Contribution to the orchid flora of mount Simvolo (E Macedonia - NE Greece)

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Abstract

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This is the first review of the 22 orchid taxa growing on Mt. Simvolo (Σύμβολον). All of them are first records for the mountain. Compared to other mountains of E Macedonia (NE Greece), Mt. Simvolo hosts a small number of orchid species, all with a relatively restricted distribution. No endemic or but locally distributed orchids are present, But the record of Serapias parviflora, being the northernmost occurrence in Greece, is phytogeographically relevant.

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Key words: East Macedonia, orchids, distribution.

Introduction

Mount Simvolo is located in E Macedonia (NE Greece), between Pieria basin in the north (south of Mt. Pangeon) and the Aegean coast in the south, and administratively belongs to the prefecture of Kavala. It extends in a WSW to ENE direction and its area is circumscribed by the coordinates 40º 42' to 40º 57' N and 23º 57' to 24º 22' E. To the west, it is bordered by the plain of Strimonas river, whereas to the east it reaches the city of Kavala (Fig. 1). Contrary to other mountainous ranges of E Macedonia, Mt. Simvolo is much lower, a range of hills rather than mountains, peaking at the summit Agriada (693 m a.s.l.). Despite its low-elevation, the area's relief is pronounced, with several streams in deep valleys with steep slopes.

Geologically, the study area belongs to the crystalline mass of Rodopi (MOUNTRAKIS 1985), dominated by extensive masses of igneous rocks (granites) in the eastern part and by limestone, gypsum and marls, and gneiss in the central and western part (ANONYMOUS 1983). From a bioclimatic point of view, the area belongs in two zones. The low-altitude areas pertain to the semi-arid bioclimatic zone with mild winters, whereas the higher altitudes pertain to the subwet zone with mild winters (MAVROMMATIS 1980).

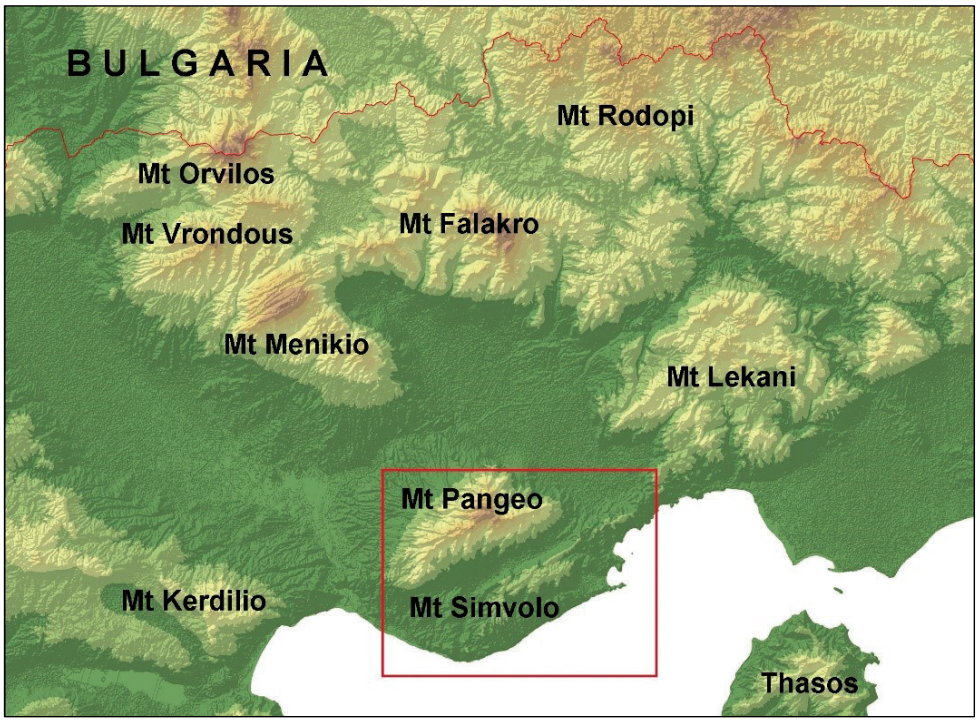


Fig. 1. Map of E Macedonia.

