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The Adiantetea class on the cliffs of SW Portugal and of the Azores

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with 1 figure and 3 tables

Abstract. Communities in the Adiantetea class are characterized by the way in which they present a double synusial structure whereby vascular plants usually depend upon the macro and regional climate, while the bryophytes do not. On the sea cliffs of SW Portugal this vegetation seems to be fairly independent of rainfall and temperature and, on the other hand, more conditioned by a particular geomorphological evolution which allows for rainwater to circulate. Water supplies are therefore continuous throughout the year. Owing to the proximity of the sea, the water has also a high saline content. These communities are mainly composed of *Adiantum capillus-veneris* and *Samolus valerandi* as well as two relatively abundant bryophytes (*Didymodon spadiceus* and *Eurhynchium speciosum*). The fact that this seems to be an original community, when compared with the rest of the Adiantetea communities, allows a new association to be proposed: Didymodon spadicei-Adiantetum capilli-veneris. ass. nov, which is endemic to SW Portugal.

On the basalt cliffs of the Azores islands, strongly influenced by a marine microclimate, a second new association was singled out: Dicrano scottiani-Adiantetum capilli-veneris. ass. nov, which is endemic to this area.

Introduction

Vegetation of the class Adiantetea is known for its fairly scarce, isolated occurrence (DEIL 1994). It comes as a surprise to learn that this kind of vegetation may be found in many places, growing on the sea cliffs of SW Alentejo (the lower Alentejo coastline between Sines and São Vicente) as well as to the north of Lisbon. As we shall demonstrate, a particular system of water circulation ensures permanent water flow and the survival and coexistence of large carpets of hydrophilic mosses and vascular plants, typical of the Adiantetea class. The Mediterranean climate has none of the qualities favouring the development of these communities outside environments that are fairly shady and have a consistently high level of moisture. As a rule, Mediterranean climates are not propitious to such environments because they suffer from relatively long dry spells. On the other hand, the amount of total annual rainfall in Southern Portugal is fairly low and water courses dry up during the summer. It is not common, therefore,

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to find places where water runs down rocky faces throughout the whole year, setting up a favourable biotope for the development of Adiantetea communities.

The following aims were drawn up for the present study:

1. Identify the mechanisms through which continual flows of water are ensured on the cliffs of SW Alentejo (the lower Alentejo coastline between Sines and São Vicente) and why there is always water available even in summer.
2. To study the floral composition of the Adiantetea growing on the cliffs and check upon the existence of an original species combination within the class and a comparison with the SW Mediterranean and Macaronesia context.
3. To analyse contact communities and the importance of transgressive species which affect the flora composition of Adiantetea, mostly on the fringes of the bryophyte beds.

Method

In order to achieve the aims set out above, the biotopes of SW Alentejo where Adiantetea communities could be found were inspected throughout. Relevés following the methods proposed by Braun-Blanquet (1964) were drawn taking into account the specific nature of these communities.

In compiling the relevés, care was taken to restrict the areas covered by the inventory so as to minimize the "interference" caused by the transgressive species, thus reducing the rate at which they were present in both number and diversity in the records.

A study was also undertaken at bryophytic level in this area so that the final study would reflect results together with the vascular and non-vascular levels from a synusial point of view (Deil 1995, 1996, 1998).

In this study, therefore, no analysis was made of the fine spatial variation within the bryophytic level which, generally speaking, characterizes the half-cave environment, frequently situated in the rocky walls of the sea cliffs of SW Alentejo.

Accordingly, a temporal and spatial geomorphological and geological study was carried out. Regarding the spatial side of the study, the morphological and vertical lithological variation of the cliff was studied in order to understand the way in which the infiltration, accumulation, circulation and resurgence of water happened, mainly on cliff faces. Moreover, the morphological study took into account the importance of fracture lines and intrusive dykes typical of schistose and quartzite material in cliffs, when defining the cracks and cavities where the microclimate is favourable to the growth of communities belonging to the Adiantetea.

Where temporal aspects were concerned, a study was undertaken in order to shed light on the main events leading to the present lithostratigraphic build-up seen in cliffs. The lithostratigraphic layers, associated with the morphology of contact surfaces between the different strata, are the main factors explaining permanent water sources in places where the Adiantetea grow.

Geomorphological study

The western coastline of Portugal leading southwards from Pego Beach down to the Algarve is mostly made up of cliffs. Lithologically, the cliffs here may be classed in two groups. To the north of Sines, the sandstone cliffs predominate; they are unstable and form gullies owing to subaerial erosion and are not suitable for the Adiantetea bryophytes, not even for the fern *Adiantum capillus-veneris*. Adiantetea communities only manage to grow on relatively stable rocky walls which are not prone to any significant rate of erosion as is the case of the Costa da Galé sandstone cliffs to the north of Sines. South of Sines, the cliffs are much more complex and as a rule, there is a vertical differentiation made up of two distinct sectors. The lower sector, which is normally composed of more than 50% cliff height, is made up of the oldest rock (mainly palaeozoic schist, quartzite, and dykes of quartz) which is hard and relatively stable and where half-caves are formed giving shelter to the Adiantetea type of vegetation. The higher parts of the cliffs are usually sandstone types (sands, sandstone and conglomerates weakly held together) and raised beaches with rounded pebblestones that are sometimes very large. These are predominantly of Quarternary age (dating from the end of the Tertiary and into the Quarternary), with the exception of the consolidated sandstones, is not nearly as hard as the lower section and is therefore easily attacked by subaerial erosion which causes serious instability and a tendency to form gullies. Some of the lithological formations showing these features are highly permeable and are extremely important sites supplying running water.

