Floristic and phytosociological investigation of the island Antikythera and nearby islets (SW Aegean, Greece)

Authors: Dimitrios Tzanoudakis, Maria Panitsa, Panayiotis Trigas, and Gregoris Iatrou

Source: Willdenowia, 36(1) : 285-301

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

URL: https://doi.org/10.3372/wi.36.36123
Floristic and phytosociological investigation of the island Antikythera and nearby islets (SW Aegean, Greece)

Abstract


Resulting from field work in all seasons 120 taxa are newly recorded for the island of Antikythera, among them 13 local or Aegean endemics. The total number of native plant taxa on the island is raised to 336. From the nearby islets Thimonies and Prassou, thus far unexplored botanically, 8 and 98 taxa, respectively, are recorded. Chorological and biological spectra of the total flora of the islands are given and discussed. A description of the vegetation of the area is added, including a vegetation map. The need for intensive exploration of the Greek island flora during all seasons is emphasized.

Key words: flora, endemics, vegetation, Thimonies, Prassou, chorology, life forms.

Introduction

The island of Antikythera is very interesting floristically and biogeographically, due to its special geographic position and geohistory. The island is a remnant of a former land bridge connecting Crete with Peloponnisos (Dermitzakis & Papanicolaou 1981). According to paleogeographical data, it became isolated from Crete and Kythera-Peloponnisos in the Pliocene, i.e. 4.5-2.5 million years ago. The remnants of the above-mentioned land bridge consist of three inhabited (Elafonisos, Kythera and Antikythera) and a number of smaller and uninhabited islands (Fig. 1).

Kythera, including its offshore islets, and Elafonisos are floristically well known (Greuter & Rechinger 1967, Yannitsaros 1969, 1971, 1998, 2004, Jagel 1992, Iatrou 1994, Tzanoudakis & al. 1998, Panitsa & al. 2004). The third island, Antikythera, with its adjacent islets Prassou and Thimonies, is scarcely explored and only a single floristic catalogue exists, prepared almost 40 years ago (Greuter & Rechinger 1967). It is a nice coincidence that the results of our explorations can be published in a Festschrift in honour of one of the authors of that contribution. It was based
on collections made by these authors, Dimitrios Phitos (Patras, Greece) and Sven Snogerup (Lund, Sweden), all, although independently, during the first half of May 1964. For this reason our collecting visits were organized in different seasons (early spring, autumn and early summer). Some results have already been published (Tzanoudakis & al. 1998, Tzanoudakis 2000, Artelari & Georgiou 2002). The present paper provides a contribution to the vascular flora, a description of the main vegetation units, and phytogeographical comments.

Geographical background

The island of Antikythera is situated 38 km SSE of the island of Kythera and almost at an equal distance WNW of Crete. It has a surface of 20.04 km² and at present less than 50 permanent inhabitants. The islet of Prassou has a surface of c. 0.5 km² and is situated c. 8 km north of Antikythera. The two islets called Thimonies are situated close to the NNW end of the island (Fig. 1).

The main island has a very rugged topography with a maximum altitude of 378 m and a coastline of 24 km. The crest of the main mountain range runs NNW to SSE. The northwestern and western slopes are very steep, whereas on the opposite side the inclination is more moderate and some small valleys with temporary streams exist. Small plains and hills, which usually lead up to vertical limestone cliffs, characterize the interior of the island. There is only one small sandy beach, on the NNE end of the island.

Geologically, the area is composed of limestone (mainly biomicrites) of Paleocene-Lower Eocene age in the north and east, and of Upper Cretaceous limestones (mainly micrudites) in the centre, south and east, and on Prassou. There are also lacustrine and marine deposits such as conglomerates, sandstones, marls and clays, sometimes with lignite beds (Borningas & Rontogianni-Tsiampaou 1983).

As there is no meteorological station on Antikythera, the climate has to be inferred from data from the nearest meteorological stations of Souda (Chania, Crete) and on the island of Kythera. According to these data and Emberger’s coefficient (Emberger 1955, Mavrommatis 1980), the area belongs to the subhumid bioclimatic zone with warm winters, almost free of frost and snow, and a dry period of 5.5 months, from early April to mid September.

Material and methods

The plant list given below is based mainly on collections and observations made by the authors during mid November 1996, early April and mid June 1997 and mid April 2000. Vouchers are deposited in Patras (UPA). The floristic information given by Greuter & Rechinger (1967), 226 taxa for Antikythera, has also been considered for the analysis of the flora, but is not listed here. Included are 17 records sent to the authors by Dr Ralf Jahn, who visited the main island on 17-18 May 1995, and not found by us. The identifications and the nomenclature are mainly based on Flora Europaea (Tutin & al. 1968-80, 1993). In a few cases more recent publications have been taken into consideration (Greuter & al. 1984-89, Turland 2004, Turland & al. 1993, Chilton & Turland 1997, Biel 2004, Strid & Tan 1997, 2002).

The chorological categories and analysis follow Pignatti (1982) except for the E Mediterranean element, which follows Davis (1965-85). Adventive and cultivated taxa are included in the list but have not been considered in the floristic analysis. Life-form categories and the corresponding life-form spectrum are according to Raunkiaer (1934). Chorological and life form spectra comprise the total native flora of the area studied and not only the new records presented in the plant list.

The description of the vegetation is based on field work and observations by the authors, including 36 relevés with 179 taxa taken from all different habitats (Panitsa & al. unpubl.). The vegetation map in Figure 1C is based on aerial photographs, supported by field verification.
Results

1. Flora

The combination of our results with the report by Greuter & Rechinger (1967; 226 taxa from the island of Antikythera) and a species list send to us by Ralf Jahn (Regensburg, Germany) gives a total of 346 native and 11 adventive/cultivated plant taxa. This includes 336 native taxa from Antikythera, 98 from Prassou and 8 from the Thimonies. Nine of the taxa from Prassou were not found on Antikythera and two of them are Aegean endemics viz. *Salsola aegaea* and *Filago cretensis* subsp. *cretensis*. One “islet specialist”, *Lavatera arborea*, was found only on the Thimonies islets. Since Prassou and the Thimonies were investigated for the first time, all taxa
are new records. The same is the case with 120 native taxa from Antikythera, which were not mentioned by Greuter & Rechinger (1967).