The only published information on the flora and vegetation of Mt. Simvolo is found in the study of ELEFTHERIADOU & al. (2005), who dealt with the woody taxa of the area. The vegetation, especially at the lower levels, is mainly dominated by formations of maquis and pseudo-maquis; and their density depends on and is affected by grazing and wildfires. Contrary to previous times, the wildfires have decreased during the last two decades, and as a result the scrub formations became denser. At higher elevations, in addition to *Quercus coccifera* L., *Carpinus orientalis* Mill., *Fraxinus ornus* L., and *Quercus pubescens* Willd. are present, the latter of which formed extensive forests in the past. In the higher parts of maquis-pseudomaquis zone, especially at elevations of above 500 m, *Q. coccifera* is replaced by *Q. frainetto* Ten., which forms pure stands in sites with favourable conditions. Along permanent water courses, a narrow wooded strip of *Platanus orientalis* L. is found, whereas in eroded or cleared areas, reafforestation with pines have occurred in the past. Natural vegetation formations mostly occur in at higher elevations and where the relief precludes agriculture. In not steeply sloping areas, especially at lower elevations in the western and southern part of the mountain, vineyards or olive groves prevail. In terms of orchid records, Simvolo is the least explored mountain area of E Macedonia (NE Greece). The present study, which presents the orchid flora of that specific area and provides information on the distribution and habitats of the recorded taxa, has been prepared to fill this gap of knowledge.

Material and methods

The data presented here are part of an ongoing project focusing on the distribution and conservation of the orchids of Greece. For that specific purpose, multiple excursions have been performed in various localities and habitats during the period 2010 to 2018. Representative specimens, kept in the author's personal herbarium, were collected exclusively from populations with a large number of individuals. Identifications were made in the field. The nomenclature follows ANTONOPOULOS & TSIFTSIS (2017) and TSIFTSIS & ANTONOPOULOS (2017). For each orchid occurrence, the UTM coordinates (World Geodetic System 1984) of 1 × 1 km grid cells are noted and mapped; and the number of cells and the corresponding vegetation types are mentioned. All taxa have been recorded in two 100 × 100 km grid cells, namely GL (34T UTM zone) and KF (35T UTM zone). For simplification, the UTM zone is not included in the 1 x 1 km grid cell designations.

Results and Discussion

List of taxa

Anacamptis morio subsp. *caucasica* (K. Koch) H. Kretzschmar & al. [14 grid cells: KF5015, KF5017, KF5217, KF5218, KF7422, KF7522, KF7126, KF6527, KF7027, KF6728, KF6730, KF7131, KF7731, KF7932]. In *Erica manipuliflora* and *E. arborea* formations, in openings of *Quercus coccifera* scrub and in grassland.

Anacamptis papilionacea (L.) R. M. Bateman & al. subsp. *papilionacea* [1 grid cell: KF5520]. In openings of heavily grazed *Quercus coccifera* scrub.

Anacamptis pyramidalis (L.) Rich. [6 grid cells: KF5713, KF5614, KF5714, KF7526, GL5017, GL5218]. In grassland and in openings of *Quercus coccifera* scrub.

Cephalanthera longifolia (L.) Fritsch [18 grid cells: KF5013, KF5413, KF5614, KF4717, KF4718, KF5018, KF5218, KF4919, KF5020, KF5120, KF5620, KF5121, KF5523, KF6224, KF6324, KF6425, GL5117, GL5218]. In *Quercus coccifera* shrub formations, in *Quercus frainetto* stands and in pine reforestations.

Dactylorhiza romana (Sebast.) Soó [5 grid cells: KF5721, KF5722, KF5822, KF7422, KF6527]. In *Quercus frainetto* stands and in *Erica manipuliflora* and *E. arborea* formations.

Himantoglossum jankae Somlyay & al. [8 grid cells: KF5017, KF5217, KF5720, KF5721, KF6425, KF6928, KF6929, GL5114]. In openings of *Quercus coccifera* scrub and in pine groves.