Hydrological circulation

As was seen in the preceding section, the coastal platform carved in Palaeozoic rock, is covered with materials that as a rule are highly permeable. This explains the fact that almost all the rainwater falling in autumn and winter immediately infiltrates through the sand dunes without being washed away at surface. Percolated water seeps deeper and comes into contact with the surface of the coastal platform carved into the Palaeozoic rock. Extensive watertables are therefore formed at the Red Formation in contact with the Palaeozoic rock. Owing to the way the coastal platform made up of Palaeozoic material generally slopes towards the northwest, water is drained in the direction of the coastline. In its movements westwards, this water finds the coastal cliffs where it collects into permanent springs. Water normally drips down the rock walls but waterfalls are not common, unless they are the micro-waterfalls occurring in the irregular surfaces of the cliffs. The permanent nature of these watercourses even during the summer is remarkable for an area with a Mediterranean climate that has a long dry season and an annual rainfall of only 500–700 mm.

Chemical qualities of the flow water

According to the data shown in Table 1, the water flowing in the cliffs in SW Portugal is obviously oligosodic and has a high pH although it contains an average amount of Ca^{2+}. The high salinity is caused by saline sea-spray carrying the sodium ion (Na^{+}) inland and depositing it on the top of the sand. The rainwater dissolves the salt and then begins to flow to the depths. In this way, the water becomes salt-enriched although its salinity is proportional the amount of rainfall. Upon analyzing Table 1, it will be seen that there is a difference in the amounts of salinity seemingly caused by the cliff's exposure to the prevailing winds. Therefore, cliffs located along Salto Beach were found to have a lower salinity because they are sheltered from the North winds (which predominate during spring and summer). The Barcas Beach cliffs facing west have an average saline count. The Almograve Beach cliffs, which are directly exposed to the North wind, have a higher salinity (Table 1).

Although the calcium content is never very high, two sources may explain its presence:

a) Calcium enriched content from shell fragments contained in the Holocene dunes situated above the Pliopleistocene complex (Ramos 2004). At times these fragments may account for more than 50 % of the mineral composition.

Table 1. Chemical qualities of the flow water.

	A	B	C
Parameters			
pH	8,0	8,0	7,8
Conductivity (at 25 °C) mS/cm	0,74	0,51	1,00
Calcium (Ca^{2+}) mg/l	33,88	33,66	16,10
Magnesium (Mg^{2+}) mg/l	16,40	10,00	24,40
Sodium (Na^{+}) mg/l	71,00	48,00	144,00
Boride (B^{-}) mg/l	0,10	0,19	0,10
Cloride (Cl^{-}) mg/l	141,84	81,56	219,85
Carbonate (CO_3^{2-}) mg/l	L. traces	None	None
Bicarbonate (CO_3H^{-}) mg/l	79,30	79,30	42,70
Sulphates (SO_4^{2-}) mg/l	42,80	Traces	39,09
Solids in suspension	Traces	L. traces	Traces
Iron (Fe) mg/l	0,0027	0,0092	0,0036
Manganese (Mn) mg/l	0,0004	0,0003	0,0002
Nitrates (NO_3^{-}) mg/l	4,6	7,9	29,6
Saturation rate	−0,15	−0,24	−1,02
Cause of adjusted sodium absorption	2,25	1,65	4,16

A – Cliffs at Porto das Barcas (Vila Nova de Milfontes) – Odemira. Western exposure.
B – Cliffs at Almograve Beach (Vila Nova de Milfontes) – Odemira. North-Western exposure.
C – Cliffs at Salto Beach (Porto Covo) – Sines. South-Western exposure.

b) Calcium enriched content from dunes and sand consolidated with limestone cement situated on the coastal platform, which has developed on cliff tops heading inland. Associated with high calcium content is also the high bicarbonate content in the water solution.

The presence of some nitrates, mainly in the water flowing on the cliffs at Praia do Salto, is the result of infiltration from farmlands situated on the coastal platform.

Flora and vegetation

The microtopography of the cliffs is paramount in the spatial organization of the vegetal communities growing around dripping water. As a whole, plant communities form a Microgeosigmetum that is heavily reliant on exposure, the thickness of the micro-soils, slopes and water-flow conditions. In general, there are three kinds of biotopes (Fig. 1).

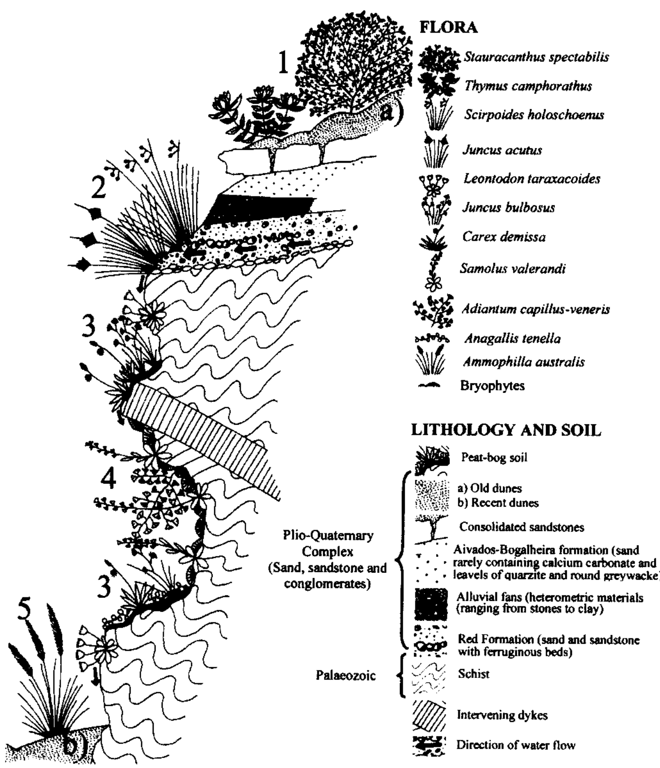

Fig. 1. Mosaic of vegetation communities typical of the SW Alentejo sea cliffs with permanent soaking water. 1 – Thymo camphorati-Stauracanthetum spectabilis; 2 – Holoschoeno-Juncetum acuti; 3 – Anagallido tenellae-Juncetum bulbosi; 4 – Didymodon spadicei-Adiantetum capilli-veneris; 5 – Loto cretici-Ammophiletum australis.

a) The water springs are generally situated in the Red Formation, which is in contact with the platform surface carved out of the Palaeozoic rock. In these places, the sand is always very moist and there are colonies of *Juncus acutus* and *Scirpoides holoschoenus* ssp. *holoschoenus* (Holoschoeno-Juncetum acuti), often in almost pure communities.
b) On the rocky ceilings and the inner walls of the cracks and half-caves, the shade favours the growth an Adiantetea community.
c) In the lower section consisting of half-caves and rocky microplatforms on the walls of the cliffs where the slope is not so sharp, there is a build-up of peat-bog microsoil which hosts a Scheuchzerio-Caricetea fuscae community.