All new records are listed below. Added are six taxa recorded by dot maps in Flora Hellenica (Strid & Tan 2002): Mesembryanthemum nodiflorum, Sedum rubens, Umbilicus horizontalis, Biscutellida didyma, Clypeola jonthlaspi and Matthiola sinuata. The list includes 39 families and 102 genera. Five of them are Pteridophytes, 84 are Dicotyledones and 31 are Monocotyledones. The best represented families among the new records are: Compositae (13.2 % of the new records), Leguminosae (13.2 %), Liliaceae s.l. (10.7 %), Gramineae (9.1 %), Caryophyllaceae (5.8 %). The new records are not evenly distributed among the 39 different families. Some plant families are almost totally represented by new records (e.g. Valerianaceae, Crassulaceae, Caryophyllaceae, Ranunculaceae and Amaryllidaceae), others by c. 50 % (e.g., Liliaceae s.l., Iridaceae).

An analysis of life forms and chorology of the total flora of the islands, including the earlier reported species, is presented in Tables 1-2. In the life-form (biological) spectrum, therophytes predominate with 53.3 % and 59.2 %, for the flora of Antikythera and Prassou, respectively, followed by the hemicyryptophytes (16.7 %) in Antikythera and chamaephytes (15.3 %), in Prassou (Table 1). The chorological spectrum of the islands is characterized by high percentages of Mediterranean elements (72.1 % for Antikythera, 68.4 % for Prassou) and by a significant representation of endemic element reaching 7.4 % for Antikythera and 8.1 % for Prassou (Table 2).

A comparison of the biological and chorological spectra of the newly reported taxa with those of the taxa already mentioned by Greuter & Rechinger (1967) gave some interesting re-

<table>
<thead>
<tr>
<th>Life forms</th>
<th>Number of taxa</th>
<th>Antikythera</th>
<th>Prassou</th>
<th>Antikythera</th>
<th>Prassou</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chamaephytes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ch. fruticose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ch. suffruticose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ch. reptant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geophytes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. bulbose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. rhizomatose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hemicryptophytes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H. biennial</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H. caespitose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H. rosulate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H. scandent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H. scapose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phanerophytes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nano-ph.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nano-ph. caespitose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nano-ph. scapose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Therophytes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Th. parasite</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Th. reptant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Th. rosulate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Th. scapose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Life form spectrum of the total flora of the islands Antikythera and Prassou.
The hemicryptophytes form 20% of the new reports but only 6% of those already known. For chamaephytes, on the contrary, the new reports have a lower percentage (5%) instead of 16.7% of the already known. 13 endemic taxa (10.8% of the new records) are added to the 12 endemic taxa already known for Antikythera. Table 3 presents the distribution of 28 endemic taxa: 25 of the total flora of the island of Antikythera (5 of which were also found on the island of Prassou) and 3 found only on Prassou and not on Antikythera. Of the 13 newly recorded endemics for Antikythera, 5 are geophytes, 4 are therophytes, 3 are hemicryptophytes and 1 is chamaephyte. It should be mentioned that 6 of these 13 (46.1%) are early spring flowering taxa (3 geophytes, 2 therophytes, 1 hemicryptophyte) and 2 (15.4%) are autumn flowering geophytes.

The new records include also members of the phrygana and chasmophytic communities which, as has been noted by Runemark (1969), show an uneven distribution in the Aegean area. (e.g. *Phlomis fruticosa*).

### 2. Plant list

**Abbreviations used:**

(i) **Localities:** WP = the village of Potamos and the NW part of the island, EP = the area E-SE of Potamos, G = the village of Galaniana and the SE part of the island, P = the mountainous area from Plagara to the Cape Apolytares, T = islets Thymonies, Pr = islet Prassou.

(ii) **Authors/collection:** Tz = D. Tzanoudakis, G. Iatrou, M. Panitsa, P. Trigas, F. Strataki, RJ = R. Jahn

(iii) **Life forms:** See Table 1.

(iv) **Chorology:** See Table 2.

(v) **Adv.:** adventive, Cultiv.: cultivated.

(vi) * = found on Prassou islet and not on Antikythera.

