

# **XIV INTERNATIONAL BOTANICAL CONGRESS**

**Excursion no. 59**

**The flora, vegetation and monuments  
of classical Greece**

**Organized by Prof. Dr. S. Diamantoglou  
and Prof. Dr. U. Kull**

## **EXCURSION GUIDE**

**by Prof. Dr. U. Kull  
and Prof. Dr. S. Diamantoglou**

**Berlin 1987**

# XIV International Botanical Congress

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The flora, vegetation, and monuments of classical Greece

2 to 10 August, 1987

Organizers: Prof. Dr. St. Diamantoglou, Athens, Greece  
Prof. Dr. U. Kull, Stuttgart, FRG

## Excursion Guide

prepared by

Ulrich Kull and Stergos Diamantoglou

1987

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Ulrich Kull and Stergos Diamantoglou

## INTRODUCTION

Attica, Central Greece ("Roumeli") and the Peloponnese ("Morea") form the heart of classical Greece. In this area, the landscape, vegetation and human history are intimately associated and interwoven. All three will be given equal consideration during this excursion, where the visit of the sites of Greek Antiquity will each time provide insights into the flora of the past and present. Among and around the ruins, the different types of the characteristic sclerophyllous vegetation of the Mediterranean, including the products of its degradation by man, may be studied. The altitudinal zonation of the vegetation will also be demonstrated, e.g. on Mt. Parnassus and in the central Peloponnese where relatively undisturbed Abies forests still cover extensive areas.

## G R E E C E

Greece, with an area of 132.000 sq.km (50.965 sq.miles) and a population of about 9.9 million, is divided into 51 nomoi (administrative units).

Since the fall of the military dictatorship in 1974 and the referendum on the monarchy, in which the great majority of the population voted for the abdication of the exiled king, Greece has been a democratic Republic. The new constitution of 1975 gives wide authority to the President, who is elected by Parliament for a term of five years. He appoints and dismisses the head of the government, can dissolve Parliament in certain specified circumstances and in a situation of national emergency has the power to legislate.

Parliament, elected for a four-year term has 300 members. The most important political parties are the New Democracy (Nea Dimokratia, ND) party and the Pan-Hellenic Socialist Movement (PASOK). The Union of the Centre, the Communist Parties (KKE) and the National Movement of the military dictators (EPEN) are confined in present circumstances to a subordinate role.

An associate member of the European Community since 1962, Greece became a full member on 1 January 1981.

Some data:

|                   |       |            |      |
|-------------------|-------|------------|------|
| Population: Greek | 98.5% | Bulgarians | 0.3% |
| Turks             | 1 %   | Armenians  | 0.2% |

Language : Modern Greek. - About 3 million persons of Greek mother-language are living abroad.

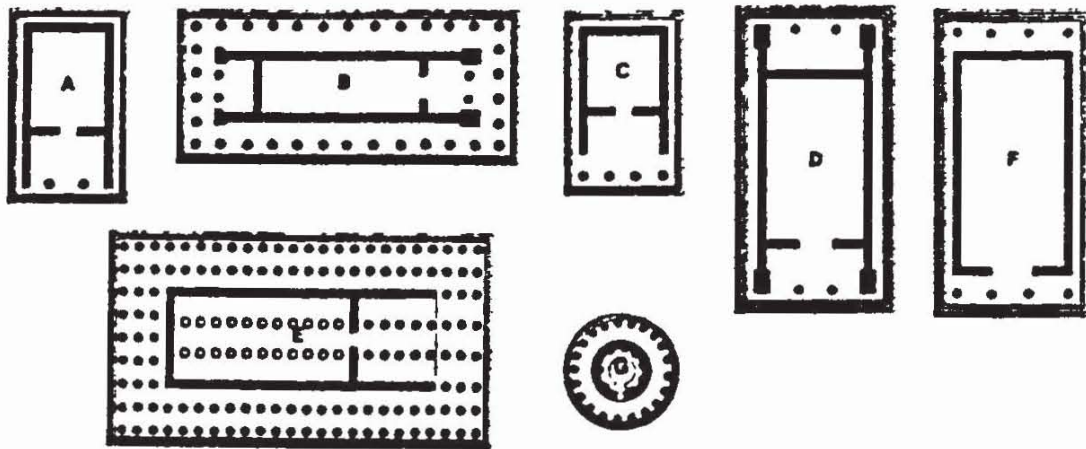


President of the Republic: Christos Sartzetakis, elected March 1985  
 Prime Minister : Andreas Papandreou (PASOK), since 1981  
 Parliament : PASOK 161 seats (election 1985: 45.8%)  
                   ND 125 seats (election 1985: 40.8%)  
                   KKE 13 seats (election 1985: 9.9%)

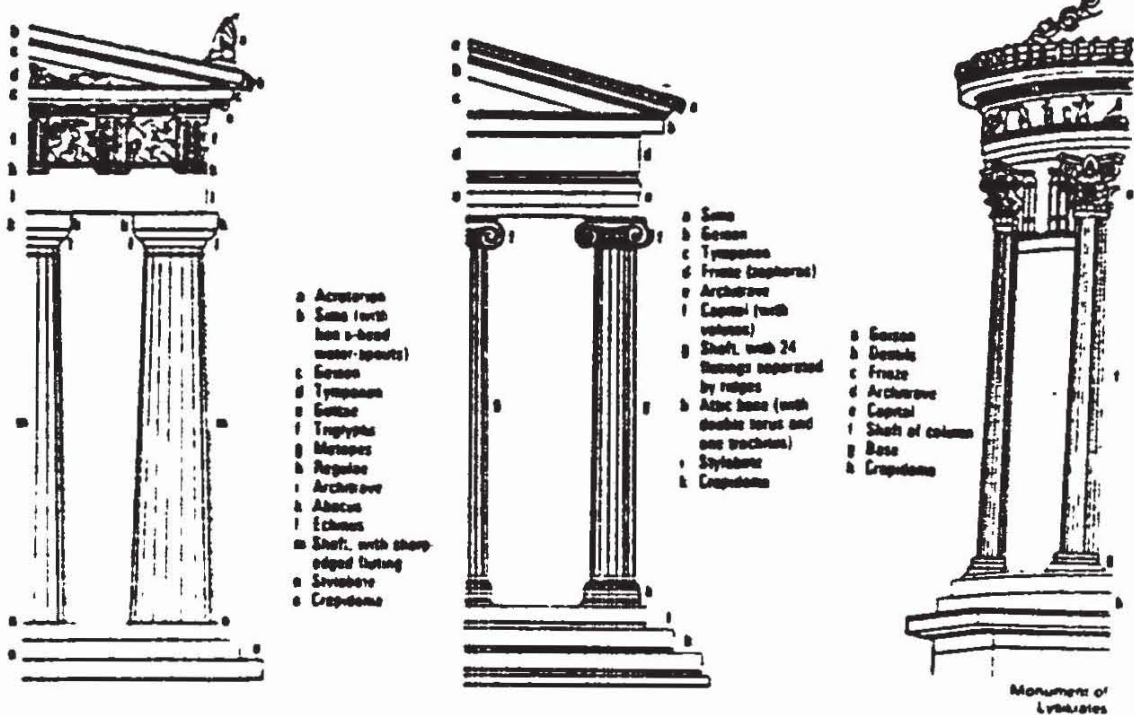


(from Area Handbook of Greece, 1977)

**Religion :** In spite of regional differences resulting from the circumstances of history and of the country's extreme geographical fragmentation, the Greeks have preserved a deep national awareness. One great unifying force, particularly in times of trouble, has been the Orthodox Church, which has preserved its full authority in both private and public life. Since 1833 the Greek Church has been autonomous, since 1850 it has been recognised by the Oecumenical Patriarchate in Constantinople (Istanbul) as autocephalous (i.e. as being governed by its own patriarch), and since 1864 it has been the established State church; its supreme head is the archbishop of Athens. Only the Dodecanese and the monastic Republic of Athos are still subject to the jurisdiction of the patriarchate of Constantinople, while Crete occupies a special position as a semi-autonomous province of the church. - Some 94% of the population profess the Greek Orthodox faith; the rest are Mohammedans, Jews, Roman Catholics (a relic of the Venetian occupation of the Cyclades) and Protestants.

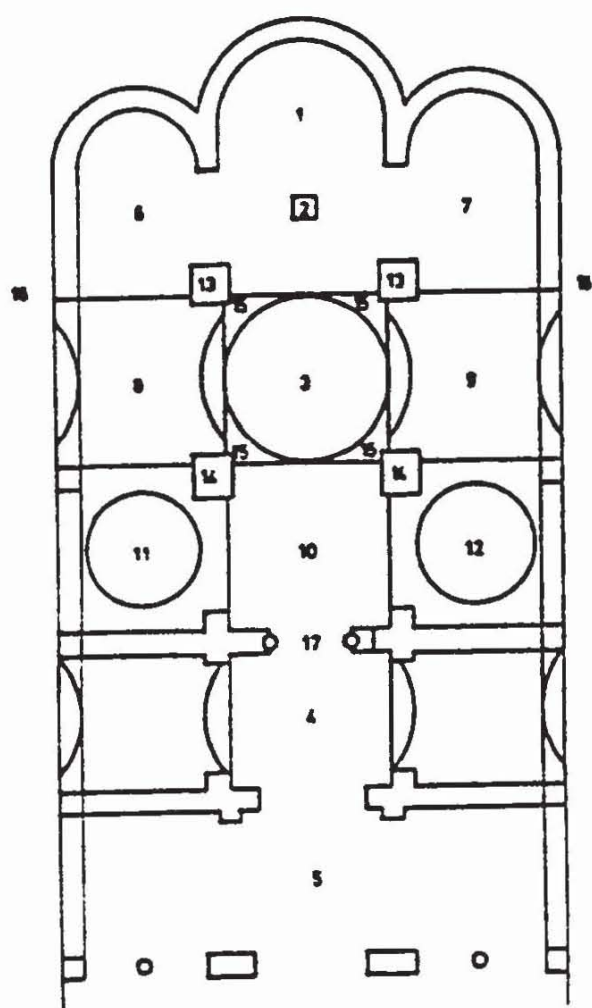


Types of Greek Temple. A Temple in antis, B Peripteral temple, C Prostyle, D Double anta temple, E Dipteral temple, F Amphiprostyle temple, G Tholos (from Baedeker's Travel Guide, modified)



Doric, Ionic, and Corinthian Order (from Baedeker's Travel Guide, modified)





