. The current distribution of *L. cythereum* reflects the phytogeographical connections of Crete and Kythira and the paleogeography of the region during the Pleistocene (c. 0.8 Mya) when low sea levels during the glacial period reconnected islands with each other and some islands with the mainland (see maps in Valakos 2008).

Limonium fragile was erroneously reported for Crete

Limonium fragile Erben & Brullo is a small species, up to 15 cm tall, bearing delicate branches, and has been reported from only few localities in Karpathos, Crete and Antikythira islands by Brullo & Erben (2016). Its occurrence in Crete is based on a specimen collected from the saline habitats of Olous near Elounda in NE Crete (*Hansen 1066*, PAL-Gr!; Brullo & Erben 2016). The specimen was originally identified as *L. virgatum* by W. Greuter in 1974, but Brullo & Erben (2016) later assigned it to *L. fragile* possibly on the basis of its small size. Hybrids between *L. fragile* and *L. virgatum* have also been reported from Crete by Brullo & Erben (2016), based on material collected from the same locality (i.e. salt marshes in Olous, *H. Kalheber 99-192*, herb. Kalheber!). The latter specimen comprises immature individuals collected in early spring. Olous and the surrounding areas in Elounda were visited twice during the fieldwork,

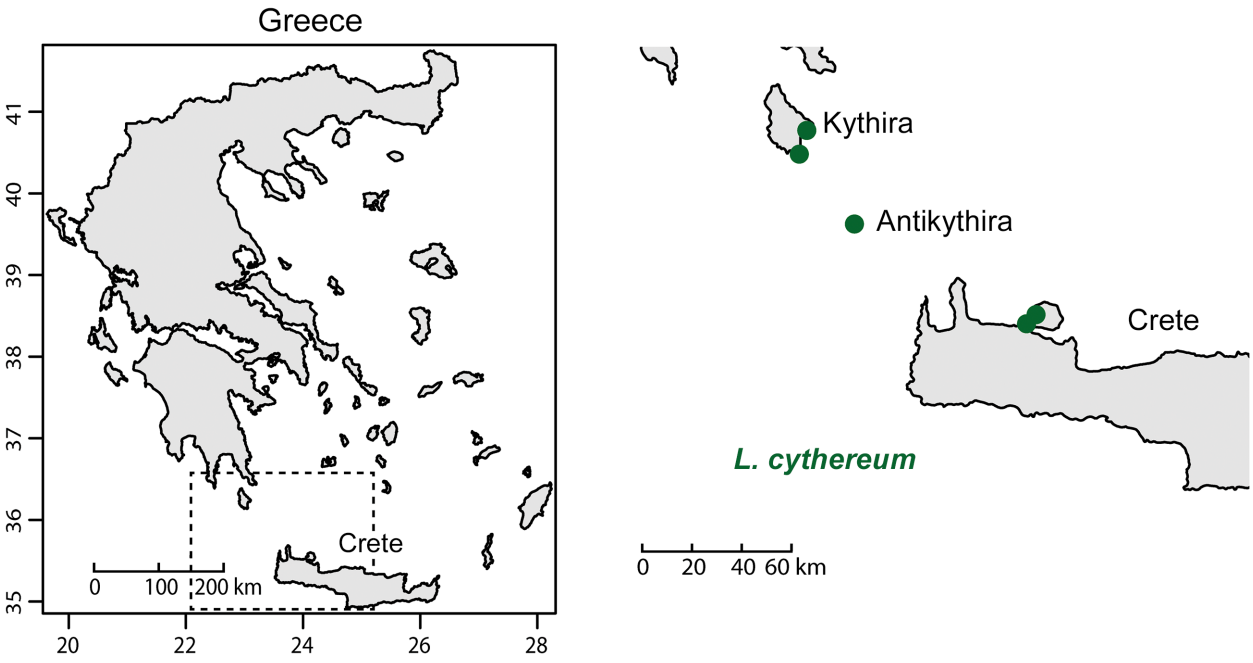

Fig. 6. Distribution map of *Limonium cythereum* in Kythira, Antikythira and Crete.

but an extensive search failed to find representatives of *L. fragile*. However, a very large population of *L. virgatum* was observed with plants of different sizes, some of them very small, growing on the saline basins that were seasonally flooded. All the material collected from this region clearly represents *L. virgatum*. Field observations and the examination of several specimens from Elounda, including the Cretan *L. fragile* specimens seen by Brullo & Erben (2016), support the view that small and immature individuals of *L. virgatum* from Olous were misidentified as *L. fragile* or *L. fragile* × *L. virgatum* by Brullo & Erben (2016). Therefore, *L. fragile* is to be regarded as absent from Crete and plants growing in Olous (Elounda) in NE Crete belong to *L. virgatum*.