Scirpoides holoschoenus ssp. holoschoenus rush-communities

The rush-dominated biotope is very frequent and always hosts extremely simple flora compositions, predominantly *Scirpoides holoschoenus* ssp. *holoschoenus* and *Juncus acutus* (Fig. 1). Its hold on the cliff depends upon soil that is both moist and deep enough. The water springs coming from sources in the Red Formation sands, are the only places providing such conditions due to the fact that thereafter, the water starts trickling down the cliff and the soil is not thick enough to sustain the community's growth.

Peat-bog vegetation

On the microplatforms or the parts of the cliff-face which are less steep and where organic matter may build up, permanently soaked microsoils may be formed. These biotopes are colonized by vegetation belonging to the Scheuchzerio-Caricetea fuscae namely a poorer version of the Anagallido tenellae-Juncetum bulbosi, a community that is found growing in some of the moist inter-dune hollows in peat-bog areas more towards the inland. On the cliffs, Anagallido tenellae-Juncetum bulbosi is dominated by *Carex demissa*, *Juncus bulbosus* and *Anagallis tenella* together with *Leontodon taraxacoides*, *Leontodon longirostris* and *Leontodon tuberosus*, the three latter being much more in evidence. Apart from being found in the Boreal-Alpine areas, the boggy oligotrophic plains also have their own vegetation communities belonging to the Anagallido tenellae-Juncion bulbosi in some of the permanently moist hollows and cliffs along the sandy Alentejo coastline. Their existence is proved by the presence of species such as *Anagallis tenella*, *Juncus bulbosus*, *Isolepis cernua*, *Arnica montana* ssp. *atlantica*, *Rhynchospora rugosa*, *Wahlenbergia hederacea*, *Scutellaria minor* and *Pinguicula lusitanica*. The association these plants have with a permanent water source seems evident in itself, despite the fact that this sort of situation is hard to find in the Mediterranean. Nevertheless, provided water is plentiful, temperature is not a hindrance and in this way communities of the Scheuchzerio-Caricetea fuscae class manage to colonize thermo-Mediterranean areas. In the same way, it should be mentioned that the bryophytes found are much more frequent in northern or mountainous regions with temperate boreal climates, such as *Didymodon spadiceus* and *Eurhynchium speciosum* DIERSSEN (2001).

The Bryo-pterodophytic communities – Didymodon spadicei-Adiantetum capilli-veneris

Although relatively rare in areas where they are normally found, there is unusually dense vegetation belonging to the Adiantetea class on the sea-cliffs of SW Alentejo, due to the numerous springs flowing there. As a rule, the Adiantetea communities grow on rocky cliff walls down which calcium-rich water slowly drips. Their dependency on calcium-rich water explains that most of these vegetation communities thrive in limestone environments (with limestone outcrops). Despite being frequently associated with limestone soils, the south-west Adiantetea is found on cliffs which are carved out of predominantly acidic material. Nevertheless, the water running down the cliffs contains sodium bicarbonate and as such, hosts bryo-pterodophytic communities of the Adiantetea class. In comparison with the continental communities, the sea-cliff communities are in an original biotope owing to the high saline content of the water flow. Regarding its flora, the differentiation of the coastal community is witnessed by two hygrophytic mosses: *Didymodon spadiceus*, which only grows in this place in Portugal (regional characteristic; a territorial endemism) (SÉRGIO et al. 2006) and *Eurhynchium speciosum*, a fairly rare species in Portugal (SÉRGIO et al. 1994), although on the SW sea cliffs they are found very frequently. An almost total predominance of *Samolus valerandi* is also noticeable, when compared with the published communities in Portugal (see LOPES 2001 – Table 4.12 page 207). This predominance is also evident inland (see Table 3). It should be pointed out that, taking into account the presence of *Eucladium verticillatum* in most of the inventories drawn up, this community has some similarities with the associations described by DÍAZ et al. (1982) for the Iberian Peninsula's south-eastern mountains. However, both are synecologically and chorologically distinct. Moreover, *Didymodon spadiceus* and *Eurhynchium speciosum* act as territorial characteristics of Didymodon spadicei-Adiantetum capilli-veneris.

Based on the original nature of the flora and biotope and also its territorial singularity, a new vegetation community is described as belonging to the Adiantetea class (Didymodon spadicei-Adiantetum capilli-veneris ass. nova hoc loco typus relevé 5, Table 2). According to studies undertaken, this new community has been found here and there on the sea cliffs of western Portugal from the Praia de São Julião (Ericeira – to the north of Lisbon) to the Cape of São Vicente.

Apart from the taxa referred to in the relevés of the Didymodon spadicei-Adiantetum capilli-veneris, characteristic species of the class Scheuchzerio-Caricetea fuscae were also found although their appearance in the bryophyte Adiantetea communities are not at all usual. They are more commonly seen in areas where half-caves are not so visible

Table 2. Didymodon spadicei-Adiantetum capilli-veneris ass. nov. (Adiantion capilli-veneris; Adiantetalia capilli-veneris; Adiantetea).