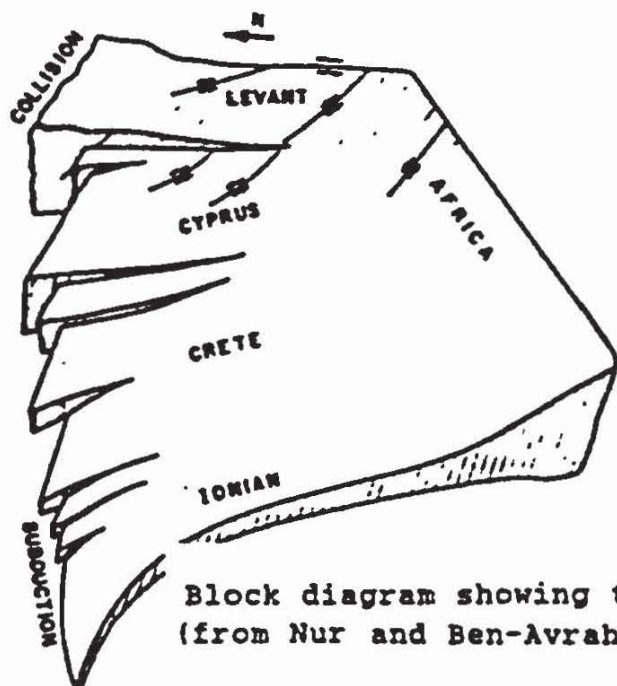
Byzantine Church and its articulation of space  
 1 apse, 2 altar(bema), 3 dome, 4 narthex, 5 exonarthex, 6 prothesis, 7 diakonikon, 8 northern transept (with barrel-vault), 9 southern transept, 10 western transept, 11 + 12 corner-rooms (often domed), 13 pillars, 14 columns, 15 pendentifs, 16 ikonostases, 17 trivelon (entrance with three arches) (from Melas, modified)

## GEOLOGY

**General:** The mountain ranges and massifs of Greece form a pattern of great variety. In the W they are usually comprehended under the term Hellenides, which means the southern part of the Dinarides. In the Greek peninsula the Hellenides run from NNW to SSE and then extend in a wide arc by way of Crete to Asia Minor. They are folded mountains of Alpine structure, formed in the Alpidic orogenesis, mainly from Cretaceous to Upper Tertiary. The mountains consist mostly of Mesozoic and Tertiary rocks, in particular limestones and dolomites, sandstones, marls and conglomerates. During the orogenesis, large overthrusts were formed, therefore several nappes are lying, at least partly, upon another, somewhat like roof-tiles. Continuing into quite recent periods the territory has been subjected to violent uplifting and subsidence, which caused the occurrence of many faults and trenches (graben-structures). In the Pelopon-

nese, late Tertiary deposits laid down by the sea are found at an altitude of about 1800 m (5900ft). The faults and fractures produced a mosaic of hills of varying height and countless little basins and plain areas, forming deep bays, long promontories and peninsulas, a scatter of islands, cliffs and a much patterned coastline. In some of the fault zones there was violent volcanic activity. In limestone areas, karstic phenomena caused by percolating groundwater are frequent. They are intensified by the folding and faulting of the limestones.

Application of the model of plate tectonics shows that the overthrusting in this area of the Mediterranean is still going on west of the Peloponnese and south of Crete, caused by subduction of the African plate, which further in the East is colliding with Asia. The subduction in its part causes the earthquakes, which are frequent especially in Southern Greece.



Block diagram showing the disruption of the African plate  
(from Nur and Ben-Avraham, 1978)

|                              |             |      |                           |
|------------------------------|-------------|------|---------------------------|
| Major Earthquakes in Greece: | 464         | B.C. | destruction of Sparta     |
|                              | 6th.c.A.C.  |      | destruction of Olympia    |
|                              | 1856        |      | Crete                     |
|                              | 1886        |      | Messenia (South.Pelopon.) |
|                              | 1926        |      | Rhodes                    |
|                              | 1928        |      | destruction of Corinth    |
|                              | 1944        |      | West coast of Mani        |
|                              | 1953        |      | Ionian Islands            |
|                              | 1975        |      | Aetolia and Acarnania     |
|                              | 1978        |      | damage in Saloniki        |
|                              | 1981 (Feb.) |      | South.Greece, Athens      |
|                              | 1986 (Sep.) |      | Kalamata (Peloponnese)    |



**Tectonics :** The Hellenides as alpinotype mountains originated from overthrusting in several orogenic phases of a pile of nappes from the internal zones on to the external zones of the mountain ranges. In our excursion area, the external zones are situated in the west, the internal zones in the east. The nappes mostly consist of mesozoic limestones and dolomites. At the front of the folding and overthrusting parts deep-sea trenches were formed, in which debris of the neighbourhood was deposited as sandstones, marls, conglomerates and breccias, often in a way of distinctive rhythmic sedimentation. These sediments are called flysch. The orogenic activity migrated outward, from east to west. Thus, the flysch sediments which were deposited in the eastern regions are older than those in the west, and the same is true for their deformation by folding and overthrusting. The crystalline areas of Attica and the islands - formerly assumed to be the metamorphic basement of the Alpidic sediments - are now divided into several nappes which were overprinted by metamorphism during the Alpidic orogenesis.

Regarding the area of this excursion, the following sequence of nappes is characteristic (according to JACOBSEN et al., 1978):

|                         |  |   |
|-------------------------|--|---|
| Inner Hellenic Nappe    |  | Ophiolitic (Eohellenic) outliers            |
| Central Hellenic Nappes | Pelagonian Nappes<br>(including Subpelagonian, Argolicum and Boeotic areas)                  | Median Crystalline Belt                     |
|                         |  | Blueschist units<br>(Attican metasediments) |
|                         | Parnassus Nappe  |   |
|                         | Pindus Nappe   |   |
|                         |  | Basal Units<br>(with marbles of Attica)     |
| West Hellenic Nappes    | *  |   |
| Upper Unit:             | Ionian / Gavrovo-Tripolitza-series   |   |
| Lower Unit:             | Phyllite series  |   |
| Autochthonous:          | Pre Apulian foreland   | Talea Ori-series<br>= Plattenkalk-series    |
|                         | * According to other authors the Ionian series has the same position as the Talea Ori-series |   |

Parts of the Central Hellenic Nappes have been affected by Alpidic metamorphism due to an early orogenic phase and now form part of the Median Crystalline Belt of Attica and the Cycladic Islands. The upper units in this area are called the Blueschist units, the lower units, containing the marbles of Attica (Hymettos marble, Pentelion marble), are the Basal units. Both of these were overridden by the Pelagonian nappes. This displacement of the units may reach large extents: the Pindus nappe is overthrust more than 100 km in the Peloponnese and in NW Greece. Some Sub-pelagonian outliers override the Parnassus nappe by more than 20 km (e.g. in the Parnassus area).



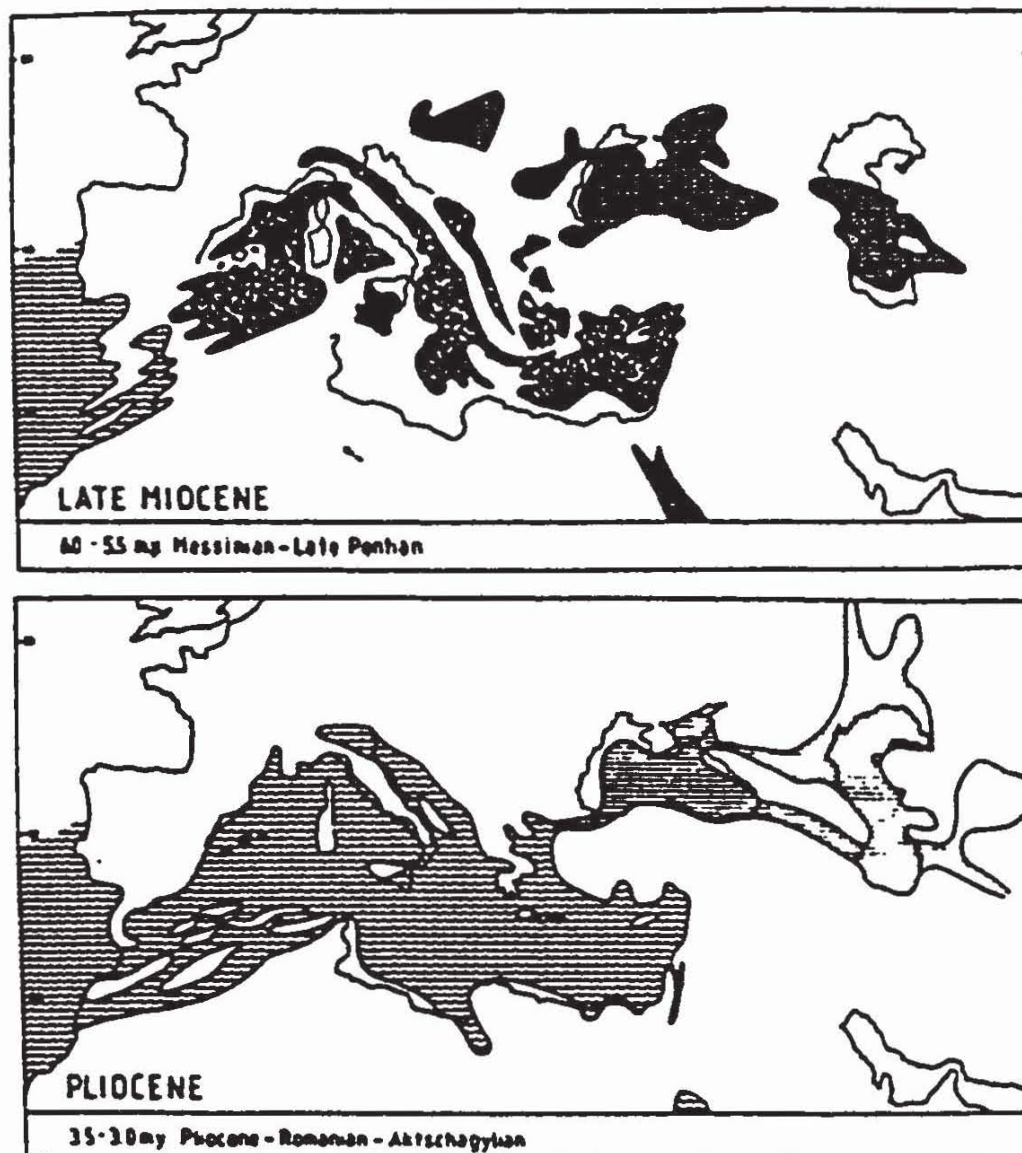
**Geology and history of vegetation during the Upper Tertiary:** The multitude of geological substrates on the one hand and the mosaic of mountains, basins, plains, peninsulas, promontories and islands on the other are the factors which have created a great variety of habitat conditions which form the basis for great diversification of the flora.

The history of the vegetation of the Mediterranean is heavily affected by the paleogeography of the area and climatic events during the Upper Tertiary and Quaternary. STEININGER and RÖGL (1984) published some maps from which can be seen that the Mediterranean functioned as an Indic-Atlantic seaway until the beginning of the Miocene. Throughout this period the tectonic instability of the area during the orogenesis gave way to recurring marine connection between the Eastern Mediterranean and the Indic, but also provided gateways for exchanges of floral and faunal elements. Fossil floras from Greece are known from the Middle Miocene, most important is the flora of Kumi on the island of Euboea (Evia). Nothing of this Arcto-Tertiary subtropical lowland flora of that time has remained. The main cause is the Messinian event, which took place during the uppermost Miocene, about 7-5 Mio years b.p., and is characterized by repeated cycles of evaporation and inundation of the Mediterranean within a short time-span of about 1-2 Mio years. The dessication of the Mediterranean sea must have been connected with a dry climate, which was of great importance to the evolution of the vegetation (GREUTER 1970, BOCQUET et al. 1978) Many species of the subtropical flora disappeared and the flora became impoverished. Orophytic and steppic plants of eastern origin immigrated, their extension was facilitated by the continuing formation of the alpine chains of the Hellenides. Multiple paths between the various Mediterranean areas opened up and led to an explosion in migrations. The result was a thorough re-distribution of floristic elements.