<table>
<thead>
<tr>
<th>Chorological unit</th>
<th>Chorological group</th>
<th>Number of taxa</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Antikythera</td>
<td>Prassou</td>
</tr>
<tr>
<td>Widespread</td>
<td>Mediterranean-Atlantic</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>(Med.-Atl.)</td>
<td>3.0</td>
<td>4.1</td>
</tr>
<tr>
<td></td>
<td>Mediterranean-Turanian</td>
<td>20</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>(Med.-Turan.)</td>
<td>6.0</td>
<td>7.2</td>
</tr>
<tr>
<td></td>
<td>Paleotemperate (Paleotemp.)</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Paleotropical (Paleotrop.)</td>
<td>1</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>Paleosubtropical (Paleosubtrop.)</td>
<td>4</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>Pantropical (Pantrop.)</td>
<td>1</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>Neotropical (Neotrop.)</td>
<td>1</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>Eurasiat-temperate</td>
<td>1</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>(Eurasiat.-temp.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>European-Caucasian</td>
<td>1</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>(Europ.-Caucas.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SE-European (SE Europ.)</td>
<td>1</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>Subcosmopolitan (Subcos)</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Cosmopolitan (Cos)</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>20.5</td>
<td>23.5</td>
</tr>
<tr>
<td>Mediterranean</td>
<td>E-Mediterranean (EMed)</td>
<td>64</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Steno-Mediterranean (StMed)</td>
<td>98</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Euri-Mediterranean (EuMed)</td>
<td>80</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>72.1</td>
<td>68.4</td>
</tr>
<tr>
<td>Endemic</td>
<td>Endemic</td>
<td>25</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>336</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Taxon</th>
<th>Ion</th>
<th>StE</th>
<th>Pe</th>
<th>KT</th>
<th>AKT</th>
<th>Kr</th>
<th>Kp</th>
<th>Rh</th>
<th>Kik</th>
<th>EAe</th>
<th>Sp</th>
<th>NPi</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Aegilops biuncialis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>subsp. archipelologica</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Allium aegilicum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 A. circinnatum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>subsp. peloponnesiacum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 A. gomphrenoides</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 A. rubriovittatum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Anchusa variegata</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Anthemis scopulorum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Arenaria aegaea</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 Asperula taygetea</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Biaxum tenafolium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*(Pr)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>subsp. abbreviatum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 Campanula sasanilis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>subsp. cytherea</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 Crepis cytherea</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 Crocus boryi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td>*(IsL.Ira)</td>
</tr>
<tr>
<td>subsp. tournefortii</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 C. laevigatus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 Dianthus fruticosus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>subsp. occidentalis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 Filago cretensis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*(Pr)</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>subsp. cretensis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17 Inula candida</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>subsp. candida</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 Melilotus graecus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19 Nigella doerferi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 Ophrys heldreichii</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 Ruta chalepensis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>subsp. fumarifolia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22 Salsola aegaea</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*(Pr)</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23 Scorzonera cretica</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 Sedum creticum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 Silene integripetala</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>subsp. lidenii</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26 Staphylea cretica</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27 Tulipa autumnyi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28 Valeriana asarifolia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Pteridophyta**

**Aspleniaceae**
Asplenium ceterach L. – Hros, Eurasiat.-temp.; G: Tz 11362

**Polypodiaceae**
Polypodium cambricum L. – Hros, EuMed; P: Tz 4204

**Selaginellaceae**
Selaginella denticulata (L.) Spring – Crept, StMed; EP RJ, P RJ

**Sinopteridaceae**
Cheilanthes acrostica (Balbis) Tod. – Hros, Med.-Turan.; G: Tz 11368, P: Tz 11527
Cosentinia vellea (Aiton) Tod. – Hros, Med.-Turan.; G: Tz 11295
Angiospermae - Dicotyledoneae

Aizoaceae
Mesembryanthemum nodiflorum L. – Tscp, StMed; WP: Tz 4215, Pr: Tz 11550; Strid & Tan (2002)

Boraginaceae
Anchusella variegata (L.) Bigazzi & al. – Tscp, Endem.; G: Tz 11345
Echium arenarium Guss. – Tscp, StMed; Pr: Tz 11245
*Heliotropium dolosum De Not. – Tscp, Med-Turan.; Pr: Tz 11549
Symphytum creticum C. Presl – Hscp, Endem.; P: Tz 11484

Campanulaceae
Campanula erinus L. – Tscp, StMed; Pr: Tz 11597

Capparaceae
Capparis spinosa subsp. rupestris (Sm.) Nyman – NP, StMed; T: Tz 11818, Pr: Tz 11563

Caprifoliaceae
Lonicera implexa Aiton – NP, StMed; G: Tz 11614

Caryophyllaceae
Arenaria aegaea Rech. f. – Tscp, Endem.; P, Pr: Tz 11594
Dianthus fruticosus subsp. occidentalis Runemark – Csuffr, Endem.; WP: obs.
*Polycarpon tetraphyllum (L.) L. – Tscp, Med-Turan.; Pr: Tz 11589
Sagina maritima Don – Tscp, Med-Atl.; EP, RJ
Silene colorata Poir. – Tscp, StMed; P, RJ
S. gallica L. – Tscp, SubCos; P: Tz 13486
S. integripetala subsp. lidenii Oxelman – Tscp, Endem.; WP, EP, P: Tz 11515
S. sedoides Poir. subsp. sedoides – Tscp, StMed; Pr: Tz 11603
Spergularia bocconei (Scheele) Graebn. – Tscp, SubCos; WP: Tz 11738
Stellaria pallida (Dumort.) Piré – Trept, Paleotemp.; Pr: Tz 11215

Chenopodiaceae
Beta vulgaris subsp. maritima (L.) Arcang. – Hscp, EuMed; WP: Tz 11733
*Salsola aegaea Rech. f. – Cfrut, Endemic; Pr: Tz 11563
Suaeda vera J. F. Gmel. – Cfrut, Med-Atl.; T: Tz 11820, Pr: Tz 11567