Numerical order	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Sampling area (m^2)	0,5	1	1	1	2	2	2	2	1	4	5	5	2	2	1
Degree of coverage (%)	80	50	60	50	80	60	60	80	50	45	50	60	50	60	70
Characteristics of association and higher units															
Adiantum capillus-veneris	2	3	3	3	4	3	2	3	2	1	2	2	2	3	2
Samolus valerandi	2	3	2	1	2	3	3	3	3	1	2	2	2	2	3
Eurhynchium speciosum	.	+	2	.	3	.	.	2	+	.	2	2	2	1	2
Didymodon spadiceus	.	+	1	1	2	.	.	.	.	+	1	1	+	2	1
Eucladium verticillatum	+	1	+	.	+	+	.	+	+	.	.	.	+	1	.
Companions															
Leontodon longirostris	1	2	+	1	1	2	1	+	1	2	2	1	1	1	2
Leontodon taraxacoides	1	1	+	+	+	1	+	+	1	2	1	1	2	+	1
Anagallis tenella	.	1	+	.	.	1	+	+	+	2	2	1	+	1	.
Carex demissa	+	.	.	1	1	.	+	1	1	1	1	1	+	1	2
Apium repens	.	+	1	+	+	1	.	+	+	1	.	1	.	.	+
Daucus halophilus	+	+	+	+	.	+	+	+	+	.	.	.	.	+	.
Scirpus pseudo-setaceus	2	1	1	1	+	.	.	.	.	.	1	1	+	.	1
Crithmum maritimum	+	.	+	+	.	+	+	+	+	.	.	.	.	+	.
Schoenus nigricans	+	.	.	.	.	+	1	+	+	.	.	.	.	.	.
Dactylis marina	+	.	+	+	+	.	+	.	.	.	.	.	.	.	.
Isolepis cernua	.	.	.	.	.	+	2	.	+	.	1	.	.	2	1
Hydrocotyle vulgaris	.	.	.	.	.	.	.	.	.	1	2	.	.	.	.
Holcus lanatus	.	.	.	.	.	.	.	.	.	.	1	+	.	.	.
Polypogon maritimus	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.
Hypericum humifusum	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Juncus bulbosus	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.
Calendula algarbiensis	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.

Localities: 1, 2, 3 – Barcas Beach (Vila Nova de Mil Fontes); 4, 5 – Salto Beach (Porto Covo); 6, 7, 8, 9 –Almograve Beach ; 10, 11, 12 – Porto Covinho Beach; 13, 14 - Malhão Beach; 15 - Julião Beach (Ericeira).

(they are flatter) and where transgressive plants may penetrate the Adiantetea more easily. Nevertheless, even in places where half-caves and cracks are more visible, it is always possible to find transgressive species as the cliffs generally face westwards and the sun's rays are projected at an angle so that most of the half-caves and cracks are bathed in sunlight until dusk.

Table 3 is a synthetic table of associations included in the Adiantetea vegetation class found in the Iberian Peninsula, Morocco and the Madeira, Azores and Canary Islands. Didymodon spadicei-Adiantetum capilli-veneris stands out as an independent, floristically well circumscribed community. Moreover, the later association and the Morrocan Adianto-Hypericetum naudiniani exhibit similar habitat features (schist rock cliffs). Nevertheless, their distinct floristic combinations correlated with distinct biogeographical contexts supports their syntaxonomical independence.

As documented by table 3, a new Azorean association can also be separated: Dicrano scottiani-Adiantetum capilli-veneris (Lüpnitz ex Deil 1996) J. C. Costa, Aguiar, Fernández-Prieto, Neto, Capelo & Sérgio stat. novus (*basion.*: Conocephalo-Woodwardietum radicantis Brullo 1986 dicranetosum scottiani Lüpnitz ex Deil 1996, in Deil

Table 3. Synthoptic table of the Adiantetea vegetation in the Iberian Peninsula, Morocco and the Madeira, Azores and Canary Islands.

column number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
number of relevés	1	3	1	1	5	5	5	6	4	2	5	16	6	7	3	4	3	1	1	28	14	5	5	7	7	3	8	5	1	8	5	10	8	3	15	15	8	9	6	4	8	1
characteristics																																										
Adiantum capillus-veneris	1	3	1	1	4	5	3	V	4	2	5	I	V	V	3	4	3	1	1	IV	IV	5	4	V	V	.	V	1	1	IV	1	V	V	1	V	II	III	V	V	4	V	.
Samolus valerandi	1	3	1	.	.	3	2	V	3	.	4	.	II	.	.	1	1	1	1	.	III	2	4	II	III	.	.	.	.	IV	1	II	.	.	V	I	.	.	.	.	.	.
Eucladium verticillatum	1	3	1	.	5	5	5	II	4	2	.	IV	V	I	2	.	1	1	.	V	V	.	2	V	II	1	III	.	.	V	1	III	V	.	IV	.	V	V	I	.	V	1
Pellia fabbroniana	.	1	1	.	.	3	.	.	.	.	.	III	II	V	.	.	3	1	.	III	.	2	.	.	V	3	.	.	.	.	.	.	.	.	.	.	II	V	.	.	.	1
Conocephalum conicum	.	.	.	.	2	.	.	.	4	.	2	.	.	II	.	.	.	.	.	.	.	.	.	III	V	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Didymodon tophaceus	.	.	.	1	1	.	.	.	.	.	.	IV	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.
Gymnostomum calcareum	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	I	III	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.
Marchantia polymorpha	.	.	.	.	.	.	.	.	.	.	4	.	.	IV	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cratoneuron commutatum	.	.	.	.	.	.	.	.	.	.	.	II	IV	V	1	.	.	.	.	I	II	.	.	II	.	.	.	.	.	.	.	.	II	3	.	.	I	V	.	.	.	.
Cratoneuron filicinum	.	.	.	.	.	.	.	.	.	.	.	I	.	I	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	III	.	.	.	.	.	.	III	.	.	.	.	.
Pachyfidissens grandifrons	.	.	.	.	.	.	.	.	.	.	.	.	.	V	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hypericum androsaemum	.	.	.	.	.	.	.	.	.	.	.	.	.	IV	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.
Pinguicula grandifl. dertos.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Crithmum maritimum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.	.	.	.	.
Trachelium caeruleum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	1	1	II	V	5	3	V	.	.	.	.	.	V	.	.	III	1	.	.	.	.	.	.	.	.
Pteris vittata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Hypericum hircinium subsp. *metroi*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Eurhynchium speciosum	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	IV	2	.	.	.	.	.	.	.	.	IV	.	.	.	.	.	.	.
Woodwardia radicans	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	3	II	1	.	.	.	.	.	.	.	.	.	I	.	.	.	.
Dicranum scottianum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Selaginella kraussiana	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cardamine calderarum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hypericum pubescens	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Camplotoma canariensis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.	.	.	.	.	.
Hypericum coadunatum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Rhynscostegiella curviseta	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.
Hypericum naudinianum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	.	.	.	.	.	.	.	.	.
Philonotis fontana	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	3	.	.	.	.	.	.	.	.
Didymodon spadiceus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	IV	.	.	.	.	.	.	.
Pinguicula valisneriifolia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	.	.	.	.	.	.
Pinguicula mundi	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	.	.	.	.	.
Hypericum nummularium	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	IV	V	4	III	.
Hymenostylium rucurvirostrum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	I	.
Pinguicula grandifl. coenocantabrica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	V	3	.	.
Pinguicula longifolia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	.
Southbya tophacea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
other bryophytes																																										
Cosmarium subcucumis	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Synechoccus aeruginosus	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Philonitis marchia	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cephalozia bicuspidata	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pellia epiphylla	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pohlia nutans	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bryum pseudotriquetrum	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	II	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Didymodon rigidicaulis	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Anisothecium howei	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pohlia carnea	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rhynchostegium riparioides	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Acrocladium cuspidatum	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Leptobryum pyriforme	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

