

New phytogeographic division record for *Bituminaria bituminosa* (*Fabaceae*) in Cyprus

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Abstract. – In Cyprus, *Bituminaria bituminosa* s. l. was known hitherto to occur along the Pentadactylos range, which falls in the phytogeographic division 7. Recently, plants from this range have been described as a new endemic species, *B. kyreniae*, and characterised as an obligate chasmophyte on south-facing cliffs of the Pentadactylos range. Herewith, we report the first record of the species in the wide sense, beyond its originally recorded phytogeographic range since 1977, at the southern part of the island, in the phytogeographic division 3.

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Introduction

The genus *Bituminaria*, member of the bean family (*Fabaceae*), consists of ten accepted species, ranging from Macaronesia to the Mediterranean, the Caucasus and the Arabian Peninsula. *Bituminaria bituminosa* (L.) C. H. Stirt., commonly known as “pitch trefoil” or “Arabian pea”, has a native range spanning from Macaronesia, to the Mediterranean and Caucasus (POWO 2024). The currently prevailing name *B. bituminosa* was published by Stirton (1981). Meikle (1977) referred to the species as *Asphaltium bituminosum* (L.) Fourr. as being common in St. Hilarion and Kyrenia area, synonymous to *Psoralea bituminosa* L., both of which were later synonymized to *B. bituminosa* (Hand & al. 2011).

The species is an erect perennial herb with a woody base, growing up to 140 cm high. It has blue to violet flowers, blooming between April and June. Its distinctive smell, resembling asphalt, gave the species its name, derived from the latin bitumen/-minis (asphalt), hence the synonym *Asphaltium bituminosum*. This intense “oil” arises from a combination of substances including alcohols, sesquiterpenes, hydrocarbons, furanocoumarins, phenol derivatives and sulphurated compounds found in the plant’s volatile oil (Tava & al. 2007).

In 2015, Giusso Del Galdo & al., described a new species, *B. kyreniae*, restricted to the cliffs of Kyrenia range. They consider the Cypriot population of *Bituminaria* as an obligate chasmophyte, growing exclusively on the crevices of south-facing steep limestone cliffs at elevation of 500–900 m a.s.l. The authors suggested that the sampled population differed from *B. bituminosa*, based on macro- and micro-morphological features and ecological requirements, favoured by rupestrian habitats, in contrast to *B. bituminosa* populations which are associated with dry grasslands or anthropogenic habitats. The current discovery of a small *B. bituminosa* population on

the south coast of Cyprus (phytogeographic division 3), recorded for the first time outside the phytogeographic division 7, is discussed in this context.

Distribution and new recorded location

All specimens of *B. bituminosa* cited in the Flora of Cyprus (Meikle 1977) originate from phytogeographic division 7 (Fig. 1), where it is considered as common especially in St. Hilarion and Kyrenia areas, as well as at Halevga, Kornos and Yaïlas, inhabiting dry, rocky, limestone hillsides, at an altitude of 400–760 m.

Giusso Del Galdo & al. (2015) examined individuals of *B. bituminosa* from the same areas, growing on the south-facing cliffs of Kyrenia range (Pentadactylos), and proposed treating the Cypriot population as a new species, *B. kyreniae*, based on distinct morphological features (mainly on the indumentum, leaves, inflorescences, flowers, pods and seeds) and ecological requirements (obligate chasmophyte). They also provided a distribution map of the species (Fig. 1) and recorded sites including Buffavento Castle, St. Hilarion Castle, Halevga, Kornos and Yaïlas (division 7) at an altitude of 500–900 m.

Hand & al. (2011) recommended that the species in Cyprus should be, for the time being, treated broadly following Meikle's (1977) classification; thus, further investigation and study is required to clarify the status of the taxon in Cyprus.

