

Azores Expedition

30th July to 5th August

Expedition to the Azorean Islands: Faial, Pico, (São Jorge) and Terceira.

Excursion leader and field guide: Eduardo Dias, University of Azores, GEVA (www.angra.uac.pt/geva/)

Flora, Endemic Plants, Natural Vegetation, Island Effect, Tertiary Forests, Volcanic Succession Process, Storm Disturbance Vegetation, Protected Areas, Natura 2000 Network, Man-made Landscape, Living in Remote Islands, World Heritage of Vines and of the Renascent City of Angra do Heroísmo.

INTRODUCTION

Colonized by the Portuguese in the 15th century, the Azores archipelago, located in the middle of the North Atlantic Ocean, was previously uninhabited, and true oceanic islands of volcanic origin compose it. The nine islands are distributed in three groups, throughout 615 Km, in the central meeting point of the three Atlantic geotectonic plates. Islands full of intense volcanic and seismic activities, which modulate their landscape and determine their main ecologic features. The oldest rocks (8 Million years old) are found in Santa Maria, but in the central group several volcanoes and lava flows from recent activities can also be found. Geomorphology, associated with different volcanic activities and deposits, is generally characterized by deep valleys, coastal ravines and mountains (Pico main cone, with 2351m above sea level, is the highest point of Portugal). Particular landscape morphologies, like the volcanic “caldeiras”, the coastal platforms called “fajãs”, large inland rocky cliffs or fissures and the lava caves, increase the number of particular habitats.

The climate is oceanic, with little variation in temperature (17,5°C at sea level). But at the mountains, temperature can reach 0°C, and Pico Mountain is covered with ice during the entire Winter season. Rainfall increases westwards, from 710mm in São Miguel to 1592mm in Flores, at sea level. However, it increases more significantly with altitude, with values of 3000mm at altitudes of 1000m. Above 500m the islands are generally covered by intense fogs throughout the year, allowing the occurrence of large areas of wet vegetation.

Strong winds are ecologically significant and define the major types of vegetation patterns. Tropical storms, with a mean cycle of



12 years, are associated to cyclic succession processes of mountain vegetation.

FLORA AND VEGETATION

The Azores were uninhabited until the middle of the 15th century. Much of the original cover was dense evergreen forest (*Laurisilva*, remnants of Tertiary European formations), heathlands in disturbed habitats and mires in high plateaus. Endemic trees, like *Laurus azorica*, *Picconia azorica*, *Myrica faya*, *Frangula azorica* and *Ilex perado* ssp. *azorica*, dominated the forests. Most of the plants on these formations derived from Tertiary Paleomediterranean vegetation, *via* Madeira.

The shrubby formations at low altitude have some elements with African affinities, paleoendemic species related with primitive *taxa*, like *Dracaena draco*, *Azorina vidalii* and *Myrsine africana*, that arrived to Azores by a stepping-stone dispersion through other Macaronesian islands.

In higher areas, a different group of wet Atlantic flora and vegetation can be found, related with post-glacial North Atlantic formations. High levels of precipitation and the nature of local soils support the development of permanent wet habitats with high differentiation as far as vegetation types are concerned. Mires with peat bogs, fens, and wet forests on a dense drainage net, lakes and ponds are dominated by plants with bird dispersion like *Sphagnum* spp., *Ranunculus* spp., *Juncus* spp., *Carex* spp. and *Calluna vulgaris*.

In the highest mountains the timberline is reached and a peri-alpine vegetation can be found, with *Deschampsia foliosa* and *Daboecia azorica*. At Pico summit a permanent winter ice cover is associated with alpine vegetation.

The natural Flora of Azores is modulated by an intense island effect. The number of vascular plants is limited, around 300 species, 25% of which are endemic. The moss flora is richer than the vascular. There are 500 species, some very rare and related with tropical floras.

However, introduced plants, in these warm conditions, have increased dramatically and became a threat for the natural ecosystems. Recent figures indicate 700 alien plants in the wild. Some of the dangerous ones were introduced due to gardening or agriculture, from continental old areas with similar ecologic conditions but where competition is a stress factor.

Human occupation of the land started on the best soils, by cutting the forest for crop production. The occupation of the inland mountain areas was much slower, and only the best areas are in fact in use nowadays. Marginal soils, recent lava flows and slopes of volcanoes or dense topography have roughly the primitive vegetation. The less intensive rural landscape has achieved a relative balance with the natural elements used to stabilise the



systems from disturbances. In most cases, these became patches of high biodiversity.