Limodorum abortivum (L.) Sw. [6 grid cells: KF5413, KF5815, KF4920, KF6324, KF7733, GL5117]. In *Quercus coccifera* scrub and *Quercus frainetto* stands.

Neotinea tridentata (Scop.) R. M. Bateman & al. [5 grid cells: KF5017, KF4718, KF6928, GL5017, GL5218]. In grassland and in openings of *Quercus coccifera* scrub.

Ophrys apifera Huds. [2 grid cells: KF5614, KF7932]. In grasslands with scattered shrubs of *Paliurus spina-christi* and in openings of *Quercus coccifera* scrub.

Ophrys epirotica (Renz) Devillers-Tersch. & Devillers [1 grid cell: KF5614]. In grasslands with scattered shrubs of *Paliurus spina-christi*.

Ophrys grammica (B. Willing & E. Willing) Devillers-Tersch. & Devillers [1 grid cell: KF7426]. In openings of *Quercus coccifera* scrub.

Ophrys mammosa Desf. [33 grid cells: KF5714, KF5814, KF4717, KF4817, KF5017, KF5217, KF4718, KF5018, KF5318, KF4919, KF4920, KF5020, KF6220, KF5721, KF5822, KF5523, KF5723, KF5724, KF6224, KF6425, KF6925, KF7225, KF7326, KF7426, KF7227, KF7028, KF6730, KF6831, KF7131, GL4917, GL5017, GL5117, GL5218]. In *Quercus coccifera* scrub, in grassland, in pine groves, and on roadsides.

Ophrys oestrifera M. Bieb. subsp. *oestrifera* [5 grid cells: KF5614, KF5020, KF5520, KF7426, KF7526]. In *Quercus coccifera* scrub and its openings.

Ophrys reinholdii Spruner ex Fleischm. [1 grid cell: KF6425]. In grasslands as openings in *Quercus coccifera* formations.

Orchis italica Poir. [7 grid cells: KF5013, KF5515, KF5217, KF5118, KF5020, KF5520, GL5114]. In grasslands, in openings of Quercus coccifera scrub and in pine groves.

Orchis provincialis Balb. ex Lam. & DC. [1 grid cells: KF6324]. In grasslands with *Pteridium aquilinum*.

Orchis purpurea Huds. [5 grid cells: KF5013, KF5614, KF5018, KF5020, KF7526]. In dense *Quercus coccifera* formations and in their openings.

Orchis simia Lam. [1 grid cell: KF5722]. In edges of dense *Quercus coccifera* formations.

Platanthera chlorantha (Custer) Rchb. subsp. *chlorantha* [2 grid cells: KF6324, KF6527]. In *Quercus frainetto* stands.

Serapias parviflora Parl. [1 grid cell: KF5017]. In grassland.

Serapias vomeracea (Burm. f.) Briq. [32 grid cells: KF5017, KF6719, KF680, KF6921, KF7021, KF7121, KF7122, KF7222, KF7322, KF7422, KF7522, KF6924, KF7124, KF7424, KF6925, KF7025, KF7125, KF7425, KF7126, KF7226, KF7326, KF7426, KF6527, KF7027, KF7127, KF7227, KF7529, KF6730, KF6831, KF7731, KF7832, KF7932]. In *Quercus coccifera* shrub formations and in grasslands.

Spiranthes spiralis (L.) Chevall. [26 grid cells: KF5819, KF6719, KF6820, KF5721, KF6921, KF7121, KF5822, KF7122, KF7222, KF7322, KF6924, KF6425, KF6725, KF6925, KF7025, KF7125, KF7126, KF7426, KF7526, KF6527, KF7127, KF6728, KF7128, KF7529, KF7731, KF7832]. In *Quercus coccifera* shrub formations, in grasslands and in pine reforestations.