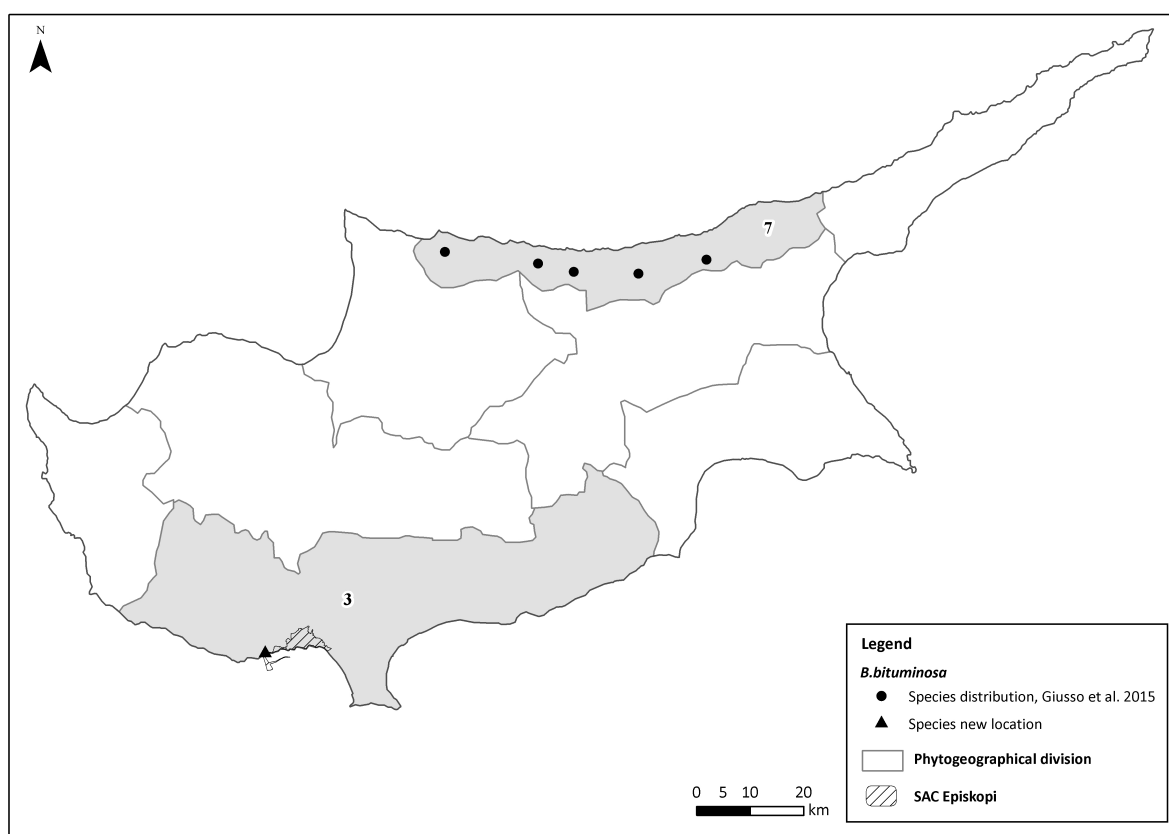


Fig. 1: Updated distribution of *Bituminaria bituminosa* in Cyprus. – Athina Papatheodoulou.

During a botanical survey on January 3, 2024, in the Avdimou Bay beach area, we recorded a small population of 5–10 individuals of *B. bituminosa* growing in small patches on the east-facing slope of a cliff (approximately 25 % inclination), among limestone rocks. Two specimens were collected and deposited in two Cypriot herbaria (Fig. 2 and 3). The collected specimens were young, bearing only basal leaves, approximately 20 cm in stem height and 40 cm in root length. When rubbed, the leaves emitted a distinctive, tar-like odour. The small population was revisited on May 20, 2024 and seeds were collected .

This finding marks the first record of the species outside phytogeographic division 7. The new recorded location, at the base of a limestone cliff (Lefkosia formation), lies on state land, within the “Episkopi Special Area of Conservation” in the Sovereign Base Areas (SBA). The collection data are as follows: Division 3 (sensu Meikle 1977), Avdimou Bay, 5 m, 3.1.2024, *M. Hadjistylli-Stavrinide & A. Papatheodoulou* (Herb. G. Hadjikyriakou no 7790, CYP 6681).



Fig. 2: Characteristic habitat of *Bituminaria bituminosa* at Avdimou beach, 5.3.2024. – Pantelis Charilaou.



Fig. 3: Leaves and taproot of the collected specimen, 3.1.2024. – Margarita Hadjistylli Stavrinide.

Habitat, co-occurring species and ecological requirements

At this site, *B. bituminosa* grows at the lower part of an east-facing calcareous slope, near the coast, at an altitude of 5 metres. While rock outcrops are present on the slope, the plants were found growing in clayey soil (calcaric cambisols and regosols), and gravel, suggesting that the species may not be an obligate chasmophyte as proposed by Giusso Del Galdo & al. (2015) for *B. kyreniae*.

