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Source: Willdenowia, 41(1) : 167-177

Published By: Botanic Garden and Botanical Museum Berlin (BGBM)

URL: https://doi.org/10.3372/wi.41.41120

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New floristic records, confirmations and other phytogeographical notes from Crete (Greece)

Abstract

Bergmeier E.: New floristic records, confirmations and other phytogeographical notes from Crete (Greece). – Willdenowia 41: 167–177. – Online ISSN 1868-6397; © 2011 BGBM Berlin-Dahlem.
doi:10.3372/wi.41.41120 (available via http://dx.doi.org/)

The present list of phytogeographically noteworthy plants recorded between 2008 and 2010 in Crete (Kriti, Greece) includes herbarium specimen data with taxonomic, ecological and distributional annotations of 53 vascular plants and one bryophyte species. Twelve native taxa are new for Crete: *Althenia orientalis, Anthyllis vulneraria* subsp. *pindicola, Carex riparia, Cerastium pumilum* s.l., *Drepanocladus aduncus, Elytrigia atherica, Erodium chium, Galium parisiense, Plantago coronopus* s.str., *P. crassifolia, P. crypsoides* and *P. phaeostoma*. The latter two are new to the Greek territory and *P. phaeostoma* to Europe, too. The occurrence of the following species in Crete could be confirmed after many decades, for some after more than a century: *Crypsis aculeata, Parapholis filiformis, Polycarpon alsinifolium* and *Turgenia latifolia*. Two new combinations are introduced: *Lomelosia sphaciotica* subsp. *decalvans* and *Schedonorus pluriflorus*.

Additional key words: Mediterranean, Aegean, Kriti, vascular plants, bryophytes, taxonomy, phytogeography

Phytosociological and phytogeographical field studies on the vegetation of Crete carried out in the last three years rendered a large number of plant records, including numerous field observations and several hundreds of herbarium specimens. Some of these are of particular interest as they refer to plant taxa new for Crete (or the 'Cretan area' in the sense of the Med-Checklist, Greuter & al. 1984) or a wider geographical area, or are new for one or more of the four Cretan prefectures (nomoi). In other cases they represent the first confirmations of species not recorded since many decades or more than a century. Others refer to species rarely recorded or prove an extension of the hitherto assumed elevational or distributional range of a taxon.

The most important standard reference works for regional phytogeographical comparison in the present paper are Flora aegaea (Rechinger 1943a), the same author's Neue Beiträge zur Flora von Kreta (Rechinger 1943b), the Mountain flora of Greece (Strid 1986; Strid & Tan 1991), the Atlas of the Cretan area (Turland & al. 1993) and its supplement (Chilton & Turland 1997), the Exkursionsflora von Kreta (Jahn & Schönfelder 1995), the Flora hellenica (Strid & Tan 1997), the *Gramineae* checklist (Böhling & Scholz 2003) and the Flora of Crete electronic supplement (Turland & Chilton 2008). At a supraregional level the Med-Checklist (Greuter & al. 1984, 1986, 1989; Greuter & Raab-Straube 2008) and its Notulae (Greuter & Raus 2009, and previous) were consulted.

This contribution to the knowledge of the flora of Crete comprises notes on 53 taxa of vascular plants and one bryophyte species. Of these, twelve native taxa and two alien species are new for Crete or a wider area; three native species and two alien species are new for western Crete (Nomos of Chania); five native species are new for

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east central Crete (Nomos of Iraklio); and five species are new to eastern Crete (Nomos of Lasithi). Five species have not been seen on the island since the early 20th or mid or late 19th century.

The specimen information includes the former administrative units which, serving as an aid to assort the localities rather than reflecting current administrative division, continue to be applied in Greek field botany, such as Nomos (N., i.e. prefecture, abolished in 2010) and Eparchia (Ep., i.e. province, abolished in 1997, reinstalled as enlarged municipalities [Demos, Dimos] with partly modified borders in 2010), locality, latitude and longitude coordinates, brief habitat characteristics, altitude, collection date and collecting number. For each species one or more own herbarium specimens are cited which are deposited in the author's private herbarium (currently at GOET). In cases of duplicates already distributed, the herbarium code is given. The species are arranged in alphabetical order of families and genera. Family assignation follows the Angiosperm Phylogeny Website (Stevens 2001).

Vascular plants

Acanthaceae

Acanthus mollis L.
N. Lasithiou, Ep. Mirambelou: 1 km E of Istro (35°07'30"N, 25°45'00"E), ruderal site under *Ficus* near private road, 40 m, 3.4.2010, *Bergmeier 10-62*.

New to Crete; escaping from cultivation as ornamental plant. This W Mediterranean species was found in the Aegean (Island of Lesvos, Davis 1982: 27) and in Turkey-in-Europe (see Greuter & al. 1984: 38, the status indication as native in both regions is probably erroneous), where it is cultivated and sometimes escaping. In Crete it is a doubtfully naturalised xenophyte.

Amaryllidaceae

Allium dentiferum Webb & Berthel.
N. and Ep. Lasithiou: Lasithi Plateau between Tzermiado and Agios Konstantinos (35°11'30"N, 25°29'33"E), roadside with dry ruderal vegetation, 822 m, 27.6.2010, *Bergmeier 10-250*.

This record extends considerably the altitudinal range of 0–400 m given in Jahn & Schönfelder (1995).

Apiaceae

Scandix macrorhyncha C. A. Mey.
N. Irakliou, Ep. Kenourgiou: Above Gergeri, southern slopes of Psiloritis (35°09'03"N, 24°56'23"E), limestone mountain phrygana, 1250 m, 14.4.2008, *Bergmeier 08-30*.

In his treatment for the Mountain flora of Greece, P. Hartvig (in Strid 1986), due to the lack of herbarium material accepted records of this rather uncommon annual umbellifer in Crete only from the Lefka Ori but Jahn & Schönfelder (1995), based on records by Hager (1985), indicate all prefectures except the eastern.

Torilis arvensis subsp. ***recta*** Jury
N. Irakliou, Ep. Viannou: Ano Viannos (35°02'58"N, 25° 24'01"E), semiwet *Schedonorus arundinaceus* (Schreb.) Dumort. meadow and fallows with *Cirsium creticum* d'Urv., 475 m, 25.6.2010, *Bergmeier 10-223*.