Taxonomic treatment

Limonium artelariae Koutr., **sp. nov.** – Fig. 4A, 5, 7, 8. Holotype: Greece, Crete, prefecture of Lasithi, beach of the village Vatos, between Myrtos and Tertsa, 34.99686°N, 25.55936°E, rocks and sand, steep, Aug 2014, *K. Koutroumpa 300* (Z [Z-000278447]; isotype: B [B 10 1161811]).

Diagnosis — *Limonium artelariae* is distinguished from its closely related species in SE Crete, *L. cornarianum* and *L. hierapetrae*, by its broadly spathulate, rounded leaves and broadly obovate and wider inner spikelet bracts. *Limonium artelariae* is rather unique among all other Aegean *Limonium* endemics for its predominantly tall habit combined with longer and wider, spathulate leaves.

Description — Plants perennial, 48–110 cm tall, glabrous, with several erect stems. *Caudices* 2–5 cm long, branched with age and then plant with numerous leaf rosettes. *Rosette leaves* fleshy, light green to glaucous, flat or irregularly folded, rugose to verrucose, (39–)50–165(–210) × 12–43 mm, broadly spathulate, more or less abruptly tapering into petiole, with petiole usually much longer than lamina, margin cartilaginous, sometimes undulate about 0.2 mm wide, apex rounded, mucronate, mucro 0.3–1 mm long, curved backward; 1 central nerve with 2 lateral nerves in large leaves. *Stems* numerous, erect, usually robust, rugose, branched usually above lower 1/4–1/3; branches very rarely proliferous. *Inflorescence* trullate to obtrullate in outline; sterile branches absent or 1–3 at lower part of stem, 15–80 mm long, straight; fertile branches straight or slightly arched, erect, directed obliquely upward or spreading. *Spikes* (12–)15–55(–73) mm long, straight to slightly arched. *Spikelets* 5.5–6.8 mm long, densely arranged, 3 or 4(or 5) per cm, composed of 2–4(–8) flowers. *Outer bract* (1.8–)2–2.6 × (1.6–)1.8–2.1(–2.3) mm, glabrous, ovate-triangular, margin broadly membranous, to 0.6 mm wide, apex acute; central part herbaceous, forming a short point. *Middle bract* 2.2–2.5 × 1.5–2 mm, glabrous, membranous, oblong-elliptic, apex rounded or sometimes emarginate. *Inner bract* 4.3–5.5 × 3.8–4.5 mm, glabrous, broadly obovate, margin membranous, 0.6–1.2 mm wide, apex rounded; central part herbaceous, forming a short point to 0.5 mm long, indistinct in mature spikelets. *Calyx* 4.5–5.5 mm long; calyx tube more or less densely long hairy; calyx lobes 0.5–0.6 mm long, ovate-triangular; tube ribs ending usually above base of lobes. *Corolla* lilac.

Note — Plant height and leaf size (length and width) measurements were taken from several individuals in the field, at Vatos and Kallikovrechtis (Crete), though not all these individuals were collected as herbarium specimens.

Chromosome number and ploidy — $2n = 43$ (chromosome count by M. Erben (Li-1721) on a cultivated plant of wild source; voucher: FR [FR-0128957]); ploidy level: 5x (inferred from preliminary flow cytometric results of genome size).

Breeding system — Apomixis is inferred from the monomorphic population with self-incompatible pollen-stigma combination B. In addition, the species is of high ploidy level with an odd chromosome number further supporting the view of an apomictic reproduction, following Erben (1978, 1979).

Distribution — Endemic to SE Crete, along the coast between the villages of Myrtos and Tertsa (replaced by *Limonium hierapetrae* in Tertsa), and at Cape Theophilos at the E edge of Sidonia beach (Fig. 1).