During the Messinian event the alpine vegetation zones and also montane forest zones were lowered; in the basins now covered by the sea (e.g. the Tyrrhenian Basin) evidence of a vegetational cover has been found from drilling-cores. Perhaps the first period of the Messinian event was hot and dry and during the second, the climate got cooler. During the first period, grass-lands must have had a vast extension and the forests may have been restricted to higher mountains. When the climate got cool, species of steppic areas could invade the area. Thereafter, a new transgression (Pliocene transgression) caused a humid and warm climate and created the modern Mediterranean sea, extending as far as the Euxinian basin (Black Sea). The pattern left by the floristic connections during the Messinian became disrupted.

Then, during the Pliocene period the climate got cooler and during the Quaternary the phases of glaciation in Northern Europe were





**Paleogeography of the Mediterranean during the late Miocene (Messinian event) and during the Pliocene (from Steininger and R6gl, 1984)**

times of a cool and dry climate in the Mediterranean, which again caused the extension of a steppic vegetation and a reduction of the areas of mediterranean evergreen sclerophyllous vegetation and also of the refuges of the species of central European nemoral deciduous forest. But, in general, Greece was largely shielded from severe effects of the ice ages by the Balkanian mountains and, therefore, much of the pre-glacial flora has survived. The relative isolation of some high mountain ridges and of many islands has produced isolated populations, where species threatened with extinction could persist and where the development of endemic species took place. From pollen-diagrams it may be concluded, that during the early Holocene (postglacial period) a forest of (mainly deciduous?) oaks developed, which beginning from Neolithic times was influenced and then part by part destroyed by man.

**Soils:** Pedogenesis in the Mediterranean area has been continuous and without such serious disturbances by strong climatic changes as is characteristic for central and northern Europe. The rather high mean temperature and the alteration of dry and humid seasons may accelerate the weathering of the parent materials and also the desintegration of the organic matter. The principal feature of many soils is the development of an oxic B-horizon with red colours, due to unhydrated  $\text{Fe}^{3+}$ . Especially on limestones in lower areas, red soils are frequent, which are called terra rossa ("red mediterranean soil"). Where the duration of the dry season is shorter, the soils are brown, not red (terra fusca). According to the classification of FAO-UNESCO, the terra rossa is classified either as ferrasol or as humic ferrasol.

The soils derived from crystalline rocks and schists are more varied in nature and may be basic, neutral, or acid in reaction and often poor in mineral content. Soil reaction has some influence on the occurrence of species in Greece. Many Ericaceous genera have a preference for acid and neutral soils. Therefore in some non-limestone areas, one may see large areas of *Erica arborea*, sometimes growing with *Arbutus* species, covering hill sides.

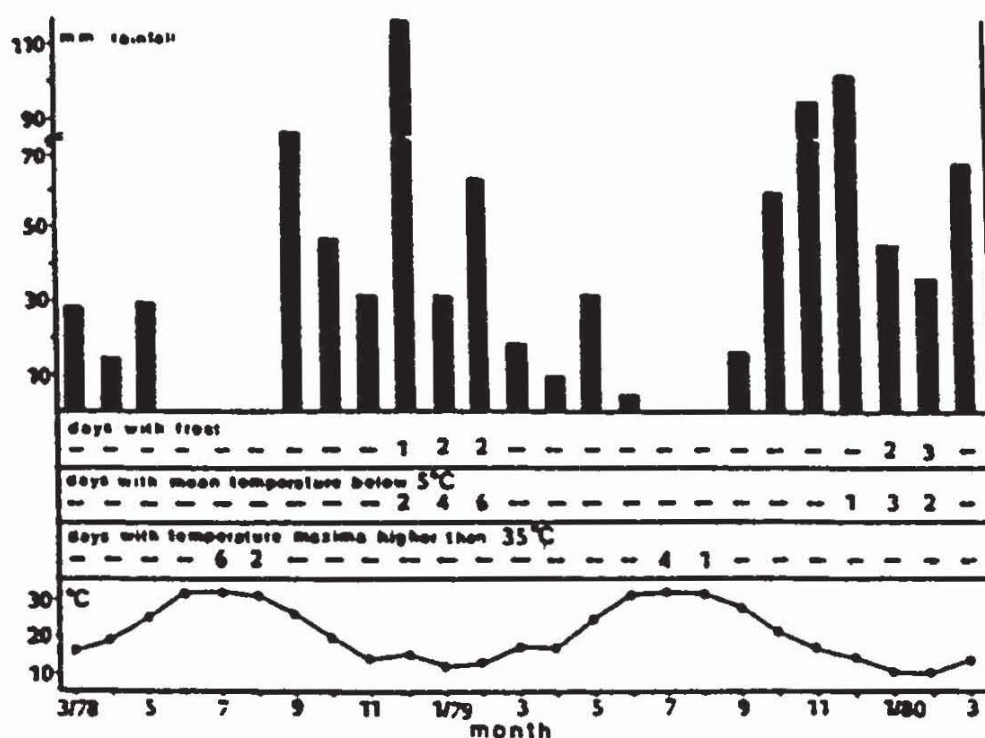
After disturbance of the protective ground cover, the top soil layers often were removed by erosion. Then, rendzina soils develop from terra rossa. Continuous erosion eventually removed all soil, bare rocks with only very sparse vegetation or badlands remained.

## CLIMATE

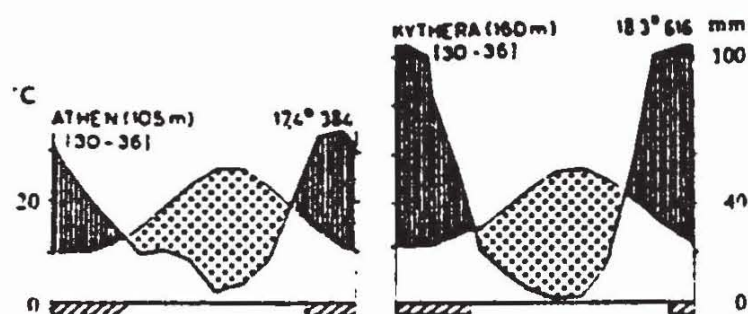
The Mediterranean climate is characterized by rainfalls during the cool seasons (October to April) and a hot and dry summer period. For Athens, the average annual temperature is 17,4 C (69 F). The winters are not cold, frosts only episodic and in lower areas snow is rare. The average winter temperatures range from 4 C (40 F) to more than 10 C (50 F) over much of the area during the coldest months (January average: Athens 9,3 C = 48 F; Patras 11 C = 52 F). During the summer, mean temperatures of 25 C to near 30 C (86 F) are reached (Athens 26,5 C = 79 F; Sparta 27,5 C = 80 F). The lowest and highest recorded temperatures from Athens are -5,5 C = 22 F and 43 C = 109 F. The average sunshine during the months of June to August is more than 10 hrs/day. Plant growth is restricted or ceases during the hot seasons and only begins again when the first copious rains arrive, usually in October.

The distribution of rainfall is conditioned by the mountain ranges and the prevailing winds. The west winds which blow in winter cause heavy rainfall in western Greece, decreasing in intensity towards the south. Particularly in the Peloponnese and in Western Crete, a





Rainfall and temperature in Athens 1978-1980, as an example for typical mediterranean climatic conditions



Klimadiagramme according to Walter characterizing the Mediterranean climate (from Horvat-Glavac-Ellenberg). The dry period on the average lasts about 6 months in Athens as well as on the island of Kythera, where the annual rainfall is much higher.

high winter rainfall is produced by moist and frequently stormy winds from the SW. In the rain shadow of the west winds the winter maxima and therefore the average annual values are considerably lower (e.g. in the area of Athens). In summer, the weather is determined by the etesian wind (dry winds from the N and NE). The summer becomes increasingly dry towards the S. Typical also is the wind called *reitemi* (Turkish word), a dry wind which blows from NW during the summer period, rising to considerable violence in the afternoon and so sometimes creating problems for shipping. In the mountainous inland region, there is a noteworthy rainfall during

the summer , with frequent thunder showers.

While the winter maxima on the whole decrease only gradually from N to S, the summer drought is much more marked towards the S, which may be seen from the number of dry months. In northern Greece in 3 to 4 months evaporation exceeds rainfall, in central Greece this is true for 4 to 5 and in southern Greece for 5 or 6 months. In the south 3 to 4 months are practically rainless.

Snow is rare at sea level, but lies for a long time on mountains above 1000m (3300ft), the climate in the mountain region is therefore closer to the Central European pattern. The contrast between summer and winter is accentuated by the fact that Greece has a short spring and no autumn, summer being immediately followed by the cool rainy season.

Many people think the olive tree (*Olea europaea* var. *sativa*) to be the plant indicator of the Mediterranean climate, since it can only flourish in a typically Mediterranean environment. The main objections to the above presumption are that the olive tree is probably not a native of the Mediterranean, but originates from its eastern border, and that it is a cultivated species. Also other single species, such as *Quercus ilex*, *Pinus halepensis* and others are not suitable as indicators. However, where one sees the *Olea europaea*, *Quercus ilex* or *Qu. coccifera*, *Pinus halepensis* growing, and particularly where any two of these grow together, one can be fairly certain to be in a Mediterranean climate.

## FLORISTICS and VEGETATION

A floristic or vegetational as well as a geographical or climatical definition of the Mediterranean region is not easy to propose. Different authors have offered different interpretations. As already mentioned (comp. "Climate"), it is not possible to define the extent of the Mediterranean region precisely by using one single species; furthermore, the area shows a considerable climatic and even bioclimatic heterogeneity.

### F L O R I S T I C S

Concerning floristics, the mediterranean region is very rich: there are approximately 20 000 - 25 000 species when the region is defined in a comprehensive way (QUEZEL). That is more than in other areas of Mediterranean climate in the world (California, Australia, Southern Africa, Chile). About 3000 species may be considered as exclusively Mediterranean. At present, it is almost impossible to supply a precise floristic inventory for the Mediterranean region. A "Med-Checklist" is being prepared under the auspices of OPTIMA and its





Distribution of the olive, *Olea europaea* var. *sativa*  
(from Polunin and Huxley, 1965)

secretary W. GREUTER which will give us a first accurate estimate. A rather rough estimate for Greece was presented in 1975 by GREUTER, PHITOS and RUNEMARK: they mentioned about 5 500 species in total and 4 000 thereof in the Mediterranean region of the country. For peninsular Greece, about 320-350 endemic species are reported; from these, about 25 are endangered and 5 seem to be extinct.