Subsequent monitoring was conducted, to observe the plants' growth stages (Fig. 4 and 5). By May 2024, during the peak of flowering period, the population at the site consisted of twelve individuals (2 reproductive plants bearing seeds and 10 vegetative plants). The coastal-rocky cliff on which the species was recorded, supports sparse scrubby vegetation, dominated by *Asparagus horridus*, *Atriplex portulacoides*, *Phagnalon rupestre*, *Prasium majus* and *Sarcopoterium spinosum*. Surveys conducted in the vicinity of the area, were unproductive in finding additional colonies or isolated plants.

Owing to the very small population and concerns about its viability, in June 2024, seeds were collected, following the ENSCONET seed collecting protocol for wild species (ENSCONET 2009), from plants on the site and planted on the hilltop plain, at an elevation of approximately 30 metres. The area exhibits significant sheet erosion, which could threaten the survival of this small population. The site was re-visited in January 2025, where we confirmed the successful growing of nine small vegetative plants on the hilltop (Fig. 6). At the original growing site we recorded one large plant and 14 small vegetative plants on the slope of the hill and six small vegetative plants on the ground below (Fig. 7).

This finding corroborates Meikle's description of the species inhabiting dry, rocky limestone hillsides, but at a much lower elevation than previously reported for the Kyrenia range (500–900 m), occurring almost at sea level by the beach, on rocky and calcareous substrate, suggesting also tolerance to salt-spray.



Fig. 4: Habitat of the plant on site, before commencing of flowering, 5.3.2024. – Pantelis Charilaou.



Fig. 5: Habitat of the plant on site, during the flowering period, 22.4.2024. – Pantelis Charilaou.

Remarks and proposed conservation and management

This small population of *B. bituminosa* found in Avdimou Bay in Lemesos is the first record of the species beyond its originally recorded phytogeographic range. Further field surveys are needed to determine whether this population is isolated or a fragment of a broader, yet unknown distribution in the island.

At least three other species formerly thought to be restricted along Pentadactylos range (division 7) have been reported from other parts of the island: *Micromeria microphylla*, a chasmophyte growing on hard limestone cliffs near Androlikou (division 1; Christodoulou 2011), *Ferulago cypria*, found at few sites on the Troodos range (division 2; Hadjikyriakou 2004) and *Pimpinella cypria* found at Vouni Panagias (division 2; Hadjikyriakou & al. 2025). These findings along with the discovery of *B. bituminosa*, at Avdimou, suggest that more extensive and consistent monitoring is needed to determine the distribution range of various species across the island and have a better understanding of their ecological requirements, which are critical to their conservation.

The new location of *B. bituminosa*, with different habitat at low elevation near the coast, not only expands its distribution range but also its habitat and ecological requirements, suggesting phenotypic plasticity influenced by the habitat. This could potentially challenge the classification of *B. kyreniae* (sensu Giusso Del Galdo & al. 2015) as an obligate chasmophyte. Indeed, observations indicate that the species in the Pentadactylos range often grows at the base of cliffs, along roadsides and on rocky slopes (pers. obs.

G. Hadjikyriakou & R. Hand), while it can be also found growing in rock crevices outside Cyprus (pers. obs. R. Hand, e. g. in S France). A systematic comparison of several specimens from the two locations (Avdimou and Pentadactylos), in addition to further surveys across similar habitats, is planned. This could be an element to clarify whether the populations from the Pentadactylos range really represent an independent taxon.

The land where *B. bituminosa* was found, is public and part of the “Episkopi Special Area of Conservation”, thus providing opportunities for conservation and management. We recommend a seasonal monitoring scheme to record population stages, numbers and condition. Inclusion in SBA Environment Department’s conservation program is also proposed, with seed collection for ex-situ deposition at the seed banks of Agricultural Research Institute (Athalassa) and Department of Forests (Troodos), as well as in-situ planting in the wider area, in autumn 2025. A survey could also be extended to areas with similar habitat characteristics and coastal slopes, which could provide valuable insights into the species’ distribution and ecological requirements.



Fig. 6: Newly emerged plants, on site where seeds were planted in June 2024, on the hilltop (~30 m altitude) on clay soil and underneath rocks, 10.1.2025. – Margarita Hadjistyli Stavriniide.



Fig. 7: Habitat of the plant on site, one year after the first finding on this location, with older and younger plants, grown this year on clay soil substrate mixed with dried seagrass, 10.1.2025. – Margarita Hadjistylli Stavrinide.

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