Cistaceae
Helianthemum salicifolium (L.) Mill. – Tscp, EuMed; G: Tz 11280

Compositae
Aetheorhiza bulbosa subsp. microcephala Rech. f. – Gbulb, EMed; Pr: Tz 11250
*Asteriscus aquaticus (L.) Less. – Tscp, StMed; Pr: Tz 11572
Anthemis scopulorum Rech. f. – Tscp, Endem.; Pr: Tz 11214
Bellis sylvestris Cirillo – Hscp, StMed; G: Tz 4202
Bellium minutum (L.) L. – Tscp, EMed; Pr: Tz 11224
Carduus pycnocephalus subsp. albidus (M. Bieb.) Kazmi – Tscp, Med-Turan.; Pr: Tz 11562
Carlina graeca Heldr. & Sart. – Hscp, EMed; Pr: Tz 11272
C. lanata L. – Tscp, StMed; Pr: Tz 11554
Carthamus lanatus subsp. baeticus (Boiss. & Reuter) Nyman – Tscp, EuMed; P RJ
C. zacintha (L.) Babc. – Tscp, StMed; EP: Tz 11674
Dittrichia graveolens (L.) Greuter – Tscp, Med-Turan.; WP: Tz 4220, Pr: Tz 4229
Filago aegaea subsp. aristata Wagenitz – Tscp, EMed; EP: Tz 11686
*F. cretensis Gand. subsp. cretensis – Tscp, Endemic; Pr: Tz 11559
F. pygmaea L. – Trept, StMed; P: Tz 11490
F. pyramidata L. – Tscap, EuMed; P RJ
Hedypnois rhagadioloides subsp. tubaeformis (Ten.) Hayek – Tscap, StMed; Pr: Tz 11592
Hypocharis achyrophorus L. – Tscap, StMed; EP RJ, P RJ, Pr: Tz 11213
Inula candida (L.) Cass. subsp. candida – Csuffr, Endem.; Pr: Tz 4234
Limbarda crithmoides (L.) Dumort. – Csuffr, Med-Atl.; Pr: Tz 4232
Notobasis syriaca (L.) Cass. – Tscap, EuMed; P: RJ
Pallenis spinosa (L.) Cass. subsp. spinosa – Tscap, EuMed; Pr: Tz 11572
Picris rhagadioloides (L.) Desf. – Tscap, StMed; G: Tz 11804
Ptilostemon chamaepeuce (L.) Less. – Cfrut, EMed; Pr: Tz 4208
Reichardia picroides (L.) Roth – Hscap, StMed; Pr: Tz 11577
Scolymus hispanicus L. – Hbienn, EuMed; Pr: Tz 11571
Scorzonera cretica Willd. – Hscap, Endem.; Pr: Tz 11590
Senecio vulgaris L. – Tscap, Cos; P: RJ, Pr: Tz 11249
Sonchus asper subsp. glaucescens (Jordan) Ball – Hbienn, Paleotemp.; Pr: Tz 11568
S. oleraceus L. – Tscap, SubCos; Pr: Tz 11240
Taraxacum alleppicum Dahlst. – Hros, EMed; G: Tz 4201
Uromerus picroides (L.) F. W. Schmidt – Tscap, EuMed; Pr: Tz 11210
Convolvulaceae
C. oleifolius Desr. – Cfrut, EMed; Pr: Tz 11570
Crassulaceae
Rosularia serrata (L.) A. Berger – Hscap, EMed; P, EP: Tz 11713
S. litoreum Guss. – Tscap, StMed; Pr: Tz 11258
Umbilicus horizontalis (Guss.) DC. – Gbulb, StMed; G: Tz 11332, Pr: Tz 11594; Strid & Tan (2002).
Cruciferae
Aurinia saxatilis subsp. megalocarpa (Hauskkn.) T. R. Dudley – Csuffr, EMed; EP: Tz 11641,
G: Tz 11702, P: Tz 11627
B. nigra (L.) W. D. J. Koch – Tscap, EuMed; WP: Tz 11747
Clypeola jonthlaspi L. – Tscap, StMed; P RJ; Strid & Tan (2002).
Malcolmia flexuosa subsp. naxensis (Rech. f.) A. L. Stork – Tscap, EMed; Pr: Tz 11573
Matthiola sinuata (L.) R. Br. – Hscap, StMed; WP: Tz 11739, T: Tz 11816, Pr: Tz 11225; Strid & Tan (2002).
Cuscutaceae
Cuscuta palaestina Boiss. subsp. palaestina – Tpar, EMed; Pr: Tz 11555
Euphorbiaceae
Euphorbia dendroides L. – NP, StMed; Pr: Tz 4226
E. peplus L. – Tscap, Cos; Pr: Tz 11266
Mercurialis annua L. – Tscap, Paleotemp.; Pr: Tz 11228
Frankeniaceae
Frankenia hirsuta L. – Csuffr, Med-Turan.; T: Tz 11821, Pr: Tz 11564
Gentianaceae
Centaurium tenuiflorum (Hoffmanns. & Link) Fritsch subsp. tenuiflorum – Tscap, StMed; Pr: Tz 11587
Geraniaceae
Erodium cicutarium (L.) L’Hér. – Tscap., SubCos; Pr: Tz 11601
E. gruinum (L.) L’Hér. – Tscap, Med-Turan.; WP: Tz 11455, EP: Tz 11392
Geranium columbinum L. – Tscap, Paleotemp.; WP: Tz 11457
G. molle L. – Hbienn/Hscap, SubCos; EP: obs.; Pr: Tz 11247

Guttiferae
Hypericum empetrifolium Willd. – Csuffr, EMed; WP: Tz 11806

Labiatae
Ballota pseudodictamnus (L.) Benth. subsp. pseudodictamnus – Cfrut, EMed; Pr: Tz 11547
Phlomis fruticosa L. – NP, StMed; P: RJ
Salvia viridis L. – Tscap, StMed; EP: Tz 11799
Teucrium capitatum L. – Cfrut, StMed; Pr: Tz 11582
T. divaricatum Heldr. subsp. divaricatum – Cfrut, EMed; Pr: Tz 11546