History of flora and vegetation (comp. also p.9): the flora of the Mediterranean is regarded as heterogeneous in its way of origin. Some taxa are of tropical or subtropical provenance and others are autochthonous or of northern origin. Taxa of the group mentioned first are e.g. the Anacardiaceae (with *Pistacia*, *Rhus*) and the genus *Vitex*. Because the same taxa are present in California, they must date back to a period before the wide opening of the North Atlantic Ocean and therefore to the Cretaceous or lowermost Tertiary. Already important in the pre-Messinian flora of the Mediterranean region were some taxa of probably palaeo-tropic origin, from which e.g. *Asparagus*, *Capparis*, *Ceratonia*, *Olea*, *Nerium*, and *Phillyrea* are descendants. The well known floristic connections between the Mediterranean and tropical resp. southern Africa (e.g. the occurrence of *Erica arborea* in the Mediterranean and in East African high mountain areas) perhaps originate from the climatic changes during the Messinian event in the uppermost Miocene. The greater part of the Mediterranean flora is determined by autochthonous or northern taxa. Some autochthonous Mediterranean taxa must have originated during the Tertiary in rather early times, because they are also present in the Mediterranean regions of America (e.g. sclerophyllous oaks, *Arbutus*, *Salvia*). The development and differentiation of the autochthonous Mediterranean flora were favoured by the existence of microplates during the Tertiary: Their cores correspond to the more important present centres of Mediter-



anean endemism: Iberian peninsula, Tyrrhenian area (Corsardic microplate), Apulia and Balkanic area (Apulian-Dinarian microplate), Anatolia.

The uplift of the alpinotype mountain ranges led to the development of an important orophilous flora, differentiating from autochthonous elements (e.g. in the taxa *Abies*, *Berberis*, *Juniperus*, *Silene*) and benefiting by the arrival of new taxa of northern European or even boreal origin. This arrival took place during the cool and dry periods of the Quaternary which in Central and Northern Europe were glacial periods. Related to geographic and climatic isolation several centres of mountain flora endemism developed during the Pliocene and Quaternary.

Perhaps already during the Messinian and again during the Quaternary eastern elements of the steppe could migrate into the Mediterranean; e.g. *Artemisia*, *Astragalus*, *Ephedra*. The abundance of endemic species in this group suggests an invasion in pre-Quaternary time. Its expansion and present dispersal in the Mediterranean region can be explained by the glacial periods. - From the temperate Holarctic flora several taxa originate, e.g. *Platanus*, *Ostrya*, *Cotinus*, *Daphne* a.o.

Typical Mediterranean flora-assemblages seem to have been present since Pliocene, about 3 Mio. years B.P. They were established probably in connection with the nascence of the annual summer-drought period. During the periods of a cool and dry climate in the Pleistocene, the Mediterranean forest communities must have been rather restricted in their areas and locally formed open woods or shrubs.

Active evolving species in the Mediterranean region show the ongoing process of the adaptation of the vegetation. These species and subspecies in most cases are very difficult to distinguish from each other and hybridize frequently. They are well known e.g. from the genera of *Campanula*, *Centaurea*, *Ophrys*, *Verbascum* a.o.

Human influence: The human influence on the vegetation has a very ancient origin, especially in the eastern Mediterranean. Since the end of the Neolithic period, clearance was intensified and cultivated plants were introduced, primarily from Anterior Asia. The agricultural activity in mainland Greece began by 8 000- 7 500 B.P. A significant expansion of the cultivated area took place by about 3 200 B.P. (investigations mainly from Northern Greece). Consequences of the intense human influence are the deterioration of woodlands, especially of the deciduous forests. This process was to the advantage of the sclerophyllous oaks and of pines. Especially the vegetation devoted "phrygana", but also most forms of *raquis* are the result of the human disturbance of the natural vegetation. Certainly, in some areas, mainly coastal regions, shrubby sclerophyllous communities appear to have been present prior to human



influence; they are sometimes called "primary maquis". Nowadays, due to the long and intense influence of man almost nothing has remained of the true natural woodlands.

During the last few hundred years, man has brought many foreign plants into the Mediterranean: agaves, cacti, *Acacia*, *Eucalyptus*, *Citrus* and all the palms of tree lined walks.

#### MEDITERRANEAN VEGETATION (especially in Greece), a short survey

The vegetation of the Mediterranean region is distinct from that of other regions in Europe and also from the vegetation south of the Mediterranean area, which is a semi-desert and desert vegetation. The Mediterranean vegetation may be characterized by the frequent occurrence of evergreen trees and shrubs which can survive the hot and dry summer period. During this period, most of the herbaceous plants die right down and remain inactive in the soil with storage organs and dormant buds. Furthermore, many annuals (therophytes) are present, which complete their life cycles by the summer. The natural variation of the ecological conditions were partly accentuated by the long human action influencing and disturbing the vegetation. This action led to different stages of degradation of the natural woodlands, caused and maintained by different intensities of cutting, firing, grazing and the resultant erosion of the soil. An evergreen, dense shrub of more than 1,5 -2 m height is known as maquis (*Macchia*); a shrubland with dwarf, scattered, mostly evergreen shrublets is called a garigue and its variants in Greece are named phrygana. A heavier degradation by overgrazing and soil erosion leads to sparse grasslands, which are partly steppe-like, containing feather-grasses (*Stipa*), and often show extensive areas of exposed rocky ground. These grasslands harbour communities of herbaceous plants, which completely die down in the dry summer months.

By prevention of human influence, regeneration may take place from phrygana to maquis and to forest. Local variations of soil and climate may prevent the development of the forest as a climax vegetation thus resulting in a stable shrub community. In very remote areas, scattered woodlands have persisted to the present. The dominating trees in the typical Mediterranean areas are evergreen oaks and pines together with many evergreen shrubs. Many of these species have small thick leathery leaves reducing transpiration during the dry summer. Active growth and flowering of the vegetation takes place in the autumn, during the winter and reaches its peak in the spring.



**Altitudinal zonation of the vegetation:**

The lowermost areas, especially coastal plains and strips, are the warmest and driest parts on the Mediterranean. Characteristic species of this areas are the carob (*Ceratonia siliqua*) and the wild olive (*Olea europaea* var. *sylvestris* = *Olea cleaster*). Therefore, this vegetation unit is often named "Oleo-Ceratonion" (=Olea-Ceratonia-zone). When the summer-drought is less intense, wild carobs are often lacking and the wild olive together with *Pistacia lentiscus* are the characteristic species ("Oleo-Lentiscetum"). Where the annual rainfall is higher and the drought period therefore less effective, as in the western Peloponnese, the Holm oak, *Quercus ilex*, formed woodlands ("Quercion ilicis" = Quercus-ilex-zone). In the higher parts of the hills and the mountains, the summer-drought is shorter and the rainfall still higher; so a sub-mediterranean zone with deciduous trees and shrubs (*Quercus pubescens*, *Quercus conferta*, *Quercus brachyphylla*, *Ostrya carpinifolia*, *Fraxinus ornus*, *Acer spec.*) develops (Quercus pubescens-zone).

On soils deficient in lime, also *Castanea sativa* is a characteristic tree and in Northern Greece, more local deciduous woods are dominated by *Aesculus hippocastanum*, by *Juglans regia* and by *Platanus orientalis*. In dry areas, coniferous woods largely of the black pine (*Pinus nigra*) occur and furtheron there are some very local and degraded juniper woods in the hills; on the Peloponnese with the only European stands of the mainly Asiatic species *Juniperus drupacea*. The higher mountain regions are covered by distinctive coniferous forests composed of pine and of fir (*Abies*) species. In Northern Greece, also *Fagus* woods occur; in the more arid South they are lacking. Above the timber-line, often hedgehock-heath communities of cushion-forming dwarf shrubs are developed. By the regular grazing of flocks during the summer period, manmade montane and subalpine grasslands are maintained; they originate from forest and shrub clearance.

In general, in the Mediterranean region a more humid altitudinal zonation of the vegetation may be distinguished from an arid or xeric zonation (H.WALTER). The humid zonation is characterized by intense rainfalls and a reduction of the dry periods in the higher altitudes. The arid zonation shows a typical dry summer period in all altitudes and therefore deciduous forests cannot exist at all. In the eastern Mediterranean, the arid zonation is more common. In central and southern Greece the humid zonation is not developed. In the area of Athens/Attica (Parnis Mts.) and of the Parnassus, a typical arid zonation is present, whereas in the less dry western Peloponnese a transition type between arid and humid zonation (a mesic zonation) exists. It has to be emphasized that the limits of the occurrence of the different tree species in nature are not directly dependent on climatic factors, but are caused by competi-

tion. The limits of the scope of a species are reached, when because of less productivity and/or reduced reproduction rate this species succumbs to another species, which supersedes the former one.

For central and southern Greece, the following

Synopsis of the

A L T I T U D I N A L   Z O N A T I O N   (orobiomes)  
may be helpful

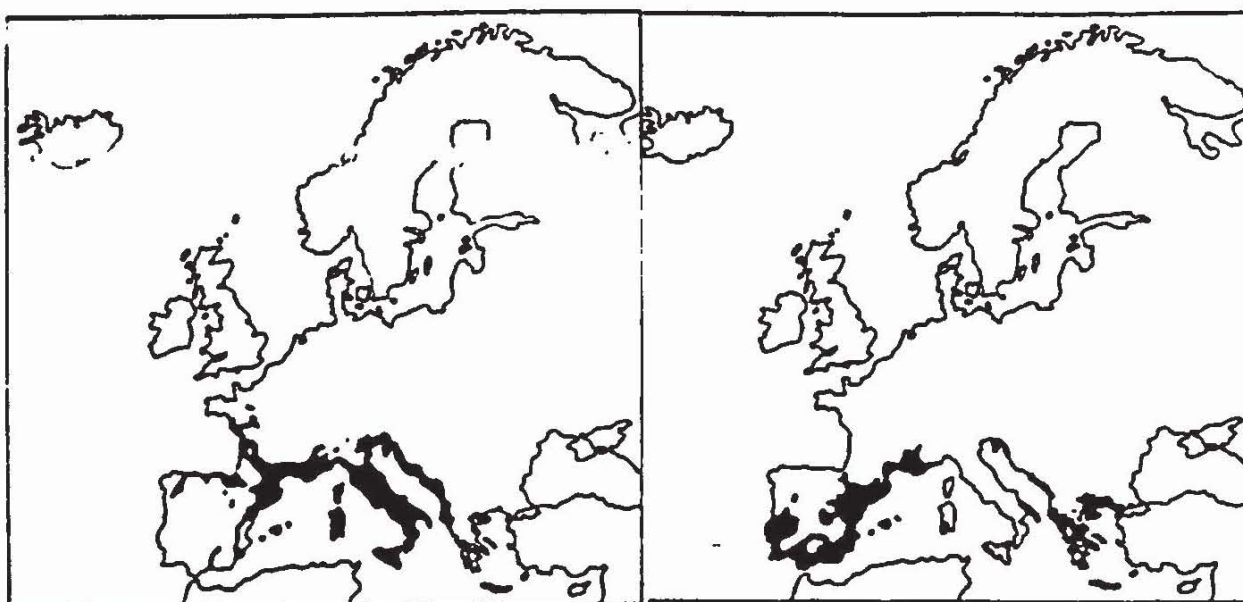
| general zone          | humid zonation  | arid zonation  |
|-----------------------|---|--|
| alpine                | alpine meadows  | alpine grasslands<br>dwarf shrubs, hedgehock-<br>shrub-communities<br>( <i>Daphne-Festuca</i> -zone) |
|                       | timberline  |  |
| subalpine             | <i>Picea</i>  | <i>Juniperus foetidissima</i>  |
| montane               | <i>Fagus silvatica</i> -<br>zone  | <i>Abies cephalonica</i> -woods  |
|                       | <i>Abies borisii-regis</i>  |  |
| submontane            | <i>Quercus-Acer</i>   | <i>Pinus nigra ssp. pallasiana</i>   |
| submediter-<br>ranean | <i>Quercus pubescens</i><br>( <i>brachyphylla</i> )-<br><i>Castanea</i> -zone | <i>Ostrya-Carpinus</i> -<br>zone<br><i>Pinus brutia</i>  |
| mediter-<br>ranean    | <i>Quercus ilex</i> -<br>zone   | <i>Olea-Ceratonia</i> -zone  |

#### V E G E T A T I O N   U N I T S

Mediterranean zone (*Olea-Ceratonia*-zone and *Quercus ilex*-zone):

A climax wood with *Olea europaea* var. *sylvestris* and with *Ceratonia siliqua* may have prevailed in the past in this zone up to altitudes to about 500 m in the east (Attica, Argolid), but the natural woods were exterminated in early historical periods by man. Most of this area is cultivated land: we find a degraded natural vegetation only in localities where erosion took place.