New to central Crete (N. Irakliou), given for the prefectures of Chania and Lasithi (Jahn & Schönfelder 1995, under *T. arvensis* subsp. *arvensis*). The seen populations included plants up to 2 m tall and their lifeform was probably biennial or short-lived perennial, unlike the other subspecies occurring in Crete, *T. arvensis* subsp. *purpurea* (Ten.) Hayek, which is an annual. Similarly tall plants were also found in two wet ruderal sites near Metamorfosi (35°20'50"N, 24°17'47"E, 8.6.2009, 5 m, together with *Cirsium creticum* d'Urv., *Pulicaria dysenterica* (L.) Bernh., *Rumex conglomeratus* Murray and *R. crispus* L.; the latter species is also rare in Crete and was collected there as *Bergmeier 09-160*) and between Dramia and Episkopi (35°19'32"N, 24°19'29"E, both in N. Chanion, Ep. Apokoronou) on 8.6.2009. Nomenclature applied here follows Jury (1996).

Turgenia latifolia (L.) Hoffm.
N. Lasithiou, Ep. Mirambelou: Katharo plain (W of Kritsa) (35°08'37"N, 25°34'08"E), oat-barley field without herbicide application, 1120 m, 29.5.2009, *Bergmeier 09-99* (c. 7 individual plants were found during the excursion of the IAVS [= International Association for Vegetation Science] together with D. Tzanoudakis and D. Christodoulakis); N. Chania, Ep. Kydonia: Omalos plateau, central part (35°20'N, 23°54'E), fallow-field margin, 1055 m, 7.6.2009, *Bergmeier 09-149* (two plants found in the site).

Confirmed for the Cretan area in general after about 100 years and, in the case of the Omalos occurrence, more than 160 years after Heldreich found *Turgenia* there in 1846 (Rechinger 1943a). This nowadays rare weed of traditional agriculture was believed to be extinct in Crete (Turland & al. 2004; Bergmeier 2005, 2006). The species is nevertheless now critically endangered in both Cretan localities due to abandonment of traditional agricultural land use.

Araceae

Lemna minuta Kunth
N. Chanion, Ep. Kydonia: c. 0.5 km E of the Lake of Agia, E of the main road (35°28'48"N, 23°57'18"E), permanently wet ditch, 47 m, 20.6.2010, *Bergmeier 10-178*.

Recently recorded as new to the Cretan flora from the Lake of Agia (Bergmeier & Landolt in Greuter & Raus 2009), this second record nearby shows that *Lemna minuta* is locally established and spreading in the area.

Asteraceae

Taraxacum aleppicum Dahlst.
N. Irakliou, Ep. Kenourgiou: above Gergeri, southern slopes of Psiloritis (35°09'03"N, 24°56'23"E), limestone

mountain phrygana, 1250 m, 14.4.2008, *Bergmeier 08-29.*

New to the Psiloritis range. Richards (in Strid & Tan 1991) indicated only the mountain ranges of Lefka Ori and Dikti.

Taraxacum bithynicum DC.
N. Lasithiou, Ep. Ierapetra: Mount Dikti (Lasithiotika), S of the summit of Agios Pnevma (35°06'28"N, 25°29'01"E), sheep-grazed doline ground with *Pimpinella depressa* DC. and *Dactylis rigida* Boiss. & Heldr., 1770 m, 26.6.2010, *Bergmeier 10-230.*

New to E Crete. This high-mountain species was indicated for the Lefka Ori (Rechinger 1943b: 159; Turland 1992: 160) and for Crete in general by Van Soest (in Davis 1975: 799) and Greuter & Raab-Straube (2008) but it was not mentioned by Richards (in Strid & Tan 1991), although previously given from the principal high mountain ranges by Heldreich, Baldacci and Gandoger (Rechinger 1943a). The plants are distinct from other Cretan *Taraxacum* species by the very small stature, yellow stigmas and very few outer phyllaries.

Bignoniaceae

Campsis radicans (L.) Seem.
N. Irakliou, Ep Temenou: Iraklio Town, near harbour and Archaeological Museum (35°20'20"N, 25°08'17"E), urban ruderal site, wall footing and derelict wall, 35 m, 30.3.2010, *Bergmeier 10-24.*

New to Crete, naturalised or in the process of naturalisation in urban ruderal sites, escape from cultivation in parks and gardens. This liana of American origin is frequently planted in the Mediterranean as an ornamental. It was indicated by Greuter & al. (1984) only for Italy (as naturalised). It was not mentioned by Yannitsaros (1992) for Crete but listed in the recent catalogue of alien plants of Greece (Arianoutsou & al. 2010) without locality specification.

Caryophyllaceae

Cerastium deschatresii Greuter & al.
N. and Ep. of Rethymno: W of Myriokefala, S of Asi Gonia (35°15'12"N, 24°16'53"E), annual-rich vegetation in more or less shady sites on loamy soil with phyllite boulders, with *Anogramma leptophylla* (L.) Link, *Filago wagenitziana* Bergmeier, *Hypericum kelleri* Bald. and *Selaginella denticulata* (L.) Spring, 730 m, 11.4.2010, *Bergmeier 10-131, 10-133.*

Cerastium deschatresii is a little known Cretan endemic described as late as 2002 from all principal mountain massifs except Lefka Ori as well as several lower mountain ranges from west to east central Crete (Greuter & al. 2002). In western Crete it was hitherto known from the phyllite hills of the Eparchies of Kissamos and Selinos (see map in Greuter & al. 2002: 47). This is the first record from the Lefka Ori proper, albeit its eastern margin, an area of high conservation significance with the only Cretan and southernmost European *Sphagnum* spring fen and the occurrence of the local endemic *Filago wagenitziana* (Bergmeier 2010).