(1996). *Lecotypus nominis* relevé. # 1, table 18, page 239 Lüpnitz (1975).] Transcription of lectotype: Ilha das Flores, Rochas dos Bordões, 340 m height, 100 % covering, 90° inclination: 2 *Adiantum capillus-veneris*, 1 *Dicranum scottianum*, 3 *Selaginella kraussiana*, 2 *Equisetum telmateia*, + *Phyllitis scolopendrium*, + *Blechnum spicant*, + *Hedera azorica*, + *Woodwardia radicans*.

Diferential of association: *Dicranum scottianum*, *Selaginella kraussiana*, *Huperzia dentata*, *Festuca petraea*, *Woodwardia radicans*.

Table 3 (cont.)

column number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
number of relevés	1	3	1	1	5	5	5	6	4	2	5	16	6	7	3	4	3	1	1	28	14	5	5	7	7	3	8	5	1	8	5	10	8	3	15	15	8	9	6	4	8	1
Gymnostomum aeruginosum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lophozia turbinata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cephaloziella baumgartneri	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hydrogonium ehrenbergii	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Jungermannia pumila	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Aneura pinguis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	I	IV	.	.	.	.	.	.	.	II	1	.	.	.	II	.	.	.	.
Eurhynchium swartzii	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Brachythecium rivulare	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Fissidens exilis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Plagiomnium cuspidatum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Barbula vinealis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pohlia wahlenbergii	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Plagiomnium undulatum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Chiloscyphus polyanthos	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bryum capillare	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Fissidens viridulus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Thrichostomum brachydontium	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rhynchostegium confertum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pohlia nutans	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Dicranella varia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Fissidens taxifolius	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Eurhynchium praelongum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Calypogeia fissa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Thamnobryum alopecurum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	II	2	.	.	.	.	.	2	.	.	.	.	.	.	.	.
Brachythecium rutabulum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Neckera crispa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
other pteridophyta																																										
Phyllitis scolopendrium	.	.	.	.	.	.	.	.	2	.	.	.	.	IV	.	1	.	.	.	.	.	.	.	.	.	.	II	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Equisetum temalteja	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cystopteris viridula	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Osmunda regalis	.	.	.	.	.	.	.	.	.	.	.	.	.	IV	.	1	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Dryopteris filix-mas	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Polystichum setiferum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Selaginella denticulata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Blechnum spicant	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	III	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Dryopteris affins	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Athyrium filix-foemina	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Asplenium scolopendrium	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Huperzia dentata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cystopteris fragilis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Adiantum hispidulum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Polypodium australe	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pteris serrulata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Asplenium monanthes	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Asplenium quadrivalens	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Asplenium hemionotis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Asplenium trichomanes	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	1	.	.
companions																																										
Parietaria judaica	1	.	.	.	.	.	.	.	2	2	.	.	.	.	.	1	.	1	.	.	.	2	.	III	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ficus carica	1	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	1	III	.	.	.	.	.	.	.	.	I	.	.	I	.	.	.	.	.	.
Polypogon viridis	1	.	.	.	.	.	1	.	.	.	3	.	.	.	.	.	.	.	.	.	I	.	.	I	.	.	.	.	.	.	.	.	II	1	.	.	.	.	.	.	.	.
Cirsium monspessulanum	1	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sonchus oleraceus	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

The segregation of the new association of the Conocephalo-Woodwardietum radicantis is due to floral, ecological and biogeographical factors.

a) Floral causes: *Dicranum scottianum*, *Huperzia dentata*, *Festuca petraea* and *Selaginella kraussiana* are only found in the Azorean community. *Hypericum hircinicum* ssp. *majus* and *Pellia fabbroniana*, which are important in the Sicily and Southern Italy community, are missing on the Azores.

Table 3 (cont.)