Distribution of *Quercus ilex* (left) and of *Quercus coccifera* (right) (from Polunin and Walters 1985)

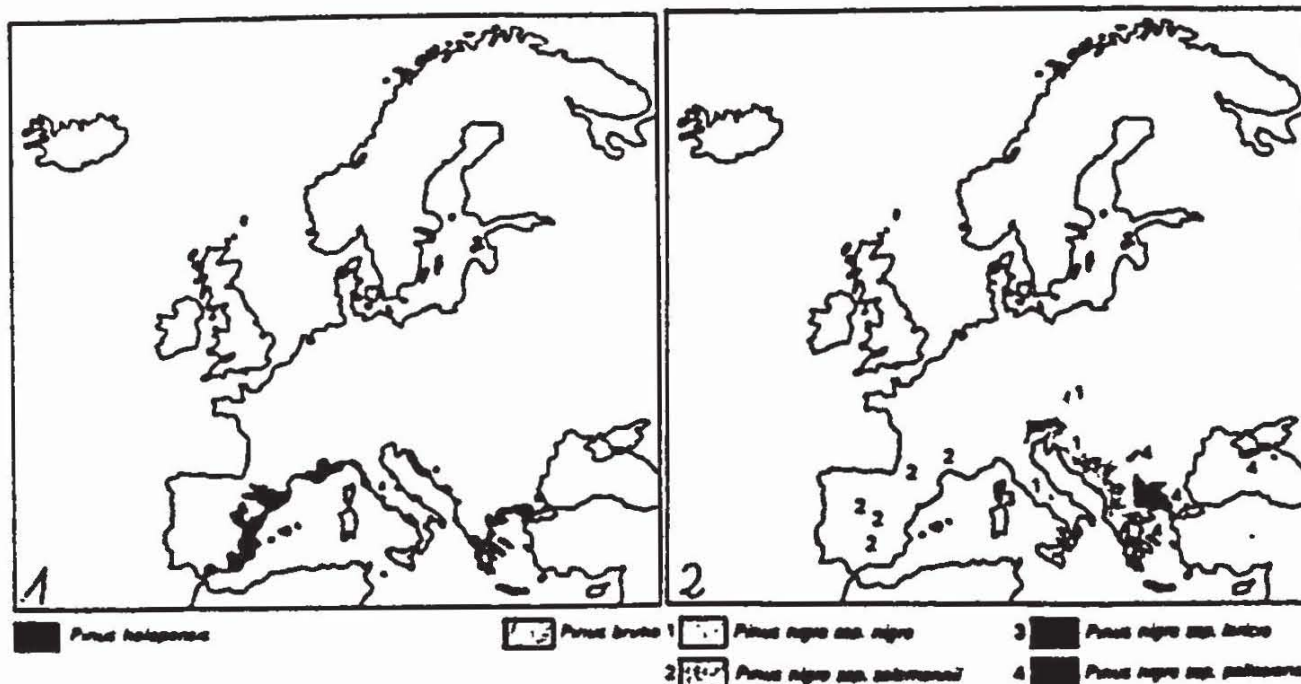
The Holm oak, *Quercus ilex*, grows to a height of about 15 m, but very rarely occurs in closed canopy, due to felling, grazing and burning. Usually the tree now is found isolated or in open stands of maquis. In these stands as well as in open forests *Quercus ilex* occurs combined with the shrubs *Pistacia lentiscus* and *P. terebinthus*, *Rhamnus alaternus*, *Arbutus unedo* and *A. andrachne*, *Phillyrea* sp.. The relic *Quercus ilex* forests in Greece usually have in addition *Pinus halepensis* and the deciduous *Quercus pubescens* (aggr.) in the tree layer. The shrub-layer usually includes: *Olea europaea*, *Quercus coccifera*, *Juniperus oxycedrus*, *Cistus creticus* and *C. salviaefolius*.

The Kermes oak, *Quercus coccifera*, is a widespread tree. Because of grazing and fires it rarely forms woods; commonly it occurs as a shrub in the phrygana. In the drier parts of Greece it often replaces *Qu. ilex* completely and perhaps in the past formed climax woods in parts of this region. *Quercus coccifera* often occurs combined with *Calicotome villosa*, *Hypericum empetrifolium*, *Phlomis fruticosa*, *Pyrus amygdaliformis* and *Sarcopoterium spinosum*.

In Greece in several places the semi-evergreen *Quercus macrolepis* is growing as a tree to a height of 15 m, because it has been cultivated for its large acorn-cups used in tanning and dyeing.

**Pine woods:** The Mediterranean zone also comprises pine woods. The most abundant species of the Mediterranean pines is the Aleppo pine, *Pinus halepensis*. In the south and east of Greece, it is replaced by the closely related *Pinus brutia*, which is now widely used for afforestations. Further, near the Greek west coast, *Pinus pinea* stands occur.





1 Distribution of *Pinus halepensis* and *Pinus brutia*  
 (from Polunin and Walters, 1985)

2 Distribution of the four major European subspecies of *Pinus nigra*  
 (from Polunin and Walters 1985)

*Pinus halepensis* often is a constituent of the Olea-Ceratonia-zone (Attica, Eastern Peloponnese). It forms woodlands on rocky outcrops on land which is not suitable for cultivation. It is most common on limestone and on littoral sediments. Dense forests are rare, normally a *Pinus halepensis* woodland shows widely spaced trees and a well developed understorey, which can grow to a height of about 2 m and forms nearly impenetrable thickets. Components of the shrub layer are *Quercus coccifera*, *Pistacia*, *Cistus*, *Arbutus unedo*, *Erica*, *Phillyrea*. On very dry ground, the shrub layer is lower (about 1 m) and dominating are *Cistus* sp. and often *Erica manipuliflora*, sometimes also *Pistacia lentiscus*. The field layer of the *Pinus halepensis* forest is poorly developed; in the spring orchids may be abundant. The trunks of *Pinus halepensis* are commonly tapped for acquisition of turpentine and resin (used e.g for resined wine = retsina).

*Pinus brutia* is very similar to *P.halepensis*, but has smaller cones and longer needles. It is still more drought-resistant than *P.halepensis*. *Pinus brutia* woods are very similar to those of the aleppo pine. *Pinus pinea* is called the umbrella pine, which describes its shape very well. It is largely a coastal tree, growing on sands and dunes of the littoral. Its distribution is centered in the Western Mediterranean. In Greece, we find small woods along the west-coast of the Peloponnese. *Pinus pinea* is widely planted, largely for its edible nut-like seeds. In the



undergrowth, the grass *Lagurus ovatus* is abundant or a shrub layer with *Pistacia*, *Cistus*, *Juniperus* and *Phillyrea* develops.

Olive groves: The wild olive, *Olea europaea* var. *sylvestris* is a native of the eastern Mediterranean area. The cultivated olive, var. *sativa* is most widely cultivated throughout the Mediterranean region and forms a sort of a man-made woodland. The olive groves usually stand on cultivated ground without any shrub or field layers below. The ground may be covered by grass, but is held free from persistent species, which would take too much water from the soil. In the spring, in the olive groves there are many annuals flowering; during the summer, often only dry plant parts remain.

Submediterranean zone: In the humid zonation this orobiome is characterized by deciduous and semi-evergreen oakwoods. In the north of the Mediterranean region, woodlands with the same composition replace the evergreen communities. Much of this submediterranean woodland is destroyed; only small relic deciduous forests are found in remote areas of the Peloponnese. Characteristic species, which are more widespread, are: *Ostrya carpinifolia*, *Pyrus amygdaliformis*, *Cercis siliquastrum*, *Fraxinus ornus*, *Cotinus coggygria*, *Celtis australis*. A submediterranean tree is *Castanea sativa*, which is cultivated since Roman times also in Western Europe, where it has now become naturalized. On the Peloponnese perhaps it is also introduced. The ground-flora of *Castanea* woods usually is rich in acid-indicating species.

Submontane and montane zones: In Central and Southern Greece, these zones are occupied by coniferous forests. The black pine, *Pinus nigra*, is widespread throughout the Mediterranean and has distinctive subspecies, each forming woods in different parts of the region:

Western Mediterranean: *Pinus nigra* ssp. *salzmannii*

Italy, Yugoslavia, Eastern Alps: *Pinus nigra* ssp. *nigra*

Corsica, Sicily, Calabria: *Pinus nigra* ssp. *laricio*

Greece, Bulgaria, Crimea: *Pinus nigra* ssp. *pallasiana*

*Pinus nigra* withstands winter frosts as well as hot and dry summers.

In the montane zone, *Abies cephalonica* forms forests in Southern Greece, particularly on Parnassus and in the mountains of the Peloponnese, at altitudes of 800-1600 m, where the mountain humidity ameliorates the dry summers. The remaining *Abies* forests are limited to the large mountainous regions. The upper limit of the *Abies* forest forms the timberline in Central and Southern Greece; it is reduced to lower heights by grazing and burning. In Northern Greece, the hybrid species *Abies borisii-regis* (*A. alba* X *cephalonica*) forms woods; it cannot be unequivocally distinguished from *A. cephalonica* by characters observable in the field (MAYER 1981). The hybrid species reaches the *Abies* forests of the Peloponnese, but is rare in this region.



The genus *Abies* formed different species in the different parts of the Mediterranean area; they are relics, separated by the climatic development during the uppermost Tertiary and the Quaternary. Endemic in Southern Spain is *Abies pinsapo*; in Sicily it is *Abies nebrodensis*. *A. pinsapo* and *A. cephalonica* are the two most drought-resistant of all Mediterranean fir species.

The *Abies cephalonica* forests have a different understorey due to exposition and height. In the lower parts, the shrubs are *Quercus coccifera*, *Quercus pubescens* aggr., *Juniperus oxycedrus*, *Pyrus amygdaliformis*. In the higher areas, *Juniperus communis*, *Daphne oleoides* and *Crataegus orientalis* are found. The ground flora is sparse in most cases. The cypress, *Cupressus sempervirens*, is a native also of the mountain region of the southern Peloponnese, but forests have disappeared almost completely.