Leguminosae
*Anagyris foetida L. – Npcaesp, EuMed; Pr: Tz 11581
Anthyllis hermanniae L. – Cfrut, StMed; Pr: Tz 11607
Astragalus pelecinus (L.) Barneby – Tscap, EuMed; P: RJ
Ceratonia siliqua L. – NP/MPh, StMed; EP: obs., G: Tz 11329
Hippocrepis ciliata Willd. – Tscap, StMed; P, G: Tz 11321
Lathyrus setifolius L. – Tscap, EuMed; G: Tz 11323
Lotus cytisoides L. – Csuffr, StMed; Pr: Tz 11596
L. edulis L. – Tscap, StMed; Pr: Tz 11340
L. orthophyloides L. – Tscap, StMed; EP: Tz 11432, G: Tz 11322
L. tetragonolobus L. – Tscap, StMed; EP: Tz 11371
M. litoralis Loisel. – Tscap, EuMed; Pr: Tz 11273
M. orbicularis (L.) Bartal. – Tscap, EuMed; EP: obs., G: Tz 11314
M. rugosa Desr. – Tscap, StMed; G: Tz 11294
M. truncatula Gaertn. – Tscap, StMed; WP: Tz 11778, G: Tz 11325
Melilotus gracipes (Boiss. & Spruner) Lassen – Tscap, Endem.; P, EP, G: Tz 11687, WP: Tz 11766
Ononis mitissima L. – Tscap, StMed; EP: Tz 11671
Scorpiurus muricatus L. – Tscap, EuMed; Pr: Tz 11544
Spartium junceum L. – NP, EuMed; G: obs.
Trifolium campestre Schreb. – Tscap, Paleotemp.; Pr: Tz 11585
T. scabrum L. – Tscap, EuMed; Pr: Tz 11566
T. stellatum L. – Tscap, EuMed; Pr: Tz 11542
T. tomentosum L. – Trept, Paleotemp.; G: Tz 11634, Pr: Tz 11602
Vicia cretica Boiss. & Heldr. subsp. cretica – Tscap, EMed; EP: Tz 11372, G: Tz 11369, P: Tz 11488, Pr: Tz 11257
V. hybrida L. – Tscap, EuMed; G: Tz 11367

Linaceae
Linum bienne Mill. – Hbienn, EuMed; Pr: Tz 11230
L. corymbulosum Rchb. – Tscap, StMed; P: RJ
L. strictum subsp. spicatum (Pers.) Nyman – Tscap, StMed; Pr: Tz 11588

Malvaceae
Althaea hirsuta L. – Tscap, EuMed; Pr: Tz 11593
Lavatera arborea L. – Hscap, StMed; T: Tz 11817
L. cretica L. – Tscap, StMed; G: Tz 11288
Malva aegyptica L. – Tscap, StMed; EP: obs., G: Tz 11354
Oleaceae
*Olea europaea* subsp. *oleaster* (Hoffmanns. & Link) Negodi – NP, StMed; Pr: Tz 11253

Orobanchaceae
*Orobanche pubescens* d’Urv. – Tpar, EuMed; EP: RJ, Pr: Tz 11237

Oxalidaceae
*Oxalis pes-caprae* L. – Gbulb, Adv.; G: Tz 11284

Papaveraceae
*Papaver purpureomarginatum* Kadereit – Tscap, EMed; EP: RJ, Pr: Tz 11237

Plantaginaceae
*Plantago weldenii* Rchb. subsp. *weldenii* – Tros, EuMed; Pr: Tz 11574

Plumbaginaceae
*Limonium sieberi* (Boiss.) Kuntze – Csuffr, EMed; T: Tz 11501, Pr: Tz 4237

Polygonaceae
*Rumex pulcher* subsp. *raulinii* (Boiss.) Rech. f. – Hscap, EMed; P, G: Tz 11341

Primulaceae
*Anagallis arvensis* L. – Trept, SubCos; WP, EP, G, P: obs., Pr: Tz 11248
*Asterolinon linum-stellatum* (L.) Duby – Tscap, StMed; WP, EP, Pr: Tz 11255
*Cyclamen hederifolium* Aiton – Gbulb, EuMed; G, WP: Tz 13485, Pr

Ranunculaceae
*Anemone coronaria* L. – Gbulb, StMed; WP: Tz 11449, EP: Tz 11410, G: Tz 4180
*Clematis cirrhosa* L. – NP, StMed; G: Tz 11289
*Nigella damascena* L. – Tscap, EuMed; EP, G: Tz 11286
*Ranunculus cytheraeus* (Halácsy) Baldini – Hros, EMed; G: Tz 4179
*R. cf. chius DC. – Tscap, EMed; G: Tz 11350

Rosaceae
*Pyrus spinosa* Forssk. – NP, StMed; EP: obs.
*Sarcopoterium spinosum* (L.) Spach – Cfrut, EMed; Pr: Tz 11600

Rubiacceae
*Galium murale* (L.) All. – Tscap, EuMed; Pr: Tz 11262
*Rubia tenuifolia* d’Urv. – NP, EMed; EP: Tz 11684, G: Tz 11330
*Valantia hispida* L. – Tscap, StMed; Pr: Tz 11238
*V. muralis* L. – Tscap, StMed; Pr: Tz 11575

Rutaceae
*Ruta chalepensis* subsp. *fumariifolia* (Boiss. & Heldr.) Nyman – Csuffr, Endem.; Pr: Tz 11586

Scrophulariaceae
*Scrophularia peregrina* L. – Tscap, StMed; G: Tz 11346

Solanaceae
*Hyoscyamus albus* L. – Hscap, EuMed; Pr: Tz 11236
*Mandragora autumnalis* Bertol. – Hros, EuMed; Pr: Tz 11244

Umbelliferae
*Daucus carota* subsp. *maritimus* (Lam.) Batt. – Hbienn, StMed; Pr: Tz 11598
*Kundmannia sicula* (L.) DC. – Tscap, StMed; WP: Tz 11805
*Tordylium apulum* L. – Tscap, StMed; Pr: Tz 11252
*Torilis nodosa* (L.) Gaertn. – Tscap, Med-Turan.; Pr: Tz 11606
Urticaceae
Parietaria cretica L. – Trept, EMed; Pr: Tz 11269