In total, 22 different species have been recorded so far on Mt. Simvolo, which occur in 83 out of the 384 1 x 1 km grid cells of the total area (Fig. 2, Figs 3-24). As there are no other studies on the orchid flora of Mt. Simvolo, all the data presented here are new records for the area. The eastern part of Mt. Simvolo is dominated by acid igneous rocks (granite) (ANONYMOUS 1983) and by consequence the soils are poorly suited for most orchids (TSIFTSIS & al. 2008). One might have expected that the western part of the mountain would host a larger number of orchids due to the prevailing of bedrock types (e.g. marls, limestone) better suited for orchids, and to its milder climatic conditions. Due to anthropic impact (mostly wildfires and grazing), in the western part, one expects that the habitat type "semi-natural dry grasslands and scrubland facies" prevails – a habitat type which, according to the interpretation manual of European

Union Habitats (ANONYMOUS 2013), is characterised as "important orchid site", both in terms of species number and population size. However, in the western part of the area, large surfaces have been converted to agricultural lands, and the remaining scrub formations are too dense or stock on steep slopes, where the lack of open spaces does not support orchids. Even so, the number of orchids recorded for the western part of the mountain exceeds that for the eastern part (see Figs 3-24).

The study area's most common orchids are *Ophrys mammosa*, *Serapias vomeracea* and *Spiranthes spiralis*. *Ophrys mammosa* does not show any clear preference as regards the geological substrate or vegetation type, whereas on the contrary, both *S. vomeracea* and *S. spiralis* were recorded mostly in scrub formations of *Q. coccifera* and *Cistus creticus* L. subsp. *creticus*, on granite. The soil type that derives from granite weathering is rich in sand, and as a result it becomes very dry during spring and summer (PAPAMICHOS 1992). *S. vomeracea* in particular, which has been recorded numerous sites (within 32 grid cells), was growing in most cases in mossy micro-habitats where soil water conditions were better near the surface. In suitable micro-habitats *S. vomeracea* formed colonies consisting of hundreds of individuals.

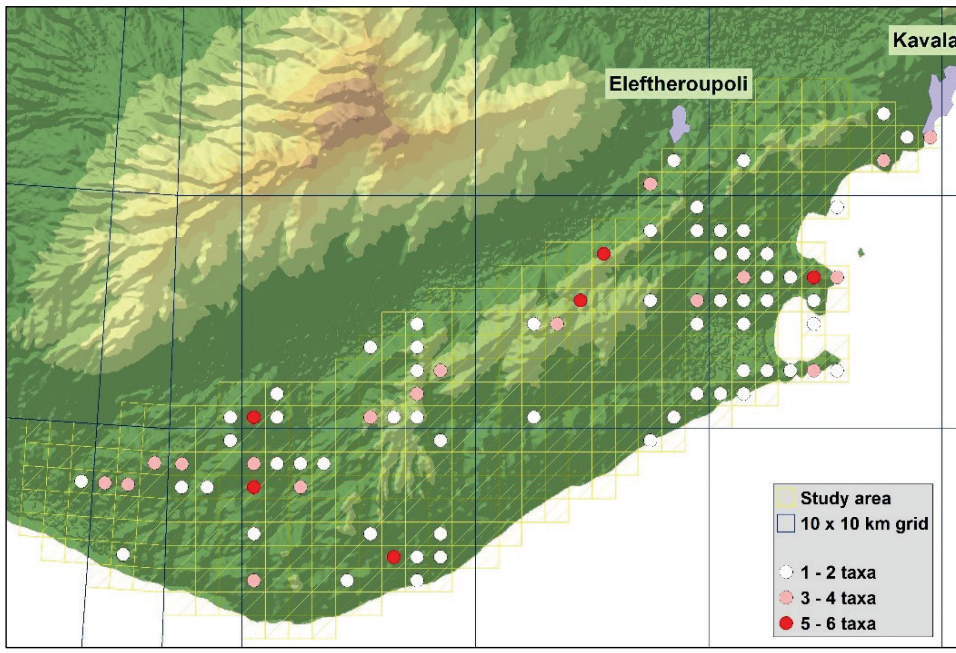
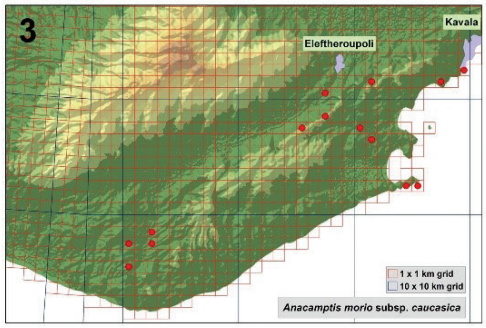
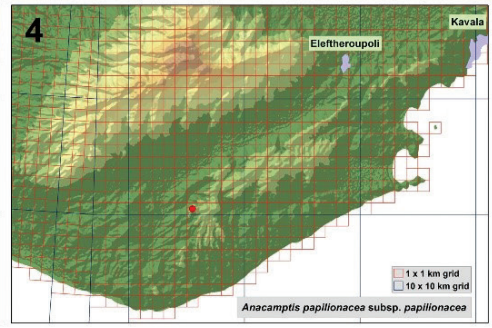
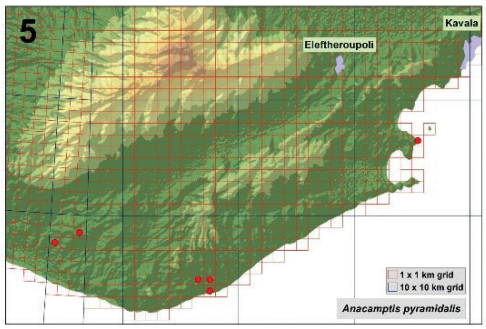