Habitat — Maritime cliffs of marly, calcareous, conglomerate and sandy substrates.

Eponymy — The specific epithet "*artelariae*" honours Dr. Rea Artelari, a former Associate Professor of the University of Patras, Greece, for her invaluable contributions to the systematics of *Limonium* in Greece and Cyprus throughout her academic career.

Taxonomic notes — The new species is morphologically most closely related to *Limonium hierapetrae*, which grows in the same area of SE Crete. However, *L. artelariae* has large, broadly spathulate, rounded leaves compared to the smaller, oblanceolate to oblong-obovate, mostly obtuse leaves of *L. hierapetrae*. The individuals of the latter are also smaller and have usually narrower, elliptic to oblong-obovate inner spikelet bracts (vs broadly obovate in *L. artelariae*; Table 1). The dense leaf rosettes with spathulate, sometimes irregularly folded leaves, the densely arranged inflorescences and the obovate shape of the inner spikelet bracts morphologically link *L. artelariae* to *L. cornarianum*, which also grows in SE Crete. Further, *L. cornarianum* is clearly distinguished from *L. artelariae* by its smaller spikelets and spikelet bracts, and leaves with an acute apex (Table 1, Fig. 4).

Limonium artelariae is also related to other representatives of the informal taxonomic "*L. sieberi*" and "*L. ocymifolium*" groups sensu Brullo & Erben (2016). Specifically, *L. artelariae* shows similarities in habit, absence of or very low number of sterile branches, shape of leaves and inflorescences with *L. aucheri* (Girard) Greuter & Burdet, *L. creticum*, *L. cythereum* and *L. sieberi* also occurring in Crete, and also with *L. pigadiense* (Rech. f.) Rech. f. from Karpathos and *L. ocymifolium* (Poir.) Kuntze from the Kyklades. However, several morphological characters clearly separate *L. artelariae* from these allied species. Specifically, *L. aucheri*, which has a broad Aegean distribution but occurs in a single locality in NW Crete, is considerably smaller (10–40 cm tall), with narrower leaves (5–10 mm wide) and obovate, narrower inner spikelet bracts (3.2–3.9(–4.1) mm wide; Brullo & Erben 2016). The Cretan endemic *L. creticum* has partially smaller (20–85 × 5–20 mm), obovate-spathulate, obtuse leaves, longer spikelets (6.5–7 mm long) with longer but narrower (6–6.8 × 3.4–3.7 mm) elliptic inner bracts and longer calyces (5.6–6.2 mm long; Artelari 1989b). *Limonium cythereum* which occurs in Kythira, Antikythira and is newly found in NW Crete, is clearly differentiated by its hairy spikelet bracts (Artelari & Georgiou 1999; Brullo & Erben 2016). *Limonium sieberi* is smaller (20–50 cm tall) and has longer spikelets (6.5–9 mm long), inner spikelet bracts (5.2–7 mm long) and calyces (5.2–6.8 mm long; Brullo & Erben 2016). The Karpathos endemic *L. pigadiense* is also smaller (20–50 cm tall), with narrower (5–15 mm wide), oblanceolate-spathulate leaves, longer spikelets (6.6–7.3 mm long), inner spikelet bracts (5.6–6 mm long) and calyces (5.2–6.5 mm long; Brullo & Erben 2016). And finally, the Kykladean endemic *L. ocymifolium* is significantly smaller (15–35 cm tall) bearing shorter and somewhat narrower leaves (25–50 × 9–20 mm), mostly longer spikelets (6.5–7.5 mm long), inner spikelet bracts (5.1–5.9 mm long) and calyces (5.2–6 mm long), and significantly wider outer spikelet bracts (2.5–3 mm wide; Brullo & Erben 2016).

Limonium artelariae has the same ploidy level and chromosome number ($2n = 5x = 43$) as *L. aucheri* (Brullo & Erben 2016), *L. hierapetrae* (Artelari 1989c; Brullo & Erben 2016), *L. ocymifolium* (Artelari 1989a; Brullo & Erben 2016), *L. pigadiense* (Brullo & Erben 2016) and *L. sieberi* (Artelari & Georgiou 2003; Brullo & Erben 2016), while *L. cornarianum* is probably triploid (see above) and both *L. creticum* and *L. cythereum* are hexaploids but with different chromosome numbers ($2n = 6x = 51$ and $2n = 6x = 52$, respectively; Artelari 1989b, 1992; Artelari & Georgiou 2003).