Major types of classified vegetation: E. Dias 1996, Mendes & Dias 2002, Elias & Dias, 2002 (for download: www.angra.uac.pt/geva/ > PUBLICAÇÕES)

For more information on-line:

- Flora checklist: www.angra.uac.pt/geva/ > LISTA DE REFERÊNCIA DA FLORA DOS AÇORES
- Flora field guide: <http://www.biologie.uni-regensburg.de/Botanik/Schoenfelder/floraazores.html>
- Natura 2000 Network: <http://www.sra.azores.pt> > areas classificadas > rede natura 2000; <http://www.icn.pt/sipnat/sipnat4.html>
- Protected natural areas: <http://www.sra.azores.pt> > areas classificadas
- Natural monument of Algar do Carvão classified as World Heritage from UNESCO: <http://www.multi.pt/speleoazores/desd.pdf>
- Landscape of vines and Pico wines, classified as World Heritage from UNESCO: <http://www.sra.azores.pt> > “Paisagem da vinha da ilha do Pico”
- Historic town of Angra do Heroísmo classified as World Heritage from UNESCO: <http://www.gzcah.pt> ; http://www.portugaltravelguide.com/en/angra_do_heroismo.htm
- Coastal and offshore activities, natural resources, protected areas and management, research, biodiversity and tourism activities: <http://www.horta.uac.pt>



EXPEDITION PROGRAMME

- Islands: Faial, Pico (São Jorge) Terceira.
Note: the exact islands and sequence to be visited can only be established after the official schedules of the flights and boats for 2005 Summer (expected only in March). São Jorge will be in the list depending on suitable transports.
Arrival at 12:30, 30th July: Horta, city of Faial island.
Departure from Terceira at 20:30, 5th August.
- Day-field trips, including three major walking expeditions planned in natural areas. Support car available at checking points.
- Other days include small journeys by bus, stopping along the coast, countryside and mountain areas of natural vegetation, mostly in NATURA 2000 areas.

- One afternoon for visiting the man-made landscape of vines in Pico Island, and half a day for visiting the historic city of Angra do Heroísmo, both classified as world heritage by UNESCO.

Programme main journeys:

1. **Coastal vegetation on lava fields:** The wide basaltic lava fields extending from mountains to coastal areas developed an unique group of habitats, very dry and warm during Summer, nutrient-rich, with water available below surface in fissures of percolate water, or in cliffs from the sea spray. Fissure halophytic vegetation, rich in endemic species, can be found at the first front line, just before the Laurel shrublands. The more inland areas are cultivated with vines on the lava fields.
2. **Coastal vegetation under deposits:** in the older parts of the islands, a different kind of coastlands, with deposits and rich soils, can be found. More diverse vegetation types are associated with them, with halophytic grass formations of *Festuca petraea* or tall-herb formations with *Solidago sempervirens* and *Daucus carota* ssp. *azorica*.
3. **Successional vegetation of historic basaltic lava:** Some lava fields in different stages of colonization by vegetation will be visited. The complex process of lava colonization is not fully understood, but it can occur very fast in the first 200 years due to nutrient availability. Island effect has been recognised as related with the process, depending on the mature stage of species, described as “zoom effect”.
4. **Mid-altitude Laurel forest:** the most extraordinary examples of the “laurissilva” forest of the Azores, dense and multistratified formation, rich in endemic species with subtropical ecology. Very rare nowadays, as they need rich soils in sheltered places. The existing spots, all of them protected, are still endangered by cattle and alien species.
5. **The high mountain forest:** hyper-humid forest, in the clouds zone, with formation of peat. Very dense and low size in the trees, is physiognomically similar to the tropical mountain elfin forests. These formations depend on the nutrients brought by marine winds and support some endemic epiphytic vascular plants and tropical epiphyllous communities. They export rich waters, with a number of specialized margin habitats of large endemic herbs exploring this superhavit.
6. **The sub-alpine vegetation of Pico Mountain:** although ascending to the Pico mountain summit will not be possible, a journey of some extent through the multiple habitats in the slope is in the programme, visiting some of the specialized vegetation types under these stress conditions.