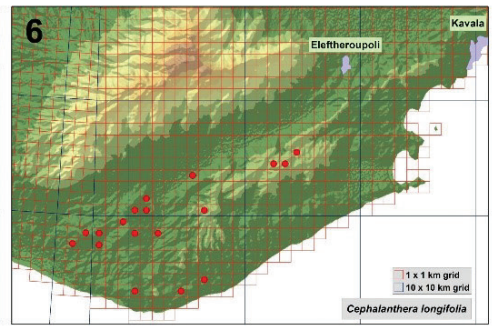
Fig. 2. Distribution of orchid species richness on Mt. Simvolo.

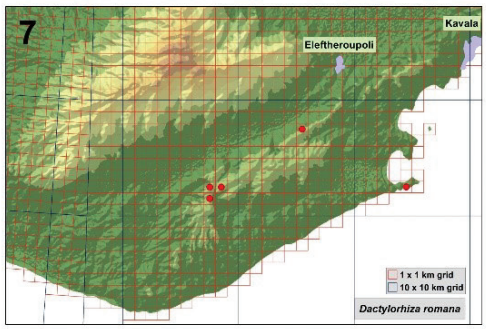
Figs 3-24. Distribution maps of the orchids of Mt. Simvolo.

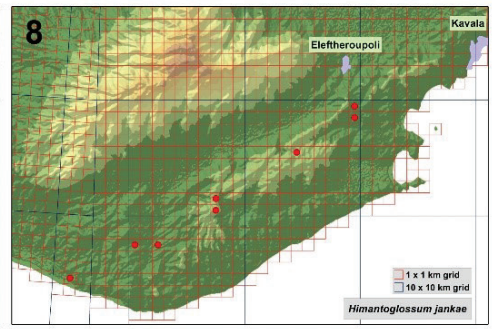


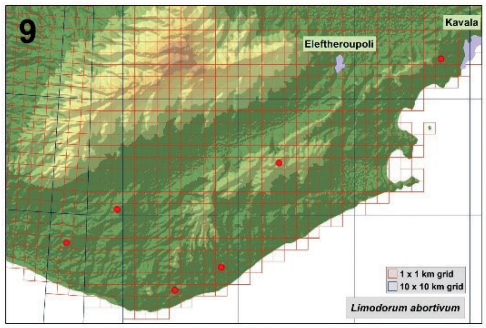


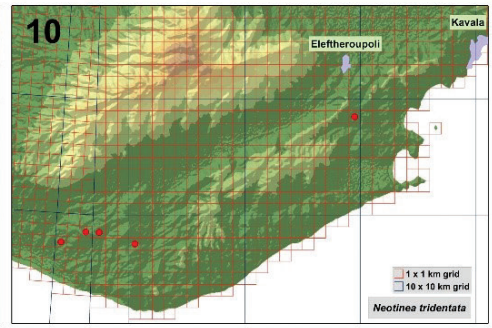


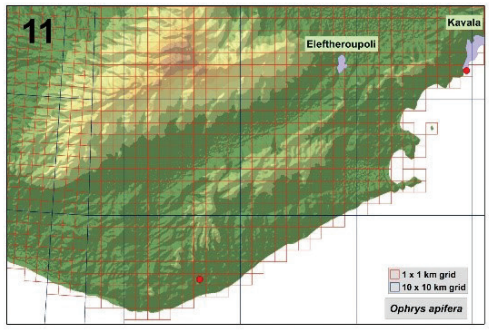


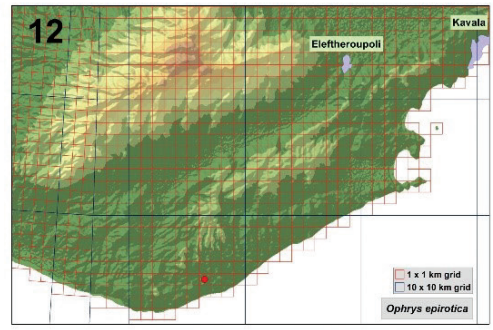


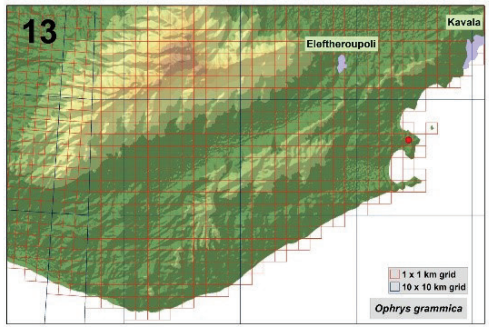


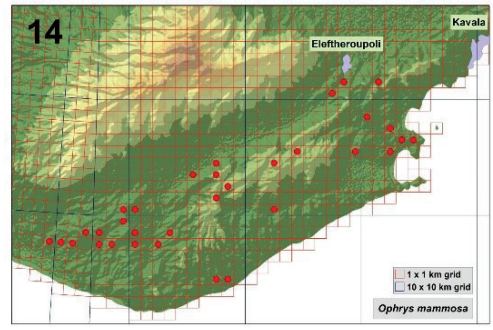


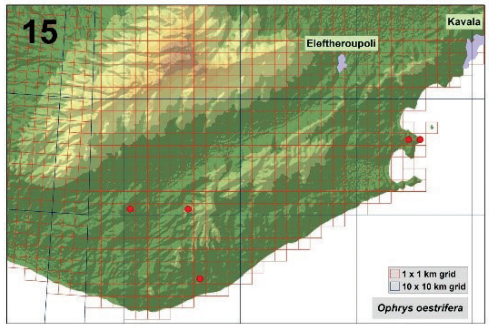


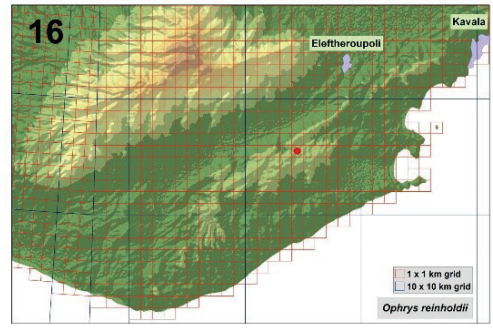

11
Eleftheroupoli
Kavala
1 x 1 km grid
10 x 10 km grid
Ophrys apifera

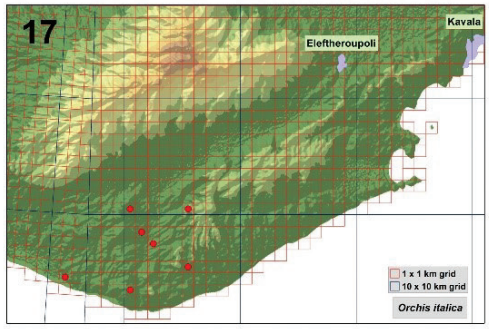

12
Eleftheroupoli
Kavala
1 x 1 km grid
10 x 10 km grid
Ophrys epirotica

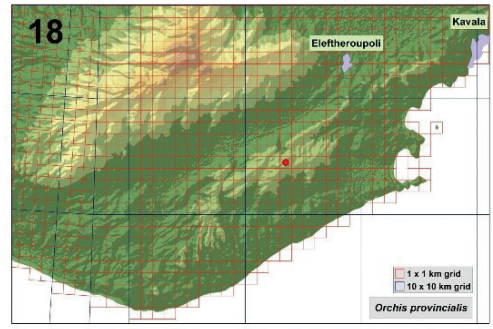

13
Eleftheroupoli
Kavala
1 x 1 km grid
10 x 10 km grid
Ophrys grammica

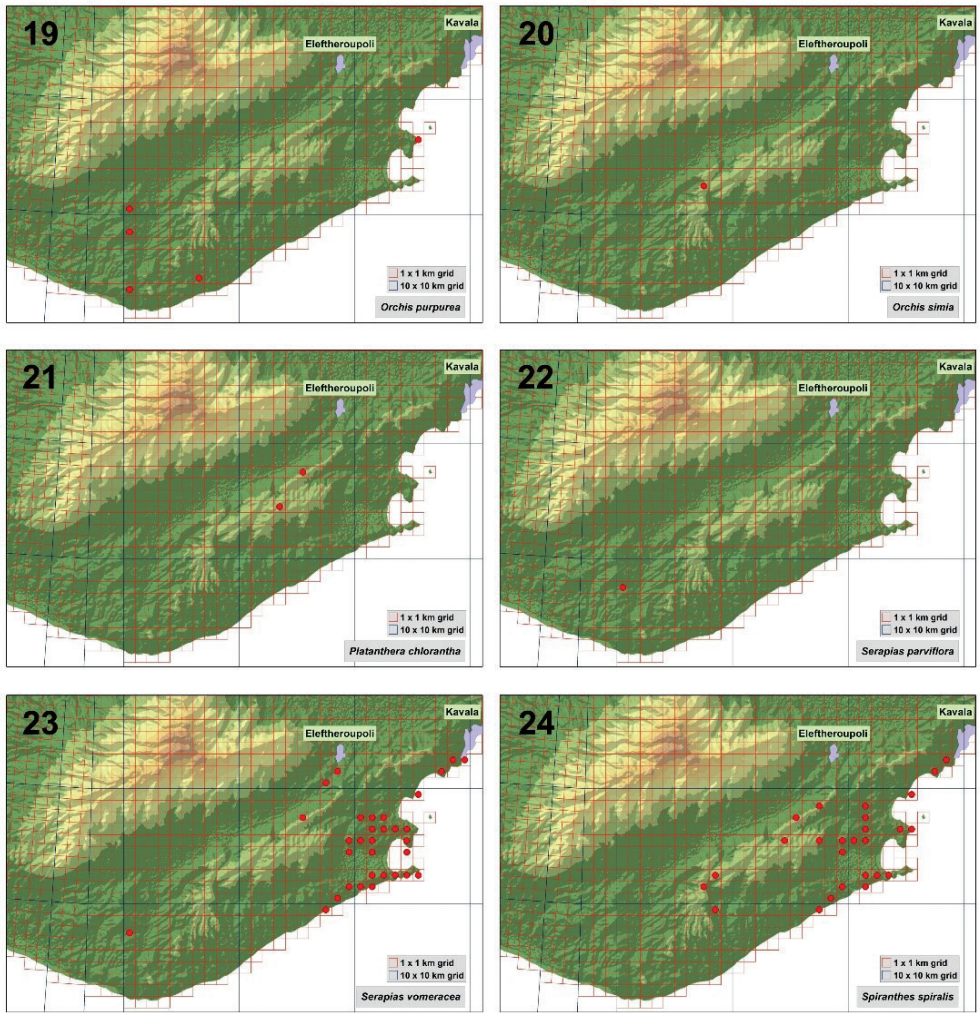

14
Eleftheroupoli
Kavala
1 x 1 km grid
10 x 10 km grid
Ophrys mammosa


15
Eleftheroupoli
Kavala
1 x 1 km grid
10 x 10 km grid
Ophrys oestrifera


16
Eleftheroupoli
Kavala
1 x 1 km grid