Cerastium pumilum Curtis [s.l.]
N. Rethymnou, Ep. Mylopotamou: Psiloritis, Nida plateau (35°12'17"N, 24°50'17"E), pasture with *Polygonum idaeum* on deep gravelly soil, 1355 m, 14.4.2008, *Bergmeier 08-41;* N. Irakliou, Ep. Viannou: Dikti, southeastern margins of Omalos plain (35°04'05"N, 25°28'14"E), pasture with fine gravelly soil, 1340 m, 15.4.2008, *Bergmeier 08-62.*

New to Crete. The *Cerastium pumilum* group is not well understood in Greece and the Aegean and, due to the lack of herbarium material from Crete, was excluded from the map in Strid & Tan (1997: 212, map 411). However, the present records provide evidence for its occurrence in the Cretan mountain oropedia (poljes). The former record refers to plants matching *C. pumilum* s.str., while the latter is closer to *C. glutinosum* Fries. However, pending comparison with more extensive materials from mainland Greece and the Aegean islands, the status of the findings has to remain provisional.

Paronychia echinulata Chater
N. Lasithiou, Ep. of Sitia: Sideros peninsula, near OTE station (35°14'42"N, 26°13'43"E), limestone phrygana rich in annuals on red slaty skeletal soil, 135 m, 14.4.2009, *Bergmeier 09-85.*

New to E Crete (N. Lasithiou). Apart from four historical localities in Crete (Rechinger 1943a: 130) and two mapped in Strid & Tan (1997), there are 6 collections and 2 observations of this annual species from all four Cretan provinces, including records in 1995 and 1996 near Vai (R. Jahn, pers. comm.).

Polycarpon alsinifolium (Biv.) DC.
N. Lasithiou, Ep. of Sitia: SE of Makrigialos (35°01'46"N, 25°59'57"E), landward side of a narrow sandy and gravelly beach, together with *Lotus halophilus* Boiss. & Spruner, *Silene ammophila* Boiss. & Heldr. and *Triplachne nitens* (Guss.) Link, 1 m, 10.4.2009, *Bergmeier 09-51 & Turland.*

Confirmed in Crete after almost a century; reported by Rechinger (1943a, as *P. tetraphyllum* var. *"alsinefolium"*) based on collections from Cousturier and Gandoger from 1914 and Lüdi from 1921. The species was not accepted as a taxon distinct from *P. tetraphyllum* L. by P. Hartvig (in Strid & Tan 1997). The collected plants are, however, distinct from *P. tetraphyllum* s.str. (which also occurs in the site) in their entirely smooth whitish seeds, thus matching the description and illustration by Amich & Pedrol (in Castroviejo & al. 1990: 162). The seed character remained strangely unregarded by Kool & al. (2007), who proposed that all members of the *P. tetraphyllum* group be treated as a single species, *P. tetraphyllum*. The plants found were green with very short

internodes and had, if compared to *P. tetraphyllum* s.str., relatively large flowers. *P. alsinifolium* seems to be a coastal species in Crete ("ad litora maris", Rechinger 1943a: 132), certainly uncommon, although possibly sometimes overlooked. Rechinger (1943b: 69) collected *P. tetraphyllum* s.l. without reference to an infraspecific taxon from perhaps the same beach ("Schotterstrand an der Bucht Mawrijalos bei Guduras").

Stellaria media (L.) Vill.
N. Irakliou, Ep. Kenourgiou: Near Nyvritos (between Zaros and Gergeri) (35°07'39"N, 24°56'26"E), ploughed ground in olive plantation, dominated by *Oxalis pes-caprae* L., together with *S. cupaniana* Nyman, 480 m, 14.4.2008, *Bergmeier 08-38.*

This record, together with other observations not cited here, corroborates the statement of Böhling & Raus (in Greuter & Raus 1999: 52) that *S. media* s.str. is frequently found in man-made habitats in Crete, as previously suggested by Jahn & Schönfelder (1995). The exclusion of the species in the Cretan area by Strid (in Strid & Tan 1997: 195 & map 369) had conveyed a different impression.

Convolvulaceae

Dichondra micrantha Urban
N. Chanion, Ep. of Kydonia: Platanias (35°31'06"N, 23°54'27"E), irrigated flowerbed, 3 m, 3.6.2009, *Bergmeier 09-102.*

New to W Crete (N. Chanion). This xenophyte is established in Crete in irrigated and trampled habitats (see Bergmeier in Greuter & Raus 2007). The new gathering is remarkable as it includes not only sterile but also fruiting plants.

Cyperaceae

Carex riparia Curtis
N. Irakliou, Ep. Viannou: Ano Viannos (35°03'00"N, 25°24'01"E), wetland, locally the dominant species in a reedbed of about 500 m², 475 m, 25.6.2010, *Bergmeier 10-224.*

New to Crete. *Carex riparia* differs from the only other tall rhizomatous sedge known from Crete, *C. hispida* Willd., in the longer and glabrous shining utricles which are ovate-inflated rather than compressed-trigonous, the longer beak, much longer female bracts, wider leaves (but only to 12 mm in Cretan plants) and red-tinged sheaths.

Eleocharis multicaulis (Sm.) DC.
N. and Ep. Rethymnou: W of Myriokefala, S of Asi Gonia (35°15'25"N, 24°16'43"E), spring fen in phyllite-quartzite area with *Carex troodi* Turrill, *Lathyrus neurolobus* Boiss. & Heldr., *Scirpoides holoschoenus* (L.) Soják and *Sibthorpia europaea* L., 695 m, 18.6.2010, *Bergmeier 10-156a.*

Eleocharis multicaulis is a species of Atlantic-Mediterranean wetlands with easternmost occurrences in the Selinos area in western Crete. This is a new locality of this rare and regionally endangered species and the easternmost known in Crete and Europe. The fruits in my collection are typically triquetrous and the upper leaf sheath is obliquely truncate. The area is known for other rare species of wet or seasonally moist habitats including the local endemic *Filago wagenitziana* (Bergmeier 2010), *Lathyrus neurolobus* (easternmost occurrence) and *Sphagnum denticulatum* Brid. (single occurrence in Crete; see also above under *Cerastium deschatresii* and below under *Schedonorus pluriflorus*).

Eleocharis uniglumis (Link) Schult.
N. Irakliou, Ep. Viannou: Omalos plain (35°04'15"N, 25°27'14"E), polje with sheep-grazed seasonally wet grassland, 1330 m, 24.6.2010, *Bergmeier 10-212.*

Eleocharis uniglumis is a halotolerant wetland species widespread in Europe but rare in Crete where it was recorded chiefly in coastal wetland sites. This is by far the highest locality known in the Aegean, thus extending the altitudinal range (0–100 m) given in Jahn & Schönfelder (1995). The species is endangered in Crete.