column number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
number of relevés	1	3	1	1	5	5	5	6	4	2	5	16	6	7	3	4	3	1	1	28	14	5	5	7	7	3	8	5	1	8	5	10	8	3	15	15	8	9	6	4	8	1
Hedera helix	1	.	.	.	.	.	.	.	.	.	.	.	.	II	.	1	1	.	.	.	3	.	2	II	.	3	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
Scirpoides holoschoenus	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	3	.	.	.	.	.	1	I	.	.	.	.	.	.	.	.	.	.	.	.
Sonchus aquatilis	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
Linum maritimum	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Brachypodium phoenicoides	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ruscus aculeatus	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Anagallis tenella	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	II	1	IV	.	.	.	.	.	.	.
Blackstonia perfoliata	.	1	1	.	.	.	3	III	.	.	.	.	I	.	.	.	.	.	.	.	III	.	.	.	.	.	.	.	1	I	.	.	IV	2	.	.	.	.	.	.	II	.
Agrostis stolonifera	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Schoenus nigricans	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	II	+	.	I	V	2	II	.
Sonchus maritimus	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	II	.	.	.	.	.	.	.	1	II	.	.	II	.	.	.	.	.	.	.	.	.
Hypericum undulatum	.	.	.	.	.	.	3	II	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Dittrichia viscosa	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	1	.	.	III	.	1	III	.	.	.	.	1	I	1	.	I	.	.	.	.	.	.	.	.	.
Salix pedicellata	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Mentha pulegium	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Polypogon maritimus	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.
Parentucellia viscosa	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Trifolium campestre	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	2	.	.	.	.	.	.	.	.
Hypochaeris laevigata	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Spiranthes aestivalis	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Radiola linoides	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Gastridium ventricosum	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cistus albidus	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Origanum elongatum	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sagina maritima	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Plantago coronopus	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Dactylis glomerata	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sanguisorba minor	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sedum villosum aristatum	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Mentha suaveolens	.	.	.	.	.	.	.	III	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	II	.	.	.	.	1	I	.	.	.	.	.	.	.	.	.	.	.	.
Brachypodium sylvaticum	.	.	.	.	.	.	.	II	.	.	.	.	.	II	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Apium nodiflorum	.	.	.	.	.	.	.	II	.	.	1	.	I	.	.	.	.	.	.	.	II	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Euphorbia hirsuta	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Calystegia sepium	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Holcus lanatus	.	.	.	.	.	.	.	I	.	.	3	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	I	.	.	.	.	.	.	.
Campanula rampunculus	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Epilobium hirsutum	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Phagnalon saxatile	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.
Lythrum salicaria	.	.	.	.	.	.	.	I	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Vinca difformis	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Veronica anagallis-aquatica	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Polypogon monspeliensis	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Myosotis debilis	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Roripa nasturtium-aquaticum	.	.	.	.	.	.	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Erigeron karvinskianus	.	.	.	.	.	.	.	.	2	1	.	.	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Tradescantia fulminensis	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Chenopodium ambrosioides	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Geranium purpureum	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	II	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lythrum junceum	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	1	.	.	.	.	I	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.
Isolepis cernua	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.	.	.	.	.
Sagina apetala	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Poa trivialis	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Trifolium dubium	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Trifolium repens	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

b) Ecological causes: The Azorean community grows on basalt and volcanic rocks where the sea winds are salt-laden, thus explaining the appearance of *Festuca jubata*. The Italian community, however, is found growing on shale and in wooded areas.

c) Biogeographical causes: The Azores is located in the Euro-Siberian region and has a hyperoceanic, temperate climate.

Table 3 (cont.)

column number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
number of relevés	1	3	1	1	5	5	5	6	4	2	5	16	6	7	3	4	3	1	1	28	14	5	5	7	7	3	8	5	1	8	5	10	8	3	15	15	8	9	6	4	8	1
Coronopus didymus	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sibthorpia peregrina	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Epilobium parviflorum	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Prunella vulgaris	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cymbalaria muralis	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rubus ulmifolius	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	1	4	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Geranium robertianum	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.
Erica vagans	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Potentilla sterilis	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex flacca	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hypericum tetrapterum	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Campanula patula	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Eupatorium cannabicum	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.
Agrostis alba	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Epilobium lanceolatum	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Galium mollugo	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Globularia nudicaulis	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	I	1	.	.
Lamium maculatum	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Mentha aquatica	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Oxalis corniculata	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Picris hieracoides	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rubia peregrina	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sagina saginoides	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Salix purpurea	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Saxifraga hirsuta	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
Scrophularia uliginosa	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Salix atrocinerea	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.
Teucrium pyrenaicum	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Molinia coerulea	.	.	.	.	.	.	.	.	.	.	.	.	.	I	2	.	.	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.
Aquilegia vulgaris	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex serotina	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Polygonatum odoratum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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Stellaria alsine	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Erinus alpinus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	1	.	.
Parietaria officinalis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Oxalis pes-caprae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Viola reichenbachiana	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Putoria calabrica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Coriaria myrtifolia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	I	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.
Lonicera periclymenum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hyparrhenia hirta	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Phagnalon rupestre	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Satureja obovata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hypericum tomentosum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	1	.	.	.	.	.	.	.	.	.	I	2	.	II	I	.	.	.	.	.
Nerium oleander	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	3	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.
Gnaphalium luteo-album	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	I	.	.	.	.	.	I	.	.	I	1	.	.	.	.	.	.	.	.
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Nostoc sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	IV	.	.	.	.	1
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Anagallis arvensis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Arbutus unedo	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hypocharis achyrophorus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Poa flaccidula	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Oxalis cernua	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Antirrhinum linkianum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Piptaterum mileaceum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pinus halepensis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.
Erica terminalis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Conclusions

The sandstone sea-cliffs to the south of Ericeira often have favourable conditions for the occurrence of plant communities belonging to the Adiantetea class. Studies have shown the original geomorphic, hydrological and floristic nature of these vegetation communities and the biotopes they colonize. With regard to the physical characteristics of the biotopes, their originality is borne out by the remarkable circulation of water and its high saline level. From the floristic point of view, their originality is conveyed by the

Table 3 (cont.)