10 x 10 km grid
Ophrys reinholdii


17
Eleftheroupoli
Kavala
1 x 1 km grid
10 x 10 km grid
Orchis italica


18
Eleftheroupoli
Kavala
1 x 1 km grid
10 x 10 km grid
Orchis provincialis



On the contrary, *Anacamptis papilionacea* subsp. *papilionacea*, *Ophrys epirotica*, *O. grammica*, *O. reinholdii*, *Orchis provincialis*, *O. simia* and *Serapias parviflora* were rare, each having been recorded in a single locality. However – except *S. parviflora* – all the others have also been recorded to occur in other mountains of E Macedonia (e.g.: *Ophrys reinholdii* and *Orchis provincialis* on Mt Pangeo; *O. epirotica* on Mts Falakro, Vrondous, and Kerdilio) (ANTONOPOULOS & TSIFTSIS 2017, TSIFTSIS & ANTONOPOULOS 2017). The find of *S. parviflora* is of phytogeographically significant. *S. parviflora* is an Atlantic-Mediterranean taxon that presents a disjunct distribution area along the Atlantic coasts of France, Spain and Portugal, a broad distribution in Italy and Greece, reaching the coastal zone of Albania and Croatia to the north. In Greece, it is widely distributed in the southern and western parts of the country, extending northward to the Corfu and Ioannina prefectures with, additionally, an isolated occurrence near Mt. Olimbos (TSIFTSIS & ANTONOPOULOS 2017). The new find of *S. parviflora* extends

considerably its Greek distribution range, being the country's northernmost and most isolated known locality.

The second most interesting find is that of *Ophrys reinholdii*, seen in a single location in an opening of *Q. coccifera* scrub. Together with its localities on Mts Pangeo and Kerdilio as well as in the lowlands close to the Nestos Delta, the new locality denotes to northern borderline of that species' Greek distribution (ANTONOPOULOS & TSIFTSIS 2017). In all these locations at the edge of its distribution, only a few isolated individuals of *O. reinholdii* were seen. Such populations or colonies near to the edge of a species' range either represent the remnants of a past, larger population or result from long-distance seed dispersal (CAREY 1999, VANDEN BROECK & al. 2014, BLEHO & al. 2015).

As shown in Table 1, in the two most species-rich grid cells six orchid taxa were recorded, in four grid cells five orchids were found, and in five grid cells, four orchids. Conversely, 59 grid cells (c. 70% of the total number) host only one or two orchid taxa. The six most species-rich grid cells are concentrated in the central and western part of the study area and are characterized by the dominance of calcareous bedrock; whereas, the most species-poor grid cells lie in the eastern part of Mt. Simvolo, where the granitic mass is centred.

Table 1. Relationship between orchid taxon number and number of grid cells.

Number of recorded orchids	Number of 1×1 km grid cells
6	2
5	4
4	5
3	13
2	31
1	28

In conclusion, Mt. Simvolo is rather poor in orchid taxa, contrary to what one might expect in view of the geographical position of the area. However, both the favourable climatic conditions and the short distance of Mt. Simvolo to the other mountains of E Macedonia, which are known to be especially rich in orchids (TSIFTSIS & al. 2007), make it likely that further phytogeographically interesting records will come to light in the future.

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