Additional specimens seen — Greece, Crete, prefecture of Iraklio: Akro Theophilou, calcareniti conglomeratiche, 27 Jun 2002, *Brullo & Giusso s.n.* (herb. Erben); cultivated from wild source, Akro Theophilou, calcareniti conglomeratiche, 27 Jun 2002, *Brullo & Giusso s.n., M. Erben Li-1721* (B [B 10 0710890], FR [FR-0128957]); between Kallikovrechtis and Tertsa, 34.98966°N, 25.54750°E, marls and sand, Aug 2014, *K. Koutroumpa 307* (Z [Z-000278446]), *K. Koutroumpa 308* (B [B 10 1161812, B 10 1243313], Z [Z-000278441]). — Prefecture of Lasithi: beach of village Vatos, between Myrtos and Tertsa, 34.99686°N, 25.55936°E, rocks and sand, steep, Aug 2014, *K. Koutroumpa 299*

Fig. 7. Holotype of *Limonium artelariae*, *K. Koutroumpa 300* (Z [Z-000278447]). – Image by United Herbaria Z+ZT / CC BY 4.0.

Table 1. Morphological diagnostic features of *Limonium artelariae*, *L. cornarianum* and *L. hierapetrae*.

	L. artelariae	***L. cornarianum***	***L. hierapetrae***
Plant height (cm)	48–110	17–63	(10–)20–45(–80)
Leaf length (mm)	(39–)50–165(–210)	25–90	(8–)15–80(–100)
Leaf width (mm)	12–43	6–20	3–16(–18)
Leaf shape	broadly spathulate	oblanceolate-spathulate	oblanceolate to oblong-obovate
Leaf apex shape	rounded, mucronate	acute, mucronate to cuspidate	obtuse (almost rounded) to slightly acute, mucronate
Lamina tapering into petiole	± abruptly	abruptly	gradually
Spike length (mm)	(12–)15–55(–73)	8–37	(6–)15–120
Spikelets per cm	3–4(–5), densely arranged	3–11, very densely arranged	1–5, more or less laxly arranged
Spikelets length (mm)	5.5–6.8	3.8–4.5	4.8–7
Outer bract length (mm)	(1.8–)2–2.6	1.1–1.7	(1.4–)1.5–2.6(–3)
Outer bract width (mm)	(1.6–)1.8–2.1(–2.3)	1–1.4	1.5–2.1
Middle bract length (mm)	2.2–2.5	1.2–1.9	1.7–2.9
Middle bract width (mm)	1.5–2	0.9–1.3	1.4–1.9
Inner bract length (mm)	4.3–5.5	2.8–3.8	(4–)4.2–5.8(–6)
Inner bract width (mm)	3.8–4.5	2.7–3.2	2.7–4
Inner bract shape	broadly obovate	obovate	elliptic to oblong-obovate
Calyx length (mm)	4.5–5.5	3.2–3.9	4–5.6

(UPA), *K. Koutroumpa 301* (ATH); Vatos, 34.99675°N, 25.55969°E, habitat with *Tamarix*, *Poaceae*, *Pancratium maritimum* and *Pistacia lentiscus*, on sand-marls, on a 'carpet' of dried *Posidonia*, Aug 2014, *K. Koutroumpa 754* (Z [Z-000278445]), *K. Koutroumpa 755* (Z [Z-000278442, Z-000278443, Z-000278444]).

Limonium hierapetrae Rech. f. in Denkschr. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 105(2, 1): 104. 1943. – Lectotype (designated by Brullo & Erben 2016: 99): Greece, Creta, distr. Hierapetra: in litore arenoso a porto Hierapetra occidentem versus, 18 May 1942, *K. H. Rechinger 13080* (W [accession no. W1960-0012705]!; isolectotypes: G [G00440217]!, M!). – Fig. 3, 4C.