Dipsacaceae

Lomelosia sphaciotica (Roem. & Schult.) Greuter & Burdet subsp. ***decalvans*** (Halácsy) Bergmeier, **comb. in stat. nov.** ≡ *Scabiosa sphaciotica* Roem. & Schult. var. *decalvans* Halácsy, Consp. Fl. Graec. 1: 766. 1901 ≡ *Lomelosia sphaciotica* (Roem. & Schult.) Greuter & Burdet var. *decalvans* (Halácsy) R. L. Jahn ≡ *Scabiosa sphaciotica* Roem. & Schult. subsp. *decalvans* (Halácsy) Rech. f.
N. Rethymnou, Ep. Mylopotamou: Psiloritis, Nida plateau (35°12'17"N, 24°50'17"E), sheep-grazed pasture, 1355 m, 14.4. 2008, *Bergmeier 08-43;* N. Lasithiou, Ep. Ierapetras: Mount Dikti (Lasithiotika), S of the summit of Agios Pnevma (35°06'28"N, 25°29'01"E), dry mountain pasture with fine-grained soil, also sheep-grazed doline ground dominated by *Pimpinella depressa* and *Dactylis rigida,* 1770 m, 26.6.2010, *Bergmeier 10-233.*

Lomelosia sphaciotica subsp. *sphaciotica* is an endemic of the Lefka Ori, while subsp. *decalvans* is restricted to the central and east central mountains of Psiloritis and Dikti. The eastern taxon has glabrous peduncles and its indumentum is generally much less dense than in subsp. *sphaciotica* so that the leaves are greyish green rather than whitish. Moreover, the taxa are also ecologically different, with subsp. *sphaciotica* being a characteristic plant of dolomite scree habitats (see Bergmeier 2002) while the eastern taxon occurs in mountain phrygana and dolines on fine-grained and gravelly soil. Due to their morphological and ecological differences and geographical vicariance, the concept of subspecies seems appropriate for the two Cretan endemic taxa.

Euphorbiaceae

Chamaesyce serpens (Kunth) Small (≡ *Euphorbia serpens* Kunth)
N. Chanion, Ep. of Kydonia: Platanias (35°31'04"N, 23° 54'26"E), between paving stones, 3 m, 3.6.2009, *Bergmeier 09-104.*

New to W Crete. This xenophyte is one of four alien species of the genus known to occur in Crete and has been found hitherto only in central Crete (Limenas Chersonisou, N Irakliou; Bergmeier in Greuter & Raus 2007).

Fabaceae

Anthyllis vulneraria L. subsp. ***pindicola*** Cullen
N. Chanion, near the Eparchia frontiers of Kidonia and Sfakia, Lefka Ori, doline 550 m WNW of summit of Mt Mavri (35°21'29"N, 24°01'25"E), 1900 m, 6.6.2009, *Bergmeier 09-129* (dupl. in MO); found at a hint from N. Turland; collecting made possible by J. Bienvenu.

New to Crete and the Cretan area. This yellow-flowered kidney-vetch of S Balkanic distribution is in Crete a facultative chasmophyte, growing on ledges of a vertical limestone cliff surrounding a deep snow-filled doline. Plants belonging here were collected in a nearby site by D. Tzanoudakis ("*A. vulneraria* ssp.", UPA *1531*!, "Lefka Ori, supra pagum Kampi in loco 'Milea', c. 1650 m") on 7.6.1974. The next occurrences of *A. vulneraria* subsp. *pindicola* are on Mt Taiyetos, Peloponnese, and probably on Mt Dikti in E Crete (N. Böhling, unpubl.).

Trifolium phitosianum N. Böhling & al.
N. Chanion, Ep. Selinou: above Koutsogerako (35°16' 19"N, 23°51'33-35"E), assemblages of annuals in openings of *Quercus coccifera-Cupressus* woodland, 1220 m, 27.4.2007, *Bergmeier 07-130, 07-131;* N. Irakliou, Ep. Kenourgiou: Forest of Rouvas, N of Zaros (35°10'45"N, 24°54'40"E), *Quercus coccifera* woodland over limestone, 1010 m, 13.4.2008, *Bergmeier 08-23.*

New to western and central Crete (prefectures of Chania and Iraklio). This annual species, described by Böhling & al. (2000), was known as a narrow endemic of E Crete (N. Lasithiou, see map provided by Böhling & al. 2000: 42). Own records suggest that it is scattered in this area and occurs chiefly in *Pinus brutia* woodland: Dikti: above Kato Simi, *Bergmeier 08-50* (dupl. MO), *08-53;* Dikti: Selikanos, *Bergmeier 08-73;* Mt Thryptis, *Bergmeier 08-94, 08-96*. The new records make *Trifolium phitosianum* a Cretan regional endemic and confirm that it is a species of mountain woodlands. The occurrence in the W Cretan site of two variants with different flower colour is particularly remarkable as this was not observed in other populations; the local population (and the collections) include plants with typically brownish purple flowers as well as others with a dull yellow colour.

Trifolium praetermissum Greuter & al.
N. Lasithiou, Ep. of Ierapetra: Foot of a hill named 'Chalepa' NE of Pachia Ammos (35°06'26"N, 25°49'39"E), annual-rich vegetation on terra rossa between *Juniperus phoenicea,* 45 m, 18.4.2008, *Bergmeier 08-110.*

While this is the third published record for Crete, R. Jahn kindly communicated two more collections from Ep. of Ierapetra: Cliff-range Homatas 2.4 km NNW of village Kavousi, small valley S of top (35°08'33"N, 25°50'50"E), phrygana on limestone slope dominated by *Thymbra capitata,* with *Sarcopoterium spinosum* and *Phlomis lanata*, 40 m, 14.4.1992, *Jahn 19920414-6*; Ep. of Sitia: Northern slope of Mt Petsofas 2.1 km SEE of Palekastro (35°11'29"N, 26°16'37"E), phrygana on limestone slope dominated by *Thymbra capitata,* with *Salvia fruticosa* and *Pistacia lentiscus*, 50 m, 16.4.1993, *Jahn s.n.* This rare regional endemic has moreover several localities on the island of Karpathos (see map in Böhling & al. 2000: 42).