Riparian woods: Near water-courses in river valleys riparian or wet woods are found. In the Mediterranean zone they are conspicuous by comprising deciduous, summer-green trees and shrubs. Characteristic species are *Salix* sp., *Populus alba*, *Platanus orientalis* which all are found also in the riparian woods of the submediterranean area; and additionally *Nerium oleander*, *Tamarix*, *Vitex agnus-castus*, *Rubus ulmifolius*. The species name of *Vitex agnus-castus*, points to the opinion that the seeds are usable as an anti-aphrodisiac. *Platanus orientalis* is a quickly growing tree with a wide-spreading crown. Therefore, it is often planted near springs and also in Greek villages on the main places, there performing a social role as a sunshade for the meeting place of the inhabitants. Submediterranean wet woods are largely dominated by *Alnus glutinosa*, *Populus alba*, *Salix alba*, *S. fragilis*, *S. purpurea* and deciduous oaks. Near water-courses the grass *Arundo donax* is frequently growing; it is said that from this material the god Pan constructed the first Pan's flute.

Mediterranean shrub communities: In most cases they are the result of man's influence on the natural vegetation: cutting and burning of wood, grazing, erosion of the top soil. All these factors lead to a depauperation of the natural communities and the vegetation is held in a sub-climax state.

Maquis: This shrubby wood can also be a type of climax vegetation ("primary maquis", comp. p. 46) which may reach a height of about 5 m. The maquis consists of evergreen sclerophyllous shrubs and usually is a very dense vegetation. In the submediterranean to submontane zones, the transition to a largely deciduous shrub community is sometimes named "pseudomaquis". The maquis is more frequent in the Western Mediterranean, where the climate generally is somewhat moister. Also in Greece, it is found largely near the moister west-coast areas. Burnt maquis can recover in about 5 years, thereby different species re-establish themselves at different rates, because they form new shoots with different speed from the plant



parts in the soil which are not affected. The maquis communities in the Olea-Ceratonia zone and in the Quercus ilex zone show relatively little differences. Characteristic species are: *Calicotome villosa*, *Pistacia lentiscus*, *Rhamnus alaternus*, *Ephedra fragilis*, *Arbutus unedo* and *A. andrachne*, *Erica sp.* and *Quercus coccifera* especially in southern Greece. If the maquis is undisturbed by man or fire, often *Pinus halepensis* is colonizing the community and may become dominant.

**Phrygana:** These Greek variants of the vegetation types named "Garigues" are characterized as evergreen, more or less open dwarf shrub communities (about 0.5-1 m high), rich in aromatic plants. Between the shrubs, there is a considerable area of bare ground with some annuals and geophytes (e.g. *Crocus*, *Fritillaria*, *Orchis*, *Ophrys*).

During the summer, these species disappear almost quantitatively. Many species contain etherical oils (e.g. *Thymus*, *Salvia*, *Lavandula*) or are in other ways unpalatable to grazing animals (as *Euphorbia*), others are very spiny (as thistles) and thus partially protected. Also shrubs may be spiny (*Genista acanthoclada*, *Euphorbia acanthothamnos*, *Sarcopoterium spinosum*, *Calicotome villosa*).

The different variants of the phrygana show considerable diversity, largely dependent on grazing pressures, burning, soil erosion, exposition and other factors. Some characteristic types are:

- *Quercus coccifera*-phrygana; often with spherically growing dwarf shrubs (*Euphorbia acanthothamnos*, *Sarcopoterium spinosum*).
- *Cistus*-phrygana: evolving particularly after burning, often with *Hypericum empetrifolium*.
- *Euphorbia*-phrygana: on rocky ground near the coast, with *Euphorbia dendroides* often dominating; in other areas in Greece often with *Euphorbia acanthothamnos*.
- *Erica*-phrygana: on acid soils, continuous transition to maquis, with *Erica arborea*, *E. manipuliflora* and *Arbutus* species.
- *Thymus*-phrygana: in Greece dominated by *Coridothymus capitatus*.
- *Salvia*-phrygana: in many areas with *Salvia triloba* dominating.
- *Paliurus*-phrygana: in mountainous areas, with species of submediterranean character, e.g. the semi-evergreen *Paliurus spina-christi* and the deciduous *Prunus spinosa*; other characteristic species are *Spartium junceum* and *Juniperus oxycedrus*.

Rather wet areas in a phrygana usually can be recognized by the occurrence of *Myrtus communis*. Some other typical phrygana plants not yet mentioned are: *Anthyllis hermanniae*, *Ballota acetabulosa*, *Glebularia alypum*, *Teucrium polium*, *Asphodelus*, *Urginea*, *Convolvulus sp.*

**Grasslands:** The Mediterranean and submediterranean grasslands are composed of native species, but are maintained as grasslands largely as the result of intense grazing and withdrawal of the woody plants.



Often they result from a destruction of woodlands and the land is covered by a mosaic of shrubland and grassland communities. The driest grassland types may be characterized by feather-grass species (*Stipa*) and therefore may be named a steppe-grassland. Typical grasses of the grasslands are *Brachypodium* sp., *Hyparrhenia hirta*, *Cynodon dactylon*, *Briza maxima* a.o. Other characteristic species are: *Euphorbia* sp., *Foeniculum vulgare*, *Salvia verbenaca*, *Trifolium stellatum*, *Verbascum* sp., *Echinops ritro*. The flowering season is short and during the summer, the vegetation cover is brown and dry; only some thistles (*Onopordum*, *Cirsium*, *Scolymus hispanicus*) and *Verbascum* being still alive.

In cases of extreme depauperation, a characteristic grassland with *Asphodelus* species, *Urginea maritima*, *Euphorbia characias* and sometimes *Sarcopoterium spinosum* is formed.

Submediterranean grasslands are the result of the clearance of submediterranean and montane forests; they are used for grazing in the spring and the autumn.

**Subalpine Grasslands:** They may replace forests of *Abies cephalonica* between about 1500 and 1700 m (e.g. on Mt. Parnassus). Characteristic species are: *Stipa pulcherrima*, *Melica ciliata*, *Festuca varia*, *Cerastium candidissimum*, *Daphne oleoides*, *Morina persica*, *Pterocephalus perennis*, *Anthemis cretica*.

**Rock-wall communities:** Cliffs and rock-walls may be rich in species especially in the submontane/montane region, particularly in north-facing situations. In such places, often endemics can be observed. As an example, in the Southern Peloponnese there are *Campanula versicolor*-associations with: *Stachys candida*, *Inula candida*, *Centranthus ruber*, *Campanula rupestris*, *Scutellaria*, *Onosma* and others.

The walls of the ancient ruins of most archeological sites have been cleared by herbicides during the last 15 years and therefore, in most places, no characteristic flora remained. In several localities, *Capparis spinosa* may be observed (Corinth, Ancient agora of Athens). The flower buds of this species are the edible capers.

**Cultivated and ornamental plants:** The Phoenicians and the ancient Greeks introduced and /or propagated many cultivated species: the olive, the fig *Ficus carica*, the pomegranate *Punica granatum*, and the first *Citrus* species. The orange, *Citrus sinensis*, was brought from East Asia by the Arabs.

New plants from all parts of the world arrived during the last three centuries: several palm species from different countries, *Eucalyptus camaldulensis*, *E. globulus* and *Acacia* species from Australia, *Agave*, *Opuntia*, *Schinus molle*, *Bougainvillea* and others from America. Also, many foreign weeds became widespread in the Mediterranean areas.



## Itinerary

Monday, August 3 :

We leave Athens on the National Highway to Northern Greece, which we follow until near Thivai through the northern part of the province (nomos) of Attica and through Boiotia. Attica (Attiki) has an area of 3350 km<sup>2</sup> (1300 sq.m.), its northern part is broken up by ranges of hills. To the left, we may see Mt. Parnis (1413m). Near the road, the lower slopes are covered with a phrygana vegetation, oak woods, and pine forests. In the higher parts still large areas bear a coniferous forest of *Abies cephalonica*. The village of Dekelia/Tatoi at the foot of Mt. Parnis in earlier times was the summer-residence of the kings of Greece. To the right of our route, there is the Pentelikon range with many marble quarries. We reach the province of Boiotia, belonging to Central Greece, (3000 km<sup>2</sup>), lying between the gulfs of Corinth and Euboea (Evvia). Near the National Highway *Nerium oleander* and *Spartium junceum* are planted frequently. The first mentioned species grows naturally near water-courses on pebbles; *Spartium* as a leguminous plant grows very well on poor soils. We pass the old settlement of Tanagra, with only few ruins of the ancient town. The graves of the great necropolis are the source of the charming figures in painted terracotta named after this locality. The sanctuary of Tanagra contained a holy *Andrachne* tree (*Arbutus andrachne*), under which the god Hermes shall have grown up. The central plain of Boiotia, supplemented in modern times by the land won by the drainage of lake Kopais, has made this province an agricultural region since ancient times. Its inhabitants were traditionally regarded as rather uncouth rustics, in spite of the fact that it was the birthplace of Hesiod, Pindar, and Plutarch. In the area of Thebes we may see fields with cotton, water-melons (*Citrullus vulgaris*) and onions. The natural vegetation in this area probably was a sort of a *Quercus ilex* woodland (*Quercus ilex*-zone; *Andrachne-Quercetum*).

Thebes (Thivai) is a little town of about 16000 inhabitants and occupies the site of the ancient city of the same name, which existed as early as the Mycenaean period. Round the royal dynasty of that time there grew up the great cycle of myths centred on Oidipus. In the 4th century B.C. under the leadership of Epameinondas Thebes became the dominant power in Greece for a short period, but after a rising was destroyed by Alexander the Great in 335 B.C.





The road now passes some hills and basins; forming a typical karstic landscape. The great basins of the Boiotic-Phocic area form a row of karstic basins along tectonic lines, deepened by solution of the limestones by percolating groundwater. In most cases they only have a subterranean drainage.

Near Aliartos to the left a medieval tower; on the limestone hills a phrygana with *Quercus coccifera* and sometimes *Paliurus spina-christi*. To the right the former lake Kopais in one of the largest polja (karstic basins in Greece (350 km<sup>2</sup>), which was drained since 1886 because of the danger of malaria. From this area, pollen diagrams have been obtained, which cover the last part of the Wurm glaciation and most of the Helocene. During Wurm the pollen is sparse, it belongs to *Pinus*, *Juniperus*, *Betula*, *Salix* and few *Quercus*. At the end of the cool period, a deciduous oak woodland seems to have been the climax vegetation. Evergreen oaks and pines were not a very important element in those woods. Such communities appear later, partly as a response to human action. The woodlands, especially of deciduous trees, were seriously reduced during final Neolithic times. In Northern Greece a severe reduction took place about 2000 to 3000 years later. The pollen diagrams of Northern Greece point to a steppe vegetation during the Wurm period and dense oak forests in early Holocene.

Livadia, with about 15000 inhabitants, was the capital of the region during the Turkish period. Catalanian citadel; wool and cotton industry. Around Livadia olive, apricot and almond cultures are frequent. - Now we may have good views to Mt. Helikon and later on we shall see the Parnassus mountains in front of us. Both mountain ranges are mainly built up of limestones and both bear forests of *Abies cephalonica* in their upper parts. ①

Behind a short tunnel in the region of Karakolithos we will have a first short glimpse on the Greek phrygana vegetation. The rocks in this area are flysch sediments of the Boiotian zone.