= *Limonium chrisianum* Brullo & Guarino in Fl. Medit. 10: 269. 2000. – Holotype: Hrisi (Ierapetra, Creta), 25 Aug 1996, *Brullo & Guarino s.n.* (CAT; isotype: FR [FR-0030972]!).

= *Limonium minoicum* Erben & Brullo in Phytotaxa 240: 107. 2016. – Holotype: Creta, Tertsa (Ierapetra), rupi calcarenitiche, 27 Jun 2002, *Brullo & Giusso s.n.* (MSB [MSB-164247]!; isotypes: B [B 10 1189106]!, CAT, FR [FR-0030969]!).

Description — Plants perennial, (10–)20–45(–80) cm tall, glabrous, with several erect stems. *Caudices* 1–7 cm long, branched with age and then plant with numerous leaf rosettes. *Rosette leaves* fleshy, pale grey-green, flat, coriaceous, verrucose to rugose, (8–)15–80(–100) × 3–16(–18) mm, oblanceolate to oblong-obovate, gradually tapering into petiole, with petiole longer than or equal to lamina, margin cartilaginous, sometimes undulate, c. 0.3 mm wide, apex obtuse (sometimes almost rounded) to slightly acute, mucronate, mucro 0.2–0.7(–1) mm long; 1 central nerve with 2 lateral nerves in large leaves. *Stems* numerous, erect, verrucose-rugose, branched usually above lower 1/4–1/3. *Inflorescence* paniculate, trullate or obtrullate in outline; sterile branches absent or 1–4 at lower part of stem, 10–70 mm long, straight; fertile branches straight or slightly arched, directed obliquely upward. *Spikes* (6–)15–120 mm long, straight to slightly arched. *Spikelets* 4.8–7 mm long, more or less laxly arranged, 1–5 per cm, composed of 1–4(–6) flowers. *Outer bract* (1.4–)1.5–2.6(–3) × 1.5–2.1 mm, glabrous, ovate-triangular, margin membranous, apex acute; central part herbaceous, forming a short point. *Middle bract* 1.7–2.9 × 1.4–1.9 mm, glabrous, membranous, oblong-elliptic, apex rounded or sometimes emarginate. *Inner bract* (4–)4.2–5.8(–6) × 2.7–4 mm, glabrous, elliptic to oblong-obovate, margin membranous, c. 1 mm wide, apex obtuse to rounded; central part herbaceous, forming a short point 0.5–0.7 mm long. *Calyx* 4–5.6 mm long; calyx tube usually unilaterally long hairy; calyx lobes 0.4–0.6 mm long, ovate; tube ribs ending at or above base of lobes. *Corolla* bluish-lilac.

Fig. 8. Paratype of *Limonium artelariae*, *K. Koutroumpa 754* (Z [Z-000278445]). – Image by United Herbaria Z+ZT / CC BY 4.0.

Chromosome number and ploidy — 2*n* = 43; ploidy level: 5x (Artelari 1989c).

Breeding system — Apomixis was inferred from the monomorphic populations with self-incompatible pollen-stigma combination B, low pollen fertility, high seed production, high ploidy level and odd chromosome number (Artelari 1989c).

Distribution — Endemic to SE Crete, growing along the coast between Moni Kapsa and Dermatos and on the neighbouring islets of Chrysi and Fotia (Fig. 1).

Habitat — Maritime calcareous, conglomerate and marly rocks, sandy and pebbly substrates.