Geraniaceae

Erodium aethiopicum (Lam.) Brumh. & Thell.
N. Lasithiou, Ep. of Ierapetra: Island of Chrisi (Gaidouronisi) (34°52'38"N 25°41'58"E), sandy beach along the north coast, 1 m, 9.4.2009, *Bergmeier 09-34.*

New to E Crete (N. Lasithiou); otherwise known in the Cretan area only from the island of Gavdos (Bergmeier & al. 1997, as *E. cicutarium* subsp. *bipinnatum* (Desf.) Tourlet).

Erodium chium (L.) Willd.
N. Lasithiou, Ep. Mirambelou: Agios Nikolaos, Sarolidi Street (35°11'25"N, 25°43'19"E), annual ruderal vegetation at wall base, 8 m, 6.4.2010, *Bergmeier 10-72.*

New to Crete, but known from Karpathos (Greuter & al. 1983); see also map in Dahlgren (1980: 493).

Isoetaceae

Isoetes durieui Bory
N. Rethymnou, Ep. of Agios Vasilios: NW of Akoumia (SE of Spili) (35°10'23"N, 24°34'14"E), seasonally wet site, gravelly soil, with *Juncus capitatus*, *Lotus angustissimus* and *L. conimbricensis,* 435 m, 10.4.2010, *Bergmeier 10-129.*

Third record for Crete after the findings of Böhling & Raus in 1999 (Omalos plain, Dikti, Ep. Viannos, in Greuter & Raus 2000: 229) and Bergmeier in 2000 (SE of Prasies, Ep. Rethymno, Bergmeier & Abrahamczyk 2008: 443).

Isoetes velata A. Braun
N. Irakliou, Ep. Viannou: Dikti, SE part of the plain of Omalos (35°04'13"N, 25°27'22"E), seasonally with stagnant water but dry from May/June, sheep-grazed, 24.6. 2010, *Bergmeier 10-202.*

First recorded from the S Aegean by N. Böhling (the species is mentioned in Böhling & al. 2002, voucher specimens in B communicated by T. Raus refer to the Omalos pond of Mt Dikti: *Böhling 5682 & 5695*, 13.5.1997) and

found in the same locality by S. Brullo (without details; pers. comm. in 2001 and 2005 to R. Jahn). The plants in my collection show the typical small megaspores, 0.4 mm, rounded tetragonal, without tubercles (see Prada in Castroviejo & al. 1986, 17ff.); immature unidentifiable *Isoetes* plants were collected nearby on 15.4.2008 (*Bergmeier 08-61*); *I. durieui* (see above) is another species found on the Omalos plain of Mt Dikti by N. Böhling & T. Raus (in Greuter & Raus 2000: 229).

Juncaceae

Juncus minutulus (Albert & Jahand.) Prain
N. Irakliou, Ep. Kenourgiou: Mt Asterousia, between Krotos and Miamou (34°57'52"N, 24°57'25"E), field margin with loamy periodically wet soil, 435 m, 7.4.2010, *Bergmeier 10-98;* also observed in 2009 on the Omalos plateau (35°20'06"N, 23°54'07"E, 1060 m, N Chanion, Ep. of Kydonia).

New to W and EC Crete; given only for the Nomos of Rethymno in Jahn & Schönfelder (1995). R. Jahn kindly communicated a record from the Ep. of Rethymno: W slope of Avlohi hill, E of river Petres, 1 km N of Old Road (35°19'15"N, 24°22'23"E), damp soil in phrygana on flat ground, 15 m, 2.4.1995, *Jahn s.n. Juncus minutulus* is a tiny easily overlooked annual which, although uncommon, is probably more widespread in Crete than the few records suggest.

Plantaginaceae

Plantago coronopus L. subsp. ***coronopus***
N. Chanion, Ep. of Kydonia: NW of Souda (35°29'36"N, 24°03'33"E), salt marsh at the shores of the riparian lagoon of Moronis, 0 m, 19.6.2010, *Bergmeier 10-171.*

New to Crete. According to a sign displayed, the lagoon and its surroundings are part of a protected area numbered 347, named 'Pera'. The shore and salt marsh is nevertheless threatened by rubbish disposal. *Plantago coronopus* (s.str.?) has been observed by Rechinger (1943b: 130) in E Crete (near Sitia) but the record was never confirmed and considered doubtful by Greuter & al. (1986) and Jahn & Schönfelder (1995).

Plantago crassifolia Forssk.
N. Iraklion, Ep. of Pediada: Analipsi (35°20'03"N, 25° 19'52"E), salt marsh landward behind the beach, 0 m, 17.6.2010, *Bergmeier 10-142.*

New to Crete and the Cretan area. *Plantago crassifolia* is critically endangered in its single known locality since the said salt marsh is under severe pressure by off-road traffic, tourism and as storage area for construction materials. It is one of the last, and to my knowledge the most extensive, salt marsh left in the otherwise densely built-up area along the north central Cretan coast.

Plantago crypsoides Boiss.
N. Chanion, Ep. of Kydonia: Omalos plateau, central part (35°20'06"N, 23°54'07"E, 1045 m, pasture, abandoned arable field), and western part (35°19'36"N, 23°53'34"E, 1060 m, sheep-grazed pasture), 7.6. 2009, *Bergmeier 09-154* (dupl. MO), *09-156*.

New to the Cretan area and the territory of Greece. This annual species of chiefly North African distribution is otherwise known in Europe only from Malta (Greuter & Raus 1989).

Plantago indica L. (= *P. arenaria* Waldst. & Kit.).
N. Chanion, Ep. of Kydonia: Platanias (35°31'08"N, 23°54'32"E), sandy beach, unbuilt site, 1 m, 3.6. 2009, *Bergmeier 09-107.*

Confirmed for the Cretan area. While Rechinger (1943a) lists records from Raulin and Gandoger from W Crete, among others from Platanias, several other findings date from the 1980s and 1990s (Strasser 1981; Strasser 1988; Zaffran 1990; Mayer 1995), although some of them may require confirmation. To my knowledge, there is no record in the more recent literature. This annual of sandy coastal habitats is critically endangered in its single locality known to me on Crete. The nomenclature adopted here follows Brummitt (2009: 281, par. 1714).