column number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
number of relevés	1	3	1	1	5	5	5	6	4	2	5	16	6	7	3	4	3	1	1	28	14	5	5	7	7	3	8	5	1	8	5	10	8	3	15	15	8	9	6	4	8	1
Coronopus didymus	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sibthorpia peregrina	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Epilobium parviflorum	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Prunella vulgaris	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cymbalaria muralis	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rubus ulmifolius	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	1	4	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Geranium robertianum	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.
Erica vagans	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Potentilla sterilis	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex flacca	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hypericum tetrapterum	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Campanula patula	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Eupatorium cannabicum	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.
Agrostis alba	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Epilobium lanceolatum	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Galium mollugo	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Globularia nudicaulis	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	I	1	.	.
Lamium maculatum	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Mentha aquatica	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Oxalis corniculata	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Picris hieracoides	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rubia peregrina	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sagina saginoides	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Salix purpurea	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Saxifraga hirsuta	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.
Scrophularia uliginosa	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Salix atrocinerea	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.
Teucrium pyrenaicum	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Molinia coerulea	.	.	.	.	.	.	.	.	.	.	.	.	.	I	2	.	.	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.
Aquilegia vulgaris	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex serotina	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Polygonatum odoratum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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Stellaria alsine	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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Parietaria officinalis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Oxalis pes-caprae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Viola reichenbachiana	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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Coriaria myrtifolia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	I	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.
Lonicera periclymenum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hyparrhenia hirta	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Phagnalon rupestre	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Satureja obovata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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Nerium oleander	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	3	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.
Gnaphalium luteo-album	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	I	.	.	.	.	.	I	.	.	I	1	.	.	.	.	.	.	.	.
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Nostoc sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	IV	.	.	.	.	I
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Anagallis arvensis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Arbutus unedo	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hypocharis achyrophorus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Poa flaccidula	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Oxalis cernua	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Antirrhinum linkianum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Piptaterum mileaceum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pinus halepensis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.
Erica terminalis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

presence of the *Eurhychium speciosum, Didymodon spadiceus* (the only place in Portugal in which it has been found), the predominance of the *Samolus valerandi* and the frequent presence of transgressive species, mainly belonging to the Scheuchzerio-Caricetea fuscae class.

Faced with this situation, we may say that the original mosaic work of the vegetation communities growing in permanently moist areas in contrast with a clearly Mediterranean environment, has to do with the unusual presence of dunes and other sandstone materials overlying the sea cliffs.

Table 3 (cont.)

column number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
number of relevés	1	3	1	1	5	5	5	6	4	2	5	16	6	7	3	4	3	1	1	28	14	5	5	7	7	3	8	5	1	8	5	10	8	3	15	15	8	9	6	4	8	1
Rosmarinus officinalis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ulex parviflorus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Erica multiflora	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Juncus articulatus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.
Tamus communis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Myrtus communis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Thymus piperella	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Campanula lusitanica ssp. *transtagana*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Antirrhinum barrelieri	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Scrophularia lyrata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Brachypodium gaditanum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.
Isoris radiata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Poa annua	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Potentilla reptans	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rosa sempervirens	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cyperus longus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sambucus nigra	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cynosurus cristatus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Vulpia geniculata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hypericum hircinium ssp. *majus*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	IV	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Geranium versicolor	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Arisarum proboscideum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sagina procumbens	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Festuca jubata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rubia agostinhoi	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Luzula purpureo-splendens	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hypericum humifusum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	1	.	.	.	.	.	.	+	.	.	.	.	.	.	.
Sibthorpia europaea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hedera azorica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Erica azorica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Scrophularia auriculata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Picris rigens	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Thymus caespititius	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Isolepis setacea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Calamintha baetica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lotus pedunculatus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Festuca arundinacea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.
Vitis vinifera	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.
Phillyrea media	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.
Eryngium maroccanum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.
Leontodon saxatile	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.
Carex divisa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.
Pericallis webbii	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Juncus acutus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Meonanthes brachypetalum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Ageratina adenophora	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Conyza bonariensis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Mentha rotundifolia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.
Daucus carota	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.
Sonchus tenerrimus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.
Brachypodium distachyon	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.
Galium concatenatum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.
Bromus rubens	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.
Lotus uliginosus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.
Cerastium brachypetalum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.
Scrophularia eriocalyx	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.
Dactylorrhiza maurusia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.
Thymus pulegioides	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.

Eucladio-Adiantetum: 1 Braun-Blanquet & Bolòs (1950), 2 Bolòs & Molinier (1958), 3 Bolòs (1967), 4 Varo & Fernandez Casa (1970), 5 Hübschmann von (1971), 6 Mateo (1983), 7 Deil (1996), 8 Pinto Gomes (1998), 9 Lopes (2001); 10 Gaspar (2003), 11 Costa et al. (2004), Eucladio-Adiantetum cratoneuretosum commutati: 12 Ros & Guerra (1987), 13 Vives (1964), Eucladio-Adiantetum hypericetosum androsaemi: 14 (Br.-Bl. 1967); Eucladio-Adiantetum pinguiculosum dertosanensis: 15 O. Bolòs (1967), Eucladio-Adiantetum asplenietosum maritimi: 16 Diaz Gonzalez, (1976) Trachelio-Adiantetum: 17 Bolòs (1957), 18 Bolòs (1967), 19 Esteve Chueca & Fernandez Casas (1972), 20 Sanchez & Gil (1982), 21 Deil (1996), 22 Lopes (2001), 23 Crespo et al. (1990) Trachelio-Adiantetum hypericetosum metroi: 24 Deil (1996); Conocephalo-Woodwardietum radicantis 25: Brullo et al. (1989) 26: Brullo et al. (2002); Dicrano scottiani-Adiantetum 27 Lüpnitz (1975); Cardaminetum caldeirari: 28 Lüpnitz (1975); Adianto-Hypericetum pubescentis: 29 Varo & Fernando Casas (1970), 30 Deil (1996); Lyperetum canariensis: 31 Sunding (1972); Adianto-Hypericetum coadunati: 32 Sunding (1972); Adianto-Hypericetum naudiniani: 33 Deil (1996); Adianto-Hypericetum naudiniani philonotidetosum fontanae: 34 Deil (1996); Didymodon spadicei-Adiantetum: 35 Neto et al. hoc loc; Pinguiculetum valisneriifoliae: 36 Heywood (1953); Eucladio-Pinguiculetum mundi: 37 Díaz et al. (1982); Hyperico nummulari-Pinguiculetum coenocantabricae: 38 Díaz et. al. (1982), 39 Rivas-Martínez et al. (1984), 40 Herrera (1988) Adianto capilli-veneris-Pinguiculetum longifoliae: 41 Rivas-Martínez et al. 1991; Southbyo tophaceae-Pinguiculetum dertosensis: 42 Asensi & Diaz-Garretas (2002).