Additional specimens seen — Greece, Crete, prefecture of Iraklio: Eparchia Viannou, Anapodaris-Küstenhof, 34°59'03"N, 25°19'30"E, 1–2 m ü.N.N, offenes *Lycium schweinfurthii-Atriplex halimus-Tamarix*-Gebüsch der Küste, 15 Oct 1998, *N. Böhling 9019* (B [B 10 0193536]); Ep[archia]. Viannos, Mündung des Anapodharis, 34°59'N, 25°19'30"E, c. 1 m, Flussbett mit Sand- und Kieselflächen, 19 Sep 1984, *H. Risse 1517* (B [B 10 1155993]); Dermatos village, at bank of river Anapodaris, 34.98328°N, 25.33094°E, Aug 2014, *K. Koutroumpa 318* (B [B 10 1164294], Z [Z-000278449]), *K. Koutroumpa 319* (Z [Z-000278458]); presso la foce del fiume Anapodaris, depressione limoso-argillosa, 22 Aug 1996, *Brullo & Guarino s.n.* (CAT); Tertsa, on calcareous maritime rocks, 34.99146°N, 25.52927°E, Aug 2014, *K. Koutroumpa 312* (Z [Z-000278450]), *K. Koutroumpa 313* (B [B 10 1163946], Z [Z-000223471]), *K. Koutroumpa 314* (Z [Z-000278451]); cultivated from wild source, Tertsa (Ierapetra), rupi calcarenitiche, *Brullo & Giusso s.n., M. Erben Li-1708* (B [B 10 1009652], FR [FR-0128958]). — Prefecture of Lasithi: Strand bei Myrtos westlich von Ierapetra, Südküste, 9 Apr 1971, *A. Hansen* 307 (C); Nea Myrtos (after Ierapetra), 10 m from sign of "Nea Myrtos" (end), 7 May 1986, *Tiniakou 1350* (UPA); Prov. Ierapetra, Neos Myrtos, 10 m, S-facing, sandy slope, 22 Apr 1994, *P. Wind 94-291* (C); from Ierapetra toward Myrtos, c. 1 km after village Nea Anatoli, Nea Myrtos, at edges of road with *Ebenus cretica*, 31 May 1988, *Artelari & Chondropoulos 1012* (UPA); cultivated from wild source, 1 km W of Nea Anatoli, *R. Artelari 1019 & V. Chondropoulos, M. Erben Li-1202* (B [B 10 0710892]); between Nea Anatoli and Ammoudares, in marls, hardly accessible spot, 35.00585°N, 25.65085°E, Aug 2014, *K. Koutroumpa 287* (B [B 10 1163942], Z [Z-000223477]), *K. Koutroumpa 290* (B [B 10 1163933], Z [Z-000278462]); Nea Anatoli, steep marls, *Artelari & Chondropoulos 1019* (B [B 10 0710893], UPA); 1 km E of Ierapetra, together with *Tamarix* and several *Poaceae*, sandy beach, 31 May 1988, *Artelari & Chondropoulos 1013* (UPA); 3.2 km E of Ierapetra, "Nicolas Apartments", on way down from stairs built on rocks, growing along and in both sides of stairs, hardly accessible spot, vertical rocks, 35.00018°N, 25.77360°E, Aug 2014, *K. Koutroumpa 281* (Z [Z-000278463]); 3.4 km E of Ierapetra, conglomerate rocks, sandy beach (E side), *Artelari & Chrondropoulos 1055* (UPA); c. 1 km W of village Ferma (Ierapetra district), maritime calcareous rocks, plants under *Pistacia*, 1 Jun 1988, *Artelari & Chondropoulos 1017* (UPA); c. 1 km W of village Ferma (Ierapetra district), coffee-bar Lilo, 31 May 1988, *Artelari & Chondropoulos 1009* (UPA); c. 1 km W of Ferma, on rocky peninsula close to ancient fish ponds (coffee-bar Lilo), rock crevices, 6 May 1986, *Tiniakou 1349* (UPA); Ferma beach, 8 Sep 2013, *K. Koutroumpa & al. 2013.09.08-11* (herb. University of Crete), *K. Koutroumpa & al. 2013.09.08-12* (herb. University of Crete), *K. Koutroumpa & al. 2013.09.08-13* (herb. University of Crete); Ferma, next to little port close to ancient fish pools, on cement floor, 35.01467°N, 25.84797°E, Aug 2014, *K. Koutroumpa 264* (Z [Z-000278464]), *K. Koutroumpa 265* (B [B 10 1133542], Z [Z-000278466]), *K. Koutroumpa 269* (Z [Z-000278465]); Distr. Hierapetrae, in saxosis litoreis insulae Photia, 22 May 1942, *H. Stubbe 13267* (W [accession no. W1960-0012700]); Makrygialos (toward Ierapetra), S coast, bushes on beach with conglomerate rocks, at edge of cliff, 6 May 1986, *Tiniakou 1348a* (UPA); Makrygialos, conglomerate rocks, in inaccessible spot, under Roman settlement, *Artelari & Chondropoulos 1018* (UPA); Makrygialos, conglomerate, inaccessible rocks below Roman settlement, 35.03499°N, 25.97258°E, Aug 2014, *K. Koutroumpa 252* (Z [Z-000278470]), *K. Koutroumpa 256* (B [B 10 1164323], Z [Z-000278448]), *K. Koutroumpa 257* (B [B 10 1163952], Z [Z-000278468]); Kalo Nero, 27 Mar 1998, *N. Böhling 7283* (UPA, B [B 10 0203903]); Kalo Nero, 10 Jun 2000, *Brullo & Giusso s.n.* (B [B 10 1189126, B 10 1189131]); Kalo Nero, 24 Aug 1996, *Brullo & Guarino s.n.* (B [B 10 1189129]); Kalo Nero, beach Staousas, on rocks at NE side of beach, 35.01763°N, 26.03379°E, Aug 2014, *K. Koutroumpa 235* (Z [Z-000278455]), *K. Koutroumpa 236* (Z [Z-000278456]), *K. Koutroumpa 237* (B [B 10 1164105], Z [Z-000278457]); Eparchia Sitias, Kalo Nero, 35°00'55"N, 26°01'32"E, 5 m ü.N.N, *Limonium hierapetrae-L. pigadiense* [sic]-*Lygeum*-Flur auf Konglomerat-Kalksandstein, mit *Schoenus nig*[*ricans*]. (rar), WSW-exp., mittel alkal., stark lehmiger Sand, 5 May 1997, *N. Böhling 5458b* (B [B 10 0199664]); cultivated from wild source, Kalo Nero, *Brullo & Giusso s.n., M. Erben Li-1705* (B [B 10 1009651]); Moni Kapsa, 8 Sep 2013, *K. Koutroumpa & al. 2013.09.08-14* (herb. University of Crete), *K. Koutroumpa & al. 2013.09.08-15* (herb. University of Crete), *K. Koutroumpa & al. 2013.09.08-16* (herb. University of Crete), *K. Koutroumpa & al. 2013.09.08-17* (herb. University of Crete); Moni Kapsa in front of Perivolakia, 8 Sep 2013, *K. Koutroumpa & al. 2013.09.08-18* (herb. University of Crete), *K. Koutroumpa & al. 2013.09.08-19* (herb. University of Crete), *K. Koutroumpa & al. 2013.09.08-20* (herb. University of