7. **The mountain fens and grass vegetation:** very rare and until recently not considered as part of the natural vegetation of the Azores because of its similarity with the extensive pastures. They only become established under stress condition, usually strong winds on wet places, and depend on rich deposits. Some formations are dominated by endemic species like *Holcus rigidus* or *Festuca jubata*, but most of them have an Atlantic species as dominant, associated with very rare endemic herbs like *Ammi trifoliatum*, *Chaerophyllum azoricum*, *Euphrasia* spp., *Scabiosa nitens*, and others.
8. **Wetlands:** the Azorean islands are generally very rich in wetlands and associated vegetation. The high or very high values of rain and cloud intersection provide a permanent influx of water on ecosystems above 500m (values of 7000 to 8000 mm have been measured at specific summits). With proper conditions of volcanic deposits, an hydromorphic process takes control of soil formation, until the conditions where no water infiltration becomes possible. The runoff is intense in soils that are always moist or flooded. The landscape becomes sprinkled with small ponds, lakes, springs and mountain streams. The flat areas become mires, large complexes of flooded vegetation. All these formations have associated complex catenal vegetation types with endemic species. Lakes and ponds have margin vegetation dominated by *Juncus*, *Ranunculus* and *Eleocharis* species, and hydrophilic vegetation with *Isoetes*, *Marsilia*, *Littorella* species. The riparian vegetation is more complex and change from *Sphagnum* formations to Laurel forest, in time with *Prunus lusitanica* ssp. *azorica* or *Taxus baccata*; the stream bed is rich in endemic species and mosses, and even some of the more endangered species like *Veronica dabney* and *Myosotis azorica* (Flores island) can be found.
9. **Bogs, fens and wet forests:** associated with these landscapes of *zonal* formation, there are patches of vegetation types associated with micro-habitats. Oligotrophic or dystrophic conditions associated to the *Sphagnum* bogs, the nutrients-rich habitats (e.g. deposits of basaltic ashes) with fens and permanent moving waters on rocky slopes with forest vegetation with a *Sphagnum* carpet. Usually very poor in plant diversity, these have few dominant high-production plants. These are mainly nutrient-exporting systems, and so the plant diversity is concentrated on margin micro-habitat where the rich waters become available.
10. **Particular habitats:** in this intense topography, a large number of specialized habitats give place to special vegetation formations. A visit is planned to some of these places, like the cave entrance “Algar do Carvão”, one of the few in the world with diatom-stalactite formations; inland



rocky cliffs, from tectonic fractures, refuges of nowadays rare plants.

11. **Man-made landscape:** few rural landscapes will be visited, places where some balance still exists between biologic diversity, integration of the major ecologic zonal factors and soil production, remnants of the time when the Azorean islands were extremely isolated and each landscape unit had to give support for human live. Regarding the intense use of “soils” under stress conditions, and the ability of man to produce wine using lava beds, the protected landscape of Pico vines (World Heritage from UNESCO) will also be visited.



LOGISTIC INFORMATION

- Arrival at 12:30, 30th of July at Horta, city of the Island of Faial.
- Departure from Terceira at 20:30, on the 5th of August.
- Most of the expeditions will be through footpaths, at least three of some extension and the others not far from the location of the bus. Detailed information will be available. Some bypass of the more difficult passages can be possible and a support car will be available at checking points.
- The weather in the Azores is always unpredictable, even during Summer and especially on the mountains. Rainy and foggy days are always expected. Living these conditions on field can be an intense experience that allows one to understand the ecology of some areas, but an extreme situation can lead to cancel some of the trips. An alternative programme will exist and will be used if necessary.
- Appropriated travel clothes are needed for wet conditions, rainy and could days. But more informal clothes can be used for most of the days and areas, and summer ones can be used for sure in the coastal areas (even some swimming is quite possible in a relaxing moment).
- A flight and two short boat travels between the islands are being planned.
- A specific site about this expedition is in construction on the GEVA on-line information (www.angra.uac.pt/geva/). During the next months, more detailed information about the field trips, including maps and vegetation, flora, geologic and historic data will be added. Practical information will also be available. The final information will include a field guide for the expedition. We invite those who are interested on this expedition to visit the site and interact with us.
- Most of the areas to be visited are protected areas and part of the Natura 2000 European Network. Collection of biologic material is not allowed without a written



permission from the local authorities. Information on these issues can be given, but if the requirements are not fulfilled, it will not be allowed to collect plants during the expedition.

INSCRIPTION AND CONDITIONS

The inscription fee is 1200€
500€ have to be paid with the inscription in advance, until the 15th of February. 50€ will not be refunded if the inscription is cancelled. The remaining 600€ can be delivered until the beginning of the excursion.

This price includes:

- The flights Lisbon - Azores – Lisbon.
- The flight and boat travels in Azores.
- All the travels, bus and access tickets related with the expedition.
- The accommodations and all the meals (long trips will have light lunches in the field). Special meals can be available under request (please contact the travel agency).
- Field guiding by people experienced in the ecology and botany of Azores. Some booklets for the trips with explanation and identification of the major types of vegetation and flora are being prepared and will be part of the individual documentation.

The organisation of this expedition has one arrangement with the Travel Agency ANGRATRAVEL for all the logistic process. Please contact them for any process related with the logistic and travel matters.



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