References

Asensi, A. & Diaz Garretas, B. (2002). Southbyo tophaceae-Pinguiculetum dertosensis ass. nova hoc loco – In: Rivas-Martínez, S., Díaz, T. E, Fernández-González, F., Izco, J., Loidi, J., Lousã, M. & Penas, A. (eds.): Vascular plant communities of Spain and Portugal. Addenda to the syntaxonomical checklist of 2001. Itinera Geobotanica **15** (1): 3–432.

Bolòs, O. de (1957): De vegetatione valentinae I. – Collect. Bot. **5**: 527–596.

– (1967): Communidades vegetales de las comarcas próximas al litoral situadas entre los rios Llobregat y Segura. – Mem. R. Acad. Sci. **38**: 1–280.

Bolòs, O. de & Molinier, R. (1958): Recherches phytosociologiques dans l'Île de Majorque. – Collect. Bot. **5**: 527–596.

Braun-Blanquet, J. (1964): Pflanzensoziologie Grundzüge der Vegetationskunde. Springer Verlag, Wien. 865 pp.

– (1967): Vegetationsskizzen aus dem Baskenland mit Ausblicken auf das weitere Ibero-Atlantikum Teil II. – Vegetatio **14**: 1–126.

Braun-Blanquet, J. & Bolòs, O. de. (1950): Aperçu des groupements végétaux des montagnes tarragonaises. – Collect. Bot. **2**: 303–342.

Brullo, S., Lo Guidice, R. & Prítiviera, M. (1989): La classe Adiantetea in Sicilia. – Arch. Bot. Ital. **65**: 81–99.

Brullo, S., Scelsi, F. & Spampinato, G. (2001): La vegetazione dell'Aspramonte. Studio fitosociologico. Lafura Editore. Regio Calabria.

Costa, J. C., Capelo, J., Jardim, R., Sequeira, M., Espírito Santo, M. D., Lousã, M. Fontinha, S., Aguiar, C. & Rivas-Martínez, S. (2004): Catálogo sintaxonómico e florístico das comunidades vegetais da Madeira e Porto Santo – In: J. Capelo (eds.): A paisagem vegetal da Ilha da Madeira. Quercetea **6**: 61–185.

Deil, U. (1995): The Class Adiantetea in the Mediterranean Area – an approach from vegetation history and community evolution. – Colloques Phytosociologiques **23**: 241–258.

– (1996): Zur Kenntnis der Adiantetea-Gesellschaften des Mittelmeerraumes und angrenzender Gebiete – mit allgemeinen Überlegungen zur ökologischen Skalierung ihrer Standorte und zur Sättigung von Pflanzengesellschaften. – Phytocoenologia **26**: 481–536.

– (1998): The class Adiantetea in the Mediterranen area – state of knowledge report. – Annali di Botanica **56**: 73–78.

Deil, U. & Galan de Mera, A. (1996): Contribution à la connaissance de la phytosociologie et de la biogéographie des groupements rupicoles calcaires du Maroc. Bull. Inst. Sci. Rabat, **20**: 87–111.

Díaz Gonzalez, T. E. (1976): La vegetación del litoral occidental Asturiano. – Rev. Fac. Cienc. Univ. Oviedo **16**: 369–545.

Díaz González, T. E., Guerra, J. & Nieto, J. M. (1982): Contribución al conocimiento de la clase Adiantetea Br.-Bl. 1942 en la Península Ibérica. Anales del Jardín Botánico de Madrid **38**: 497–506.

Dierßen, K. (2001): Distribution, ecological amplitude and phytosociological characterization of European bryophytes. Berlin, J. Cramer, 289 p.

Esteve Chueca, F. & Fernandez Casas, J. (1972): De vegetatione baetica I. – Cuad. Ci. Biol. 1: 65–71.

Feio, M. (1951): A evolução do Relevo do Baixo Alentejo e Algarve. – Com. Serv. Geol. Port. **32**: 179 p.

Gaspar, N. (2003): Comunidades vegetais do Ribatejo. Dissertação de Doutoramento. I. S. Agronomia. Lisboa.

Herrera, M. (1988): Estudio de la vegetación y flora vascular de la cuenca del rio Ason (Cantabria). Tesis Doctoral. Leioa.

Heywood, V. H. (1953): El concepto de asociación en las comunidades rupícolas. – Anal. Inst. Bot. Cav. **11**: 463–481.

Hübschmann, A. von (1971): Bryosoziologische Studien auf der Insel Madeira. – Nova Hedwigia **22**: 423–467.

Lopes, M. C. (2001): A flora e vegetação das Terras de Sicó. Tese de Doutoramento. Lisboa, I.S.A., 398 p.

Lüpnitz, D. (1975): Geobotanische Studien zur natürlichen Vegetation der Azoren unter Berücksichtigung der Chorologie innerhalb Makaronesiens. – Beitr. Biol. Pflanzen **51**: 149–319.

Mateo, G. (1983): Estudio sobre la flora y vegetación de las Sierras de Mira y Talayuelas. – I.C.O.N.A., Monografias: 31, Madrid.

Neto, C. S. (2002): A flora e a vegetação do superdistrito Sadense (Portugal). – Guineana **8**: 269 p.

Pinto Gomes, C. (1998): Estudo Fitossociológico do Barrocal Algarvio (Tavira-Portimão), Dissertação de Doutoramento, Évora, Universidade de Évora, 460 p.

Ramos Pereira, A. (1990): A plataforma litoral do Alentejo e Algarve Ocidental. Estudo de Geomorfologia. Tese de Doutoramento. Lisboa, 450 p.

Ramos Pereira, A. & Angellucci, D. (2004): Formações dunares no litoral português, do final do Plistocénico e inícios do Holocénico, como indicadores paleoclimáticos e paleogeográficos. – In: Tavares, A. A, Ferro Tavares, M. J. & Cardoso, J. (eds.): Evolução geohistórica do litoral português e fenómenos correlativos, 221–256. Univ. Aberta, Lisboa.