Crete); Moni Kapsa, 10 Jun 2000, *Brullo & Giusso s.n.* (B [B 10 1189130]); Moni Kapsa, next to monastery in gorge which ends to sea, 35.01973°N, 26.05157°E, Aug 2014, *K. Koutroumpa 227* (Z [Z-000278467]), *K. Koutroumpa 228* (Z [Z-000278469]); Eparchia Sitias, M[oni]. Kapsa, 35°01'01"N, 26°03'01"E, 5 m ü.N.N., Konglomeratfelsküste, 16 Oct 1997, *N. Böhling 6734* (B [B 10 0192510]); cultivated from wild source, Moni Kapsa, *S. Brullo & Giusso s.n., M. Erben Li-1719* (B [B 10 1132915]); cultivated from wild source, Südost-Küste, Kloster Kapsa, *Kattari s.n., M. Erben Li-1727* (B [B 10 1009650]).

Limonium cornarianum Kypr. & R. Artelari in Phyton (Horn) 38: 144. 1998. – Holotype: Greece, Crete, Nomos Lasithiou, Ep[archia]. Sitias, Moni Kapsa, 35°01'N, 26°03'E, on calcareous maritime rocks, 20 Sep 1994, *Z. Kypriotakis 8534* (UPA!). – Fig. 2, 4B.