Plantago phaeostoma Boiss. & Heldr.
N. Lasithiou, Ep. of Sitia: Koufonisi island, near NW corner of island (34°56'45"N, 25°29'59"E); subhalophytic margin of clay pan with *Suaeda palaestina*, 20 m, 5.4.2009, *Bergmeier 09-13* (dupl. MO).

New to the Cretan area and Europe; otherwise occurring in North Africa and the Near East. This is another species of Near East and North African distribution which reaches Greece and Europe only on the island of Koufonisi. Others are *Ononis vaginalis* Vahl and *Suaeda palaestina* Eig & Zohary (Bergmeier & al. 2001).

Veronica agrestis L.
N. Chanion, Ep. Sfakion: Ammoudari (2.5 km WSW of Askyfou), 0.8 km NNE of the settlement (35°17'57"N, 24°10'27"E), limestone mountain phrygana, E-facing slope, 945 m, 27.5.2009, *M. Chytrý, Z. Rozbrojová, E. Hettenbergerová & J. Božková s.n.* (BRNU).

Rechinger (1943a) lists localities in the west and central Cretan prefectures of Chania, Rethymno and Iraklio. No post-1930 records of this species from Crete were known to Turland & Chilton (2008) but R. Jahn kindly communicated other recent findings: Ep. Amariou: Chondrada, doline 148 (35°10'15"N, 24°45'55"E, 1040 m) (Egli 1993); N. Chanion, Ep. Kydonias: Neriana, near main road (35°29'10"N, 23°48'44"E, 70 m), 17.4.2010, *Jahn s.n.*; Ep. Apokoronou: S slope of hill Ganadé between Kalamitsi Alexandrou and Kalamitsi Amigdali (35°23'02"N, 24°14'06"E, 280 m), 25.3.1993, *Jahn s.n.*, as well as three more collections near the road from Vrises to Imbros.

Poaceae

Aegilops markgrafii var. ***polyathera*** (Boiss.) K. Hammer
N. Irakliou, Ep. Temenou: Iraklio, Airport (35°20'12"N, 25°10'19"E), embankment with ornamental plants, 40 m, 12.4.2008, *Bergmeier 08-14.*

New to the Nomos of Iraklio. This taxon was collected by Dörfler in 1904 from the Nomos of Rethymno, Agia Galini ("Hag. Galinis", Rechinger 1943a: 767) (see also Böhling & Scholz 2003, as *Aegilops caudata* L. subsp. *polyathera* (Boiss.) Zhuk.) and more recently by V. Schubert near Elounda (N of Lasithi) (see Weidner 2004: Anhang 2) and by R. Jahn (pers. comm.).

Aira elegantissima subsp. ***ambigua*** (Arcang.) Doğan
N. Chanion, Ep. of Kydonia: Omalos plateau, western part (35°19'36"N, 23°53'34"E); sheep-grazed pasture, 1060 m, 7.6.2009, *Bergmeier 09-150a.*

New to W Crete (N. Chanion). Böhling & Scholz (2003) were the first to refer to the presence of this subspecies with both lemmas awned and relatively tall stature in the Cretan area, indicating two records in the prefectures of Iraklio and Lasithi.

Brachypodium glaucovirens (Murb.) Sagorski
N. Chanion, Ep. Apokoronou: *Paspalum*-dominated wet grassland patch near roadside at the margin of Dramia (35°20'41"N, 24°18'32"E), 37 m, 18.6.2010, *Bergmeier 10-151;* near Metamorfosi, W of Dramia, and also seen between Dramia and Episkopi (35°20'50"N, 24°17'47"E; 35°20'28"N, 24°17'49"E), roadside ditches with ruderal vegetation, 5 m, 40 m, 8.6. 2009, *Bergmeier 09-157.*

This is an uncommon and neglected species of humid or moist sites of SE Mediterranean distribution. It was recorded as new to Crete by Rechinger (1943b: 172) from near Chania, but subsequently neglected as a synonym of *Brachypodium sylvaticum* (Huds.) P. Beauv. (as such in Böhling & Scholz 2003). The taxonomic identity, distinctness and wider distribution of *B. glaucovirens* was recently clarified by Scholz (2007). From Crete, Scholz (2007) cites one record each from the prefectures of Chania, Rethymno and Iraklio. The plants differ from *B. sylvaticum* in their more erect spikes. In Cretan plants of *B. glaucovirens* I found long spikelets with 11–16 florets, glabrous glumes and lemmas, relatively short awns, and leaves and sheaths glabrous except for the nodes; Cretan plants of *B. sylvaticum* had laxer spikes, less than 10 (mostly 7-9) florets per spikelet, and leaves and especially lower sheaths were hairy.

Crypsis aculeata (L.) Aiton
N. Irakliou, Ep. of Pediada: Analipsi (35°20'05"N, 25°19'45"E), seasonal pond in salt marsh behind the beach, 0 m, 4.9.2007, 17.6.2010, *Bergmeier 07-529, 10-147, 10-148.*

Confirmed in Crete and the Cretan area after almost 70 years approximately 20 km E of Rechinger's locality ("Niederung zwischen den Flüssen Almyros und Gazanos bei Gazi", Rechinger 1943b); see also map in Böhling & Scholz (2003: 39).

Crypsis schoenoides (L.) Lam.
N. Irakliou, Ep. of Pediada: Between Analipsi and Kato Gouves, stream of Aposelemis (35°19'47"N, 25°20'00"E), seasonally flooded streambed, loamy soil, 2 m, 4.9.2007, *Bergmeier 07-534*.

Apart from four 19th and early 20th century records from W Crete (Rechinger 1943a: 799, as *Heleochloa schoenoides*), this is the fourth modern record after findings from Böhling in 1997 and 1998 from east central Crete (see map in Böhling & Scholz 2003: 39) and Boteva & Wolf in 1999 (in Greuter & Raus 2000: 241). This rare summer-annual grass grows late in the year in seasonally flooded muddy habitats. Due to its rarity and habitat requirement it must be considered vulnerable in Crete.