Some frequent species are:

|                             |                             |                            |
|-----------------------------|-----------------------------|----------------------------|
| <i>Arbutus unedo</i>        | <i>Calicotome villosa</i>   | <i>Cistus creticus</i>     |
| <i>Cistus salviaefolius</i> | <i>Cotinus coggygria</i>    | <i>Phillyrea latifolia</i> |
| <i>Pistacia lentiscus</i>   | <i>Pyrus amygdaliformis</i> | <i>Quercus coccifera</i>   |
| <i>Spartium junceum</i>     |                             |                            |

Near a small (perhaps dry) water-course:

|                        |                            |                           |
|------------------------|----------------------------|---------------------------|
| <i>Myrtus communis</i> | <i>Platanus orientalis</i> | <i>Vitex agnus-castus</i> |
|------------------------|----------------------------|---------------------------|

Non woody plants:

|                              |                            |                         |
|------------------------------|----------------------------|-------------------------|
| <i>Centaurea calcitrapa</i>  | <i>Dittrichia viscosa</i>  | <i>Malva sylvestris</i> |
| <i>Eryngium amethystinum</i> | <i>Scolymus hispanicus</i> |                         |

Continuing our journey we see near the road *Cupressus sempervirens*, *Nerium oleander*, *Spartium junceum*, *Robinia pseudoacacia*.



We reach the plain of Distomon with large areas covered with a low phrygana, due to heavy grazing. Near the turning of the street, which we follow to the left, there is the ancient triodos or schiste (divided road) which was believed to be the place where Oidipos killed his father Laios.- The village of Distomon was rebuilt after destruction during World War II by the Germans. Then we reach the byzantine monastery of Osios Loukas.

Monastery of Osios Loukas:<sup>②</sup> It is most famous for its mosaics, which belong to the best examples of 11th century mosaic work.

The monk St. Luke of Stiri lived in this place from about 910 until his death in 953 as a hermit. During his lifetime a chapel of St. Barbara was built (941-944), around this the monastery developed and now dominates the surroundings with its two magnificent churches. The chapel of St. Barbara has been preserved as the crypt of the principal church; according to others it is now part of the church of the Panaghia to the left of the principal church.

The Crypt contains the sarcophagus of St. Luke and two other sarcophagi, traditionally believed to contain the remains of the Byzantine Emperor Romanos II (959-963) and his wife. After damages during the last war, the monastery was thoroughly restored 1953-1962. The two churches - the principal church (now museum) dedicated to St. Luke and the other to the Mother of God (Theotokos, Panaghia) - both show the characteristic pattern of a domed cruciform church. In the church of St. Luke the mosaics were the work of artists from Byzanz. The subjects are arranged according to the rules established by the 9th century. In the narthex we find scenes from the passion, above the doorway leading into the church a figure of Christ as the Light of the World. The mosaic of Christ in the central dome was destroyed when the dome collapsed in 1593. In the N aisle to the left a portrait-like figure of Osios Loukas. In 1659 by an earthquake parts of the mosaics were destroyed and thereafter replaced by frescoes. To the iconostasis of the principal church belonged 4 icons painted by Damaskinos from Crete, who was the teacher of the famous painter El Greco; but they recently were brought to the museum.

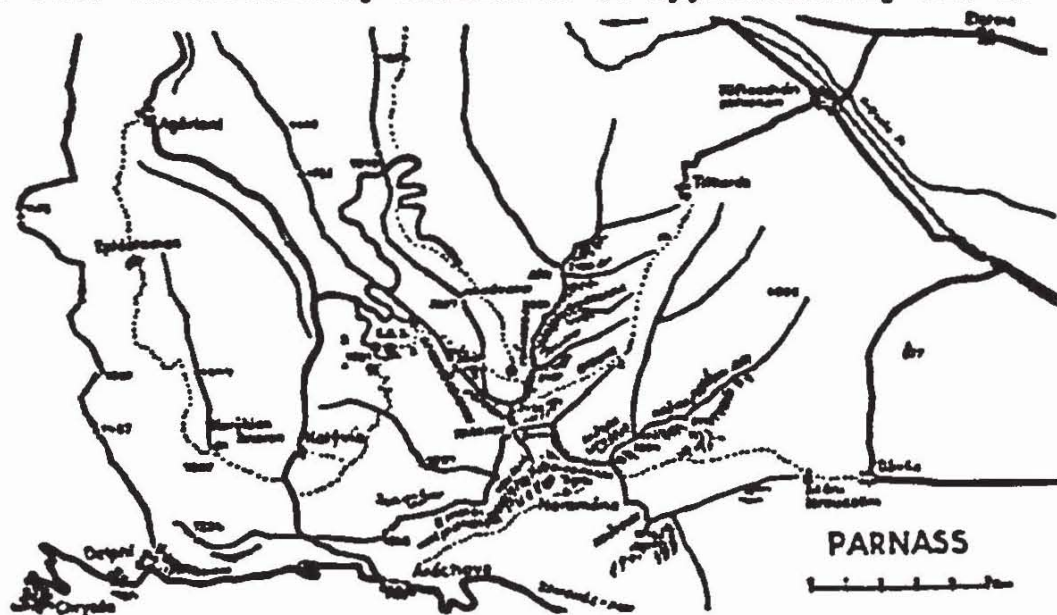
When back to the cross-way we now follow the road to Delphi. On the left the Xerovouni mountain, with *Abies cephalonica* woods. On the right the slopes of the mountain range of Parnassus. In the slopes, a bauxite mine may be observed. It brings up bauxite from the third bauxite-horizon. There are 3 main bauxites, which were formed during periods of emersion: The first in the Middle Jura, the second in the Lower Cretaceous and the third in the Upper Cretaceous. The slopes of Mt. Parnassus to the North show relics of *Abies cephalonica* forest. The valley which we follow to Arachova and Delphi runs in flysch sediments laying in a trench-like structure. North of us, the Parnassus massif is overthrust in a southern direction; but in the south the flysch in a normal way overlays the limestones.

Arachova is a mountain village in a magnificent situation, noted for its colourful textiles in traditional patterns. In this place during the Greek war of independence, in a battle in 1826 Karaiskakis killed 1500 Turks.

On the western end of the village the road to Parnassus branches off the road to Delphi and climbs over a shoulder and across the Livadi plain northward.



Parnassus<sup>①</sup> is a limestone massif rising to 2457 m (8060ft). In ancient times it was sacred to the cult of Apollo and Dionysos and was regarded as the home of the Muses. Geologically it belongs to the Parnassus-Ghiona-nappe, which reaches about 15-20 km further to the west and comprises a thick sequence of carbonatic rocks, reaching from Trias to the Lower Tertiary. It constituted a more rigid part of the hellenic geosyncline between the Pelagonian unit in the east and the Pindus-zone in the west. It was transported (during the Oligocene) in western direction over the flysch of the Pindus zone. The area of Parnassus shows still large coniferous forests and in the higher parts alpine meadows. The highest summit is called Liakoura, but also Gerontovrakhos and Kotrona summit reach more than 2400 m. Now Parnassus is a skiing area, of which many roads, ski lifts and so on, destroying the natural vegetation, bear evidence. Parnassus was decreed as a National Reserve area about 50 years ago, but no practical steps have been taken to conserve its flora and landscape. The zone of *Abies cephalonica* (Greek fir) theoretically commences at approximately 800 m.



Area of Mt. Parnassus (from Colettis 1963, modified)

On our road we find forests beginning from about 1100-1200 m. Especially the southern and eastern slopes of Parnassus were heavily deforested. The Parnassus massif comprises also the southern limit of the natural occurrence of *Aesculus hippocastanum*.

On our road, vineyards may be observed on to a height of about 1000 m. From the viewpoint on the shoulder we see the large karstic basin of the Livadi plain with the now abandoned settlement of Kalyvia. Only sheperds for some periods stay here. Near the viewpoint many thistles of the species *Picnomon acarna* are growing.



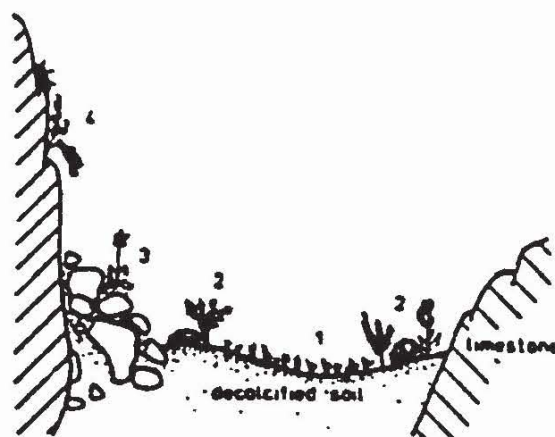
We will have a stop in the *Abies* forest at about 1300 m. The forest has a southern exposition and therefore is rather dry. The rocks are limestones, which bear a terra fusca soil.

Frequent species:

|   |   |
|---|---|
| <i>Abies cephalonica</i>                                  | <i>Juniperus oxycedrus</i>                  |
| <i>Asplenium ceterach</i> ( <i>Ceterach officinarum</i> ) | <i>Lactuca viminea</i>                      |
| <i>Astragalus sempervirens</i>                            | <i>Lamium garganicum</i> ssp. <i>pictur</i> |
| <i>Campanula patula</i> aggr.                             | <i>Lithospermum permixtum</i>               |
| <i>Centaurea solstitialis</i>                             | <i>Marrubium velutinum</i>                  |
| <i>Crataegus orientalis</i>                               | <i>Potentilla reptans</i>                   |
| <i>Cyclamen</i>   | <i>Prunus spinosa</i>                       |
| <i>Digitalis laevigata</i> ssp. <i>graeca</i>             | <i>Rosa rubiginosa</i>                      |
| <i>Echinops ritro</i>                                     | <i>Satureja alpina</i>                      |
| <i>Euphorbia rigida</i>                                   |   |

Along the road magnificent tall thistles can be seen: *Onopordum tauricum*, *Cirsium candelabrum*, and further on *Echinops*. A short stop shows us a fine stand of the brown-flowered *Digitalis laevigata* ssp. *graeca*, *Nepeta nuda* and *Verbascum delphicum*. - The upper limit of the *Abies* forest is destroyed by grazing and by cutting of trees. The ski-lift station, where we will have another stop, is situated at about 1750 m. The effects of heavy grazing may be observed everywhere and nearby the last battered *Abies cephalonica* can be seen. The only one higher shrub or small tree in this area above the *Abies* forest is *Juniperus foetidissima*, which reaches further up and indicates the depression of the timberline by the intense grazing. Most of the predominating plants owe their success to being in some way self-protective against the grazing. Among the interesting species we can find the following, which seem to be particularly successful in resistance: *Astragalus angustifolius*, *Cerastium candidissimum*, *Daphne oleoides*, *Echinops spinosissimus*, *Marrubium velutinum* (by Dioscorides called "prasion"), *Nepeta nuda*, *Senecio thapsoides*. In the vicinity of the station and of the refuges the area is covered with dolina with steep sides and often flat bottoms. They are characteristic karstic phenomena in limestone mountains. The different parts of these dolina have different micro-climates and therefore show interesting profiles of plant-associations (QUEZEL). On the cliffs, often out of reach of the animals, we may find *Geranium macrorrhizum*, *Campanula versicolor* and *Campanula rupicola*. Near the base of the cliffs *Senecio thapsoides* with its silvery-grey foliage is usually present (*Geranium macrorrhizum*-*Senecio thapsoides*-association). Between rocks and screes and on the flat floor we may find *Morina persica*, *Nepeta nuda*, *Pterocephalus perennis*, *Astragalus baldacii* and *Stipa pennata*. On rather horizontal parts of the cliffs *Prunus prostata*, *Daphne oleoides*, *Lysimachia serpyllifol-*