Description — Plants perennial, 17–63 cm tall, glabrous, with several erect stems. *Caudices* 2–12 cm long, branched with age and then plant with numerous leaf rosettes. *Rosette leaves* fleshy, pale green, flat or more usually irregularly folded, rugose, 25–90 × 6–20 mm, oblanceolate-spathulate, abruptly tapering into petiole, with petiole longer than lamina, margin cartilaginous, sometimes undulate, c. 0.1 mm wide, apex acute, mucronate to cuspidate, mucro 0.3–1.2 mm long; 1 central nerve with 2 lateral nerves in large leaves. *Stems* several, usually slender, erect, rugose, branched usually above lower 1/3. *Inflorescence* rhombic to trullate, rarely obtrullate in outline; sterile branches absent or 1–3 at lower part of stem, straight; fertile branches straight or slightly arched, directed obliquely upward. *Spikes* 8–37 mm long, more or less straight. *Spikelets* 3.8–4.5 mm long, very densely arranged, 3–11 per cm, mainly distichous, composed of 2–7 flowers. *Outer bract* 1.1–1.7 × 1–1.4 mm, glabrous, ovate-triangular, margin membranous, apex acute; central part, herbaceous forming a short point. *Middle bract* 1.2–1.9 × 0.9–1.3 mm, glabrous, membranous, oblong-elliptic, apex rounded. *Inner bract* 2.8–3.8 × 2.7–3.2 mm, glabrous, obovate, margin membranous, 0.5–0.8 mm wide, apex obtuse to rounded; central part herbaceous, forming a short point 0.4–0.5 mm long. *Calyx* 3.2–3.9 mm long; calyx tube usually unilaterally long hairy; calyx lobes 0.3–0.7 mm long, ovate; tube ribs ending at or above base of lobes. *Corolla* lilac.

Note — Plant leaf size (length and width) measurements were taken from several individuals in the field, at Pacheia Ammos (Crete), though not all these individuals were collected as herbarium specimens.

Chromosome number and ploidy — Ploidy level: 3x (inferred from preliminary flow cytometric results of genome size).

Breeding system — Apomixis was inferred from the monomorphic population in the locus classicus with self-incompatible floral combination B (Artelari & Georgiou 1999) and triploidy.

Distribution — Endemic, restricted to the Moni Kapsa gorge (SE Crete) and the E edge of Pacheia Ammos cove (NE Crete) (Fig. 1).

Habitat — Steep, calcareous rocks and dried salt marsh near the coast.

Additional specimens seen — Greece, Crete, prefecture of Lasithi: Pacheia Ammos, at E side of coast, on salt marshes between little church Agia Foteini and a small port, marshes with *Tamarix*, 35.11060°N, 25.81533°E, Aug 2014, *K. Koutroumpa 99* (Z [Z-000278459]), *K. Koutroumpa 100* (Z [Z-000278452]); Sitia, 3 km SSW of Kato Perivolakia, lower part of Moni Kapsas gorge, alt. 15 m, crevice of E-facing calcareous cliff, 26 Jun 1994, *N. Turland 777* (BM, UPA); Moni Kapsa gorge on lower part toward sea, alt. 15–20 m, 35.02189°N, 26.05044°E, Aug 2014, *K. Koutroumpa 731* (B [B 10 1164150], Z [Z-000278453]), *K. Koutroumpa 751* (B [B 10 1164136], Z [Z-000278454]); Eparchia Sitias, M[oni]. Kapsa, Schlucht, 35°01'03"N, 26°03'05"E, 50–100 m ü.N.N., Felswände (Kalk), 16 Oct 1997, *N. Böhling 6738* (B [B 10 0192506]); Exp. E der Kapsa-Schlucht, Ostkreta, 20 m, Kalkfelsen, 15 Oct 1998, *R. Ulrich* (B [B 10 0189672]).

Key to *Limonium artelariae* and morphologically related species from SE Crete

1. Spikelets to 4.5 mm long; inner spikelet bract to 3.8 mm long . . . . . ***L. cornarianum***
– Spikelets 4.8–7 mm long; inner spikelet bract 4–6 mm long **2**
2. Plants 48–110 cm tall; leaves to 210 × 43 mm, broadly spathulate, more or less abruptly tapering into petiole (e.g. Fig. 4A); inner spikelet bracts broadly obovate, 3.8–4.5 mm wide . . . . . ***L. artelariae***
– Plants usually to 45 cm tall; leaves to 100 × 18 mm, oblanceolate to oblong-obovate, gradually tapering into petiole (e.g. Fig. 4C); inner spikelet bracts elliptic to oblong-obovate, 2.7–4 mm wide . . ***L. hierapetrae***

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