Valerianaceae
Centranthus calcitrapae (L.) Dufr. subsp. calcitrapae – Tscap, StMed; EP: obs., P: Tz 11516
Valeriana asarifolia Dufr. – Hscap, Endem.; G, EP: Tz 11824
Valerianella coronata (L.) DC. – Tscap, Paleotemp.; WP, G: Tz 11302
V. discoidea (L.) Loisel. – Tscap, StMed; P: RJ

Monocotyledones
Alliaceae
Allium aegilicum Tzanoud. – Gbulb, Endem.; WP: Tz 11767, G: Tz 9722
A. ampelesparsum L. – Gbulb, EuMed; WP, EP, G: Tz 11808
A. circinnatum subsp. peloponnesiacum Tzanoud. – Gbulb, Endem.; WP: Tz 11453
A. commutatum Guss. – Gbulb, StMed; EP: Tz 11736, T: obs.
A. longanum Pamp. – Gbulb, EMed; WP: Tz 11439, G: Tz 11277, P: Tz 11503
A. rubroviittatum Boiss. & Heldr. – Gbulb, Endem.; G, EP: Tz 11730, P: Tz 11636

Amaryllidaceae
Narcissus serotinus L. – Gbulb, StMed; G: Tz 4196
N. tazetta L. – Gbulb, StMed; G: Tz 13484
*Sternbergia lutea (L.) Spreng. – Gbulb, EuMed; Pr: Tz 4223

Asparagaceae
Asparagus aphyllus subsp. orientalis (Baker) P. H. Davis – Cfrut, StMed; Pr: Tz 4240

Araceae
*Biarum tenuifolium subsp. abbreviatum (Schott) Richt. – Gbulb, Endem.; Pr: Tz 11551

Cyperaceae
Carex halleriana Asso – Hcaesp, EuMed; EP: RJ

Gramineae
Avellinia michelii (Savi) Parl. – Tscap, StMed; EP: RJ, P: RJ
Avena barbata Link – Tscap, EuMed; Pr: Tz 11239
Brachypodium pinnatum (L.) P. Beauv. – Hcaesp, Paleotemp.; EP: Tz 11698, G: Tz 11629
Bromus fasciculatus C. Presl – Tscap, EMed; Pr: Tz 11560
B. madritensis L. – Tscap, EuMed; Pr: Tz 11559
Catapodium marinum (L.) C. E. Hubb. – Tscap, EuMed; Pr: Tz 11578
Cynosurus echinatus L. – Tscap, EuMed; G: Tz 11339, P: Tz 11660
Digitaria sanguinalis (L.) Scop. – Tscap, Adv.; WP: Tz 11741
Elymus farctus subsp. rechingeri (Runemark) Melderis – Grhiz, EMed; T: Tz 11819
Gastridium phleoides (Nees & Meyen) C. E. Hubb. – Tscap, EuMed; P: RJ
Hordeum leporinum Link – Tscap, EuMed; Pr: Tz 11221
Hypparrhenia hirta (L.) Stapf – Hcaesp, Paleotrop.; G: Tz 11664
Lagurus ovatus L. – Tscap, EuMed; Pr: Tz 11270
Parapholis incurva (L.) C. E. Hubb. – Tscap, Med-Atl.; Pr: Tz 11268
Phleum exaratum subsp. aegaeum (Vierh.) Doğan – Tscap, EMed; Pr: Tz 11561
Polypogon monspeliensis (L.) Desf. – Tscap, Paleosubtrop.; EP: RJ
Rostraria cristata (L.) Tzvelev – Tscap, SubCos; Pr: Tz 11595

Downloaded From: https://bioone.org/journals/Willdenowia on 26 May 2019
Terms of Use: https://bioone.org/terms-of-use
Stipa capensis Thunb. – Tscap, StMed; G: Tz 11320
Trachynia distachya (L.) Link – Tscap, Med-Turan.; Pr: Tz 11579

Hyacinthaceae
Bellevalia dubia (Guss.) Rchb. – Gbulb, StMed; G: Tz 11301, P: Tz 11498
Charychdis maritima (L.) Speta – Gbulb, StMed; Pr: Tz 11275
Muscaria commutatum Guss. – Gbulb, EMed; WP: Tz 11454, EP: Tz 11418, P: Tz 11524
Ornithogalum collinum Guss. – Gbulb, EuMed; G: Tz 11298
Scilla autumnalis L. – Gbulb, EuMed; G: Tz 4187, P: obs.

Iridaceae
Crocus laevigatus Bory & Chaub. – Gbulb, Endem.; G: Tz 11499
Hermodactylus tuberosus (L.) Mill. – Gbulb, EMed; G: Tz 11281
Moraea sisyrinchium (L.) Ker.-Gawl. – Gbulb, EuMed; EP: Tz 11690

Liliaceae
Gagea graeca (L.) A. Terracc. – Gbulb, EMed; WP: Tz 11462, EP: Tz 11387
Tulipa goulimyi Sealy & Turrill – Gbulb, Endem.; G: Tz 11282
Colchicum cupanii Guss. – Gbulb, StMed; G: Tz 11352

Orchidaceae
Anacamptis pyramidalis (L.) Rich. – Gbulb, Med-Atl.; Pr: Tz 11591
Ophrys sicula Tineo – Gbulb, StMed; WP: Tz 11438, EP: Tz 11391, Pr: Tz 11229
Spiranthes spiralis (L.) Chevall. – Grhiz, Europe-Caucas.; G: Tz 4190

3. Vegetation
Four main vegetation types can be distinguished on Antikythera and Prassou: (1) halophytic communities, (2) chasmophytic communities, (3) dwarf shrub communities (phrygana) and (4) scrub communities with Juniperus phoenicea, Pistacia lentiscus, Quercus coccifera and Euphorbia dendroides. Figure 1C shows the main distribution of these vegetation types. Small areas with these types or their characteristic species exist outside the mapped areas. Chasmophytic and halophytic communities are assigned a higher value for naturalness since they prefer places not suitable to human activities. Scrub with Quercus coccifera and phrygana are considered as secondary communities due to human interference (agriculture, land-clearance, grazing and fires), see, e.g., Bohn & al. (2000-03).