Elytrigia atherica (Link) Kerguélen
N. Chanion, Ep. of Kydonia: NW of Souda (35°29'35"N, 24°03'34"E), disturbed margin of a salt marsh at the riparian lagoon of Moronis, 0 m, 19.6.2010, *Bergmeier 10-165.*

New to Crete, or rather a confirmation of an older record further west (Platanias, Damanakis & Economidou 1986) which was not accepted in the checklist of Böhling & Scholz (2003). The plants found were shortly rhizomatous, had spikes with strikingly densely set spikelets, acute glumes, and ciliate outer sheath margins. The species appears to be now critically endangered on Crete.

Lamarckia aurea (L.) Moench
N. Irakliou, Ep. of Temenos: City of Iraklio, near harbour and Archaeological Museum (35°20'26"N, 25°08'19"E), urban ruderal site, gravel, 20 m, 30.3.2010, *Bergmeier 10-17;* N. Lasithiou, Ep. Mirambelou: Agios Nikolaos, urban ruderal site above the 'Lake', 35°11'29"N, 25°43'01"E, 15 m, 4.4.2010, *Bergmeier obs*.

Confirming a Heldreich record (Merabello: Aludha) from 1846. According to Böhling & Scholz (2003), three recent records are known for central Crete (prefectures of Rethymno and Iraklio). Further records kindly communicated by R. Jahn: Yanisada *(Runemark 18647)*, Fasas valley *(Kalheber)*, Travoula gorge E of Lentas (*Jahn obs.,* 19.4.2010), Agios Vasilios: 500 m SW Ag. Georgios (*Jahn,* 17.4.1994).

Melica magnolii Gren. & Godr.
N. Chanion, Ep. Sfakion: Village of Asfendos (35°14'31"N, 24°12'41"E), dry rocky ruderal site, 745 m, 8.6.2009, *Bergmeier 09-172.*

The species occurs probably in all Cretan prefectures (Jahn & Schönfelder 1995) but the *M. ciliata* group was not differentiated by Böhling & Scholz (2003). In the present locality two taxa of this species group were found together: *M. magnolii* (in Hempel 2009 as *M. ciliata* subsp. *magnolii* (Gren. & Godr.) K. Richt.) and *"M. cili-*

ata" (*Bergmeier 09-171;* according to Hempel 2009 the Cretan plants belong to *M. transsilvanica* Schur subsp. *klokovii* Tzvelev). *M. magnolii* differs from the latter by its panicle which is more lobed and cuneate at the base rather than rounded.

Parapholis filiformis (Roth) C. E. Hubb.
N. Chanion, Ep. of Kydonia: NW of Souda (35°29'38"N, 24°03'39"E), salt marsh at the shores of the riparian lagoon of Moronis, 0 m, 19.6.2010, *Bergmeier 10-166.*

Not listed for the Cretan area in recent floras and checklists but in fact a confirmation of Raulin's record from "Suda" (Rechinger 1943a). Raulin collected this halophilous annual grass probably in 1845, 165 years ago, in what may well be exactly the same locality as today. Raulin's record was not accepted in the checklist of Böhling & Scholz (2003).

Phragmites frutescens H. Scholz
N. Lasithiou, Ep. of Sitia: Kato Zakros (35°05'43"N, 26°15'45"E), reed bed along the estuary mouth of the stream of Zakros, 0 m, 13.4.2009, *Bergmeier 09-71.*

New to E Crete. This tall branched reed grass was described as late as 1996 and subsequently found widespread in the E Mediterranean. Scholz & Böhling (2000) demonstrated its differences from the frequently co-occurring *P. australis* (Cav.) Steud. In Crete, numerous records of *P. frutescens* from the western and central part are known but, according to Böhling & Scholz (2003), there was hitherto no record from the Nomos of Lasithi.

Polypogon monspeliensis (L.) Desf.
N. Irakliou, Ep. Viannou: Omalos plain (35°04'14"N, 25°27'14"E), sheep-grazed seasonally wet grassland, 1325 m, 24.6.2010, *Bergmeier 10-208.*

While widespread and not uncommon in the Cretan lowlands this record extends considerably the altitudinal range as communicated in Böhling & Scholz (2003) and Jahn & Schönfelder (1995) (0–600 m).

Schedonorus pluriflorus (Schult.) Bergmeier & H. Scholz, **comb. nov.** ≡ *Festuca pluriflora* Schult., Mant. 2: 402. 1824 ≡ *Schedonorus pratensis* (Huds.) P. Beauv. subsp. *pluriflorus* (Schult.) H. Scholz ≡ *Festuca multiflora* C. Presl, Cyper. Gram. Sicul. 37. 1820, non Walter, Fl. Carol. 81. 1788.

N. and Ep. Rethymnou: W of Myriokefala, S of Asi Gonia (35°15'25"N, 24°16'43"E), spring fen in phyllite-quartzite area with *Carex troodi, Lathyrus neurolobus, Scirpoides holoschoenus* and *Sibthorpia europaea,* 695 m, 18.6.2010, *Bergmeier 10-155;* N. Irakliou, Ep. Viannou: NW end of Omalos plain (35°04'18"N, 25°27'08"E), rush fen and wet pasture near spring with *Juncus heldreichianus* dominating, 1330 m, 24.6.2010, *Bergmeier 10-206* .

New to east central Crete (N. Irakliou) and the easternmost locality known of this taxon. Both records are much higher than my previous records cited in Böhling & Scholz (2003: 75). Species rank seems appropriate for this taxon which is known otherwise only from Sicily and the Greek mainland. It differs from the widespread European meadow grass *Schedonorus pratensis* (Huds.) P. Beauv. (≡ *Festuca pratensis* Huds.) by its awned lemmas, somewhat smaller spikelets, less robust habit and habitat preferences. *S. pluriflorus* is a rare wetland species and a vulnerable taxon in Crete.