The best developed halophytic communities have been observed on the SSW end of both Antikythera and Prassou (Fig. 1C-10), where the inclination of the coast is more moderate (less than 30 %). They belong to the class and order Crithmo-Staticetea Br.-Bl. 1947 (-etalia Mol. 1934) and the alliance Crithmo-Frankenion Mayer 1995. Characteristic species of the order and class are: Crithmum maritimum, Limonium spp., Silene sedoides, Lotus cytisoides, Reichardia picroides and Parapholis incurva, while Frankenia hirsuta is the characteristic species of the alliance. Limonium virgatum and L. sieberi are the characteristic species of the associations Crithmo-Limonietum virgati Mayer 1995 and Crithmo-Limonietum sieberi Gehr & al. 1987, respectively.

The Thimonies islets are almost in total exposed to sea waves and wind and for this reason only one of them, the one protected by the other, is inhabited by halophytic species, which can resist these extreme conditions. It has a flora dominated by islet specialists such as Allium commutatum, Lavatera arborea, Matthiola sinuata subsp. glandulosa, Elymus farctus subsp. rechingeri, accompanied by Frankenia hirsuta, Suaeda vera, Limonium sieberi and Capparis spinosa subsp. rupestris. The inclination is about 70 % and the vegetation cover at the upper part of the islet is about 80 %.

The halophytic zone is followed by the epilitoral zone, which is dominated by Cichorium spinosum in combination with, e.g., Limonium sieberi, Trigonella monspeliaca, Anthemis sco-
pulorum, Silene sedoides, Rostraria cristata, Dactylis glomerata subsp. hispanica, Malcolmia flexuosa subsp. naxensis and Allium gomphrenoides. The vegetation cover in this zone is about 60 %.

Although most of the coastline consists of limestone cliffs (Fig. 1C-1), the strong waves do not permit the establishment of a chasmophytic flora on most of their surface. This is restricted to the upper part and consequently the species are not easily reached. The best-developed interior cliff system exists on the NNW part of Antikythera (Fig. 1C-8). The communities here consist of, e.g., Aurinia saxatilis subsp. megalocarpa, Asperula taygetea, Campanula saxatilis subsp. cytherea, Scrophularia heterophylla subsp. heterophylla, Inula candida subsp. candida, Scorzonera cretica, Allium gomphrenoides, Brassica cretica subsp. aegaea, Valeriana asarifolia, Rosularia serrata and Sedum creticum. The plant coverage is not more than 50 % and the vegetation height about 25 cm. The species Inula candida subsp. candida and Asperula taygetea are characteristic for the association Inulo candidae-Asperuletum taygeteae Zaffran 1982 described from Crete. This association belongs, according to Zaffran (1990), to the class Asplenietea trichomanis (Br.-Bl. 1934) corr. Oberdorfer 1977, order Petromaruletalia pinnatae Zaffran 1990 and the alliance Scutellarion sieberi Zaffran 1990. According to Dimopoulos & al. (1997), “the low altitude order Petromaruletalia pinnatae with a high number of diagnostic taxa is a Cretan endemic syntaxon. The alliance Scutellarion sieberi is prevailing by Cretan, Aegean and East Mediterranean elements and the geographical range of its diagnostic species coincides with the range of the alliance, which at present seems to be restricted to calcareous cliffs at low altitude in Crete”.

Where phrygana formations of the class and order Cisto-Micromerietea (-etalia) are well developed (Fig. 1C-9), xerophilous dwarf shrubs such as Sarcopoterium spinosum and Coridothymus capitatus dominate. These species are accompanied by Helichrysum conglobatum, Erica manipuliflora, Phlomis cretica, Dorycnium hirsutum and Cistus spp., annuals. Intense grazing and fires or land-clearance lead to the dominance of spiny shrubs, mostly Genista acanthoclada (Fig. 1C-2).

In the interior of Antikythera on non-cultivated hillsides formations of evergreen, sclerophyllous shrubs appear, characterized by the dominance of Juniperus phoenicea and Pistacia lentiscus (Fig. 1C-4). They belong to the class Quercetalia ilicis Br.-Bl., the order Pistacio-Rhamnetalia Rivas-Martinez 1974 and the alliance Ceratonio-Rhamnion Barbero & Quezel 1980. In the east and southeast of Antikythera dense, well-developed communities with Juniperus phoenicea (plant coverage 100 %, main vegetation height c. 1.8 m) have been observed on hills with an inclination of about 60-70 % (Fig. 1C-7).

Well-developed Quercus coccifera communities are also present on Antikythera, where Quercus coccifera is dominating in combination with Calicotome villosa, Pistacia lentiscus and Coridothymus capitatus.

The SSE part of Prassou is characterized by a vegetation type dominated by Euphorbia dendroides with plant coverage of 80-100 % and a main vegetation height exceeding 1 m (Fig. 1C-3). Combinations of species such as Pistacia lentiscus, Olea europaea subsp. oleaster or Juniperus phoenicea with, e.g., Erica manipuliflora, Calicotome villosa and Phlomis cretica are widespread. A few spots of vegetation of a similar composition with Euphorbia dendroides have been observed on the WSW part of the main island.

Discussion

The results of the present study confirm the floristic and biogeographical importance of Antikythera. To the 226 taxa given by Greuter & Rechinger (1967) for the island of Antikythera, 120 new records have been added, including 13 Greek endemic taxa. Many of the new records are autumn or early spring flowering taxa and this observation confirms the importance of “all seasons” floristic investigation.
The result of the floristic analysis (biological and chorological spectra) reflects the geographic position and the climate of the area studied as well as the human impact. The later is suggested by the high percentage of therophytes (53.3 %) and of leguminous taxa (14.1 %). These indicate disturbance in Mediterranean ecosystems (Naveh 1974, Arionoutso & Margaris 1981, Barbero & al. 1990, Panitsa & al. 1994, 2003, Panitsa & Tzanoudakis 1998). Even now intense stock farming takes place in Antikythera. The isolation of the island from the mainland, in combination with the fact that the number of permanent inhabitants of the island in the past was much higher, leaves no doubt that the situation was similar for other agricultural activities until a few years ago.

The high percentage of chamaephytes and hemicryptophytes depends on the frequency of limestone cliffs, which very often harbour endemic taxa (Kypriotakis 1998, Kypriotakis & Tzanoudakis 2001).

The percentage of Greek endemics has increased, compared to that given by Greuter & Rechinger (1967), since among the 120 new records 13 are endemics. One of them, *Allium aegilicu*um is a recently described local endemic (Tzanoudakis 2000). Others provide useful information regarding the biogeographical position of the area studied and the biogeographical boundary lines in the Aegean. For some species, Antikythera seems to be the northwesternmost limit of their distribution range, suggesting a close phytogeographical relationship between this island and Crete (Iatrou 1994, Tzanoudakis & al. 1998). This concerns *Allium rubrovittatum*, *Silene integripetala* subsp. *lidenii* and *Valeriana asarifolia*, which were considered Southern Aegean (Crete, Karpathos) endemics and now their range is shown to include Antikythera. Similar seems to be the situation for *Nigella doerfleri*, *Sedum creticum* and *Filago cretensis* subsp. *cretensis*, known previously only from the Cardaegean region. *Allium longanum* is also a southern element, but has its main distribution in Africa (Cyrenaica). In Greece it was previously known only from a few remote and isolated stations in the Aegean, viz. islets south of Astipalea, the easternmost end of Crete and the island of Gavdos (Stearn 1977, Tzanoudakis 1986, Bergmeier & al. 1997). Now Antikythera appears to be the northwestern limit of its distribution range. *Ranunculus cytheraeus* shows a similar distribution pattern.

![Distribution of SW Aegean endemic taxa](https://bioone.org/journals/Willdenowia on 26 May 2019)

---

**Fig. 2. Distribution of SW Aegean endemic taxa** – 1: *Campanula saxatilis* subsp. *cytherea*; 2: *C. saxatilis* subsp. *saxatilis*; 3: *Allium circinnatum* subsp. *peloponnesiacum*; 4: *A. rubrovittatum*; 5: *A. gomphrenoides*; 6: *A. circinnatum* subsp. *circinnatum*. – For abbreviations see Table 3.
Other taxa support phytogeographical relationships to both the southern Aegean and Kythera-Peloponnisos regions, or to only the later one. *Tulipa goulimyi* and *Allium circinnatum* are species extending from Crete to the southern Peloponnisos. A similar distribution range is shown by the species *Campanula saxatilis* and *Allium gomphrenoides*, the first of which, however, is absent from Peloponnisos and the second from Crete (Fig. 2).

In species or species complexes, which are represented by different morphological entities in both areas, the relation of Antikythera to the Peloponnisos prevails. So *Allium circinnatum*, *Campanula saxatilis* and the *Crepis neglecta* complex are represented in Antikythera not by the Cretan taxon (species or subspecies) but by the Kytherian or the Peloponnesian one.

The presence of *Inula candida* subsp. *candida* and *Asperula taygetea*, characteristics of the association Inulo candidae-Asperuletum taygeteae Zaffran 1982, described from Crete, points to a phytosociological affinity of Antikythera with Crete. This association belongs to the class Asplenietae trichomanis, order Petromaruletalia pinnatae, alliance Scutellarion sieberi (Zaffran 1990) and also some characteristic taxa of the order and the alliance occur on the island, *Scorzonera cretica* and *Valeriana asarifolia* (for the order) and *Allium rubrovittatum* (for the alliance). Also present are the low altitude order Petromaruletalia pinnatae, considered a Cretan endemic syntaxon, and the alliance Scutellarion sieberi so far known only from calcareous cliffs at low altitude in Crete. These data show that the phytogeographical affinity of Antikythera with Crete is also reflected in phytosociological units.

**Acknowledgements**

The authors thank the Greek Ministry of Environment, Regional Planning and Public Works for financial support and the Greek Ministry of Mercantile Marine and the port guard of Neapolis for transport facilities during our visits in the area. The authors appreciate the support by Dr Ralf Jahn who contributed the results of his floristic exploration of the island.

**References**


— , Bonin, G., Loisel, R. & Quézel, P. 1990: Changes and disturbances of forest ecosystems caused by human activities in the western part of the Mediterranean basin. – Vegetatio 87: 151-173. [CrossRef]


Mayer, A. 1995: Comparative study of the coastal vegetation of Sardinia (Italy) and Crete (Greece) with respect to the effects of human influence. – Libri Bot. 15.


Zaffran, J. 1990: Contributions à la flore et à la végétation de la Crète. II. Végétation. – Université de Provence.

Addresses of the authors:
Dimitrios Tzanoudakis, Gregoris Iatrou, Division of Plant Biology, Department of Biology, University of Patras, GR-26500 Patras, Greece; e-mail: tzanoyd@upatras.gr, iatrou@upatras.gr

Maria Panitsa, Department of Environmental and Natural Resources Management, University of Ioannina, Seferi 2, GR-30100 Agrinio, Greece; e-mail: mpanitsa@cc.uoi.gr

Panayiotis Trigas, National Agricultural Research Foundation (N.AG.RE.F.), Forest Research Institute, Terma Alkmanos str., Ilisia, GR-11528 Athens, Greece.