Polygonaceae

Rumex cristatus DC.
N. Chanion, Ep. of Kydonia: Meskla (SE of Alikianos) (35°24'02"N, 23°57'16"E), ruderal village site with seasonally moist soil vegetated with *Anthemis cotula* L., *Brassica geniculata* (Desf.) Snogerup & B. Snogerup, *Melilotus indicus* (L.) All., *Rapistrum rugosum* (L.) All. and *Trifolium spumosum* L., 215 m, 5.6. 2009, *Bergmeier 09-124, 124b.*

In the same year (2009) found in two localities in the prefectures of Chania and Iraklio and reported as new to Crete by R. Jahn (in Greuter & Raus 2009). Further records (communicated by R. Jahn): Therisos, 200 m N Venizelos monument (35°24'21"N, 23°59'05"E, 700 m), 11.5.1996, *Jahn s.n.* (immature specimen); banks of Tavronitis river 1.1 km NNE of Neo Chorio (35°28'37"N, 23°48'24"E, 80 m), 17.4.2010, *Jahn obs. & photo.*

Rumex obtusifolius subsp. ***subalpinus*** (Schur) Rech. f.
N. Chanion, Ep. Apokoronou: Asi Gonia (35°16'23"N, 24°16'51"E), ruderal village site, 390 m, 8.6.2009, *Bergmeier 09-166.*

Third record for Crete. First published by Böhling & Snogerup (in Greuter & Raus 2000: 239) from Anisaraki, Ep. Selinou. The species was also recorded from Sasalos (Ep. Kissamou) by Turland & al. (2004: 404).

Potamogetonaceae

Althenia orientalis (Tzvelev) García Mur. & Talavera
N. Lasithiou, Ep. of Sitia: Chiona (NE of Palekastro) (35°11'48"N, 26°16'39"E), seasonal maritime pond landward of the beach, 0 m, 13.4.2009, *Bergmeier 09-69.*

New to the Cretan area. Endangered in its single known locality in Crete. *A. orientalis* differs from *A. filiformis* Petit chiefly by the single nerve of the leaves (lateral nerves are lacking) and by the lack of stipule nerves (García Murillo & Talavera 1986; Talavera & García Murillo in Talavera & al. 2010). Koumpli-Sovantzi & Yannitsaros (2010), in their contribution to the Red List of Greece, treat *A. filiformis* in a wide sense, including *A. orientalis*. In Greece, *A. filiformis* s.l. is considered Endangered (Koumpli-Sovantzi & Yannitsaros 2010). It is indicated only from the Cycladian island of Naxos and from Attiki. Both records are likely to be referable to *A. orientalis,* as *A. filiformis* s.str. is, according to current knowledge, an endemic of S France and Italy. The

Cretan population consists of plants matching the typical subspecies of *A. orientalis* according to the description provided by García Murillo & Talavera (1986). Fruits of the plants in my collection are typically narrowly ovate, 2 × 1 mm, with long style and short pedicel.

Zannichellia pedunculata Rchb.
N. Lasithiou, Ep. of Sitia: Chametoulo (E Ziros) (35° 03'07"N, 26°11'12"E), karst pool, 525 m, 11.4.2009, *Bergmeier 09-60.*

New to E Crete (N. Lasithiou). The species is otherwise known only from the island of Gavdos (Ep. Selinou; Bergmeier & al. 1997, as *Zannichellia palustris* subsp. *pedicellata* (Wahlenb. & Rosén) Hegi). It is possible that *Z. pedunculata* is the most widespread or even the only member of the *Z. palustris* group occurring in Crete.

Rubiaceae

Galium parisiense L.
N. Chanion, Ep. of Kydonia: Omalos plateau, central part (35°20'06"N, 23°54'07"E), pasture, abandoned field, 1045 m, 7.6.2009, *Bergmeier 09-151*.

New to the Cretan area. The annual species is similar to *Galium divaricatum* Lam. but differs, among others, in the shape of the inflorescence which is much longer than wide due to the relatively short partial inflorescences.

Galium verrucosum Huds.
N. Lasithiou, Ep. of Sitia: 3 km S of Ziros (35°03'01"N, 26°07'59"E), arable field, fallow, red loamy soil, 565 m, 10.4.2009, *Bergmeier 09-49.*

Reconfirmed for E Crete. Recent records of this rare arable weed of traditional agriculture refer to few sites in W Crete (Turland & al. 2004; Bergmeier 2005, 2006) and one from N Lasithiou, Mt Thripti (Egli 1993).

Solanaceae

Nicandra physalodes (L.) Gaertn.
N. Irakliou, Ep. Temenou: Port of Iraklio (35°20'41"N, 25°09'16"E), ruderal vegetation on earth deposit, 2 m, 31.3.2010, *Bergmeier 10-33.*

First mentioned by Gandoger (1916) from two locations in the region of Chania, then as established alien species in orange plantations near Fodele (Kull & Diamantoglou 1998); the present record represents a casual occurrence.

Bryophytes

Amblystegiaceae

Drepanocladus aduncus (Hedw.) Warnst.
N. Irakliou, Ep.Viannou: Dikti, Omalos plain above Kato Symi and Ano Viannos (35°04'14"N, 25°27'14"E), seasonally flooded sheep-grazed grassland, 1320 m, 24.6.2010, *Bergmeier s.n.* (dupl. in E).

New to Crete. This almost cosmopolitan species has not been found anywhere in Crete before (Düll 1995; Blockeel, in litt.). The nearest known localities are in Peloponnese (Düll 1995: 54).

Acknowledgements

I am much obliged to Nicholas Turland for his invitation to the research-project 'Human recreation versus plant diversity on maritime sands in Crete' (the immediate floristic results of this project will be published elsewhere) and the National Geographic Society for a travel grant (NGS grant no. 8573-08) which supported field investigations in spring 2009, among others, in SE Crete and the islands of Chrisi and Koufonisi. Travels in W Crete in spring 2008 were funded through the LIFE-NATURE project 'A pilot network of plant micro-reserves in western Crete' ('Cretaplant', LIFE 04/NAT/GR/000104). Thanks are due to H. Scholz for his advice and confirmation of the identity of, among other grasses, *Elytrigia atherica,* Thomas Blockeel for his identification of *Drepanocladus aduncus,* and to Jiri Danihelka and Milan Chýtrý, Brno, who collected and produced the *Veronica agrestis* specimen and kindly made the record available for this paper. I also thank my wife Ute Bergmeier for her company and assistance in the field during many excursions. The two reviewers, Ralf Jahn and Nicholas Turland, provided further records and helped substantially to improve the paper.

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