Vegetation of a doline of Parnassus near the timberline  
(according to Quezel 1964, modified)

- 1 Association of *Alopecurus gerardi* and *Crocus sieberi*
- 2 Association of *Astragalus cephalonicus* and *Nepeta nuda*
- 3 Association of *Geranium macrorrhizum* and *Senecio thapsoides*
- 4 Association of *Satureja parnassica* and *Sedum magellense*

*lia*, *Lamium garganicum* and *Astragalus sp.* may be found. At some places the pale green, hard mats of *Minuartia stellata* can be observed, for which Parnassus is the typus-locality. In the deepest parts of the doline, where soil (*terra fusca*) accumulates, several assemblages of species are present; frequent are: *Arum maculatum*, *Cerastium candidissimum*, *Eryngium amethystinum ssp. tennifolium*, *Marrubium velutinum*, *Satureja alpina*, *Urtica dioica*. If there is enough time, it is possible to observe the man-made timberline of the *Abies* forest from above near the ski-centre of Parnassus and/or to have another glimpse on the doline vegetation near the old EOS-hut.

After continuing our journey back to Arachova we turn to the right and have only 9 km to reach Delphi. Near the road *Spartium junceum* and *Centranthus ruber*.

Delphi (Delphoi),<sup>④</sup> lying on the SW-slopes of Parnassus, is one of the most famous cult sites in Greece, renowned throughout the ancient world as the sanctuary of Apollo and the seat of his oracle. The wealth of ancient remains combined with the magnificent setting makes Delphi one of the high points of a visit to Greece. The new village of Delphi, now a busy little town, was established in 1892. Then, the village of Kastri which had grown up on the locality of the old ruins, was moved to allow excavations. These excavations were made by French archaeologists and are still going on. The Museum between the excavation area and the village shows a wonderful collection of findings from the site. Most famous the charioteer (bronze statue).

From Delphi we have a view over the largest olive-tree "forest" of Europe, which we will cross next day. This wonderful landscape now is in danger because there is a plan to establish a large aluminium plant which can use the bauxite mined in the surroundings.

Tuesday, August 4 :

In the morning we have a visit of the excavations. There are three parts: the sanctuary of Apollo, the Castalian spring and the sanctuary of Athena at Marmaria.

The archaeological area has also a rich vegetation of ruderal species, but in the summer it is mostly dry. Perhaps the fructifications of *Lunaria annua*, *Asphodeline lutea*, and *Euphorbia characias* may be observed.

The Castalian spring, one of the three great karstic springs of Delphi, is situated in a gorge between the rocks called Phaidriades. Here we see *Platanus orientalis* and *Cercis siliquastrum* and on the cliffs grow many interesting and also some rare species, e.g.: *Campanula topaliana* and *versicolor*, *Centranthus ruber*, *Ptilostemon chamaepeuce*, *Silene congesta* and *gigantea*, *Smyrnium orphanides*.

The road to Itsea leads through the large olive tree groves of this area. The southern exposition and the availability of water allows olive cultures to about 800/850 m. In this area predominantly table olives are grown. In Greece the majority of the olives are used for oil production. Table olives are also grown in Thessaly, in the Southern Peloponnese (Kalamata) and in Western Greece near Arta.

**Olives:** The great triangular tympanon above the west entrance to the Parthenon on the Acropolis of Athens depicted the legendary contest between the goddess Athena and Poseidon, god of the sea, for control of Attica and Athens. Athena offered the olive tree and wisdom; Poseidon offered the horse and the power of the sea. The decision went to Athena, who became the patron of the city. One sacred olive tree, planted again in more recent times, is growing near the Erechtheion on the acropolis. Another one, which was a very old tree, stood at the Holy Road (Iera Odos) leading from Athens to Elefsis, and was destroyed some years ago by a truck-accident. Now a young tree has been planted at the same place.

The cultivated olive had its origin from selections from the wild olive, probably in the eastern Mediterranean. The olive tree has been cultivated in Greece at least since the time of the Minoan civilization on the island of Crete (3000 B.C.) and at least since about 1500 B.C. on the Peloponnese. One of the gold cups of the Vaphio-tomb, remnants of the Mycenaean civilization, shows olive leaf patterns used as decorations. The olive tree was considered by the ancient Greeks to be a symbol of wisdom, peace, and victory. The winners of the ancient Olympic Games in the early times received a sample crown from olive branches as their reward.

The olive has rather strict climatic requirements. The trees are killed by temperatures below -8°C, however they need chilling during the winter in order to initiate flowering. Olive production is generally confined to the lower and coastal areas of Southern Greece and to the islands. There are several varieties grown in Greece; in the area around Itsea as a table olive it is predominantly the variety *Konservolia*. On the Peloponnese especially the oil varieties *Koroneiki*, *Kothreiki* and *Koutsourolia* and the table variety *Kalamon* are planted.



The gulf of Corinth is a great graben structure with unequal shoulders. Near Kollini we pass bauxite mines. The tree horizons of bauxite can be seen on the Kefali hill. Next the road the lowermost horizon is mined.

On slopes near the sea there is a *Euphorbia dendroides* dominated vegetation. *E.dendroides* is mainly a west-mediterranean species. Now, in August, it stands without leaves. - We follow the road along the sea in western direction. Near Galaxidi the overthrust of the Parnass-Ghiona nappe upon the Pindus flysch may be observed. In the area of Eratini a shrubby vegetation with *Pinus halepensis* forms a sort of maquis. On several slopes there are *Pinus* afforestations on the Pindus flysch. Some fans of debris coming down from the hills (e.g. near Marathias) show plenty of *Nerium oleander* in natural stands. Near Efpalion limestones (mainly Cretaceous) of the Pindus series form the mountain ridges.

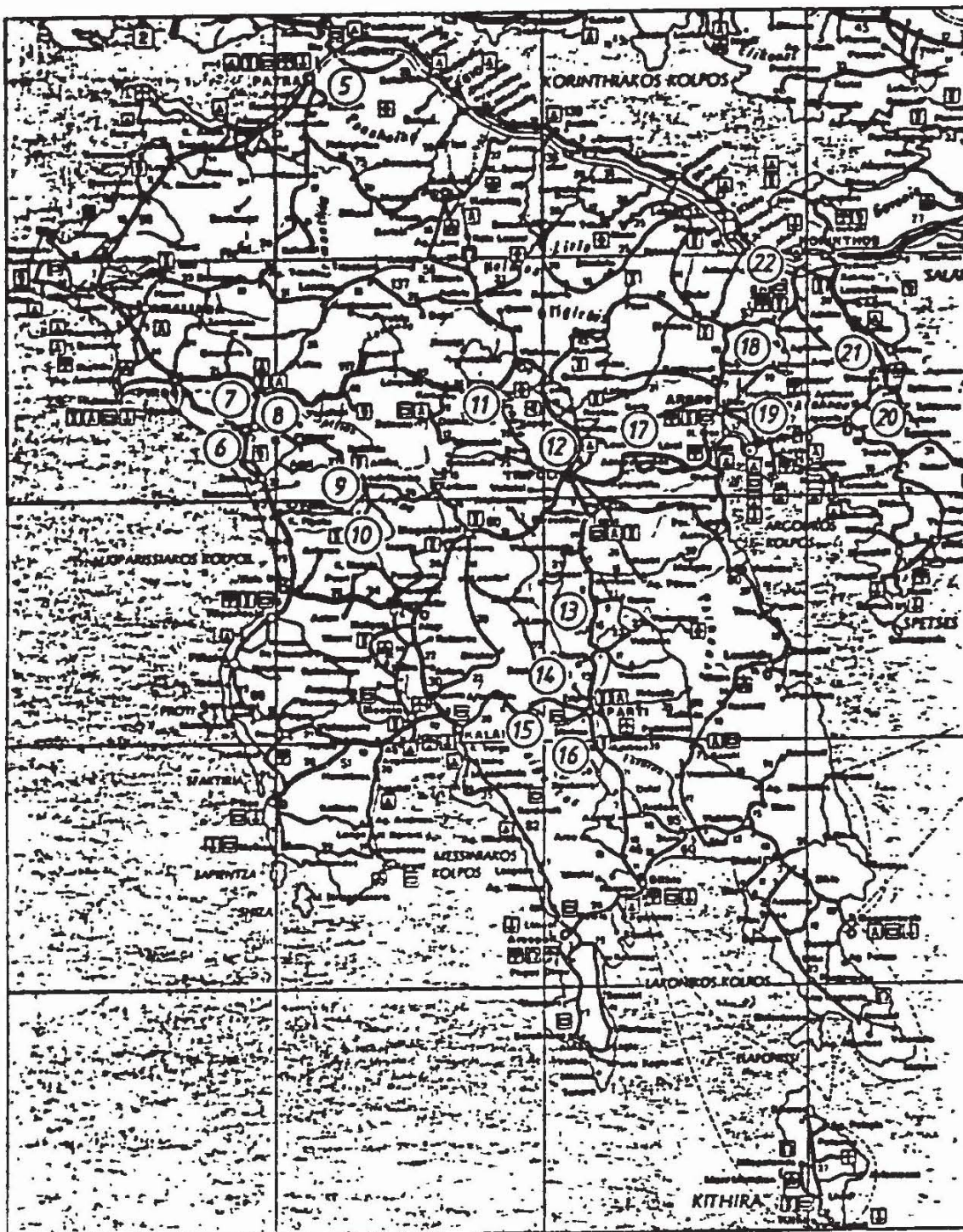
Nafpaktos: port and town, 9 km E of the strait of Rion. The fortifications climb up to the castle on top of a hill. On this castle-hill also the overthrust of the Pindus nappe (Triassic limestones) upon the Gavrova-flysch may be observed. Nafpaktos was known to the Venetians as Lepanto and became famous through the naval battle of Lepanto in 1571 (Oct.5). From 1499 to 1687 and from 1700 to 1821 the town was Turkish. The Turkish fleet sailed from here to fight the battle which marked the first naval victory by the allied powers of Europe over the hitherto undefeated Turks. The battle took place further to the West, between Mesolongi and the Czia islands. The commander of the "Holy league", formed by Spain, Venice, Genova, the Pope, and the Order of St. John was Don Juan d'Austria, a natural son of the Emperor Charles V. Among the participants of the battle was Cervantes, author of "Don Quixote", who lost an arm in the encounter.

Antirrio/Rio: Ferryboat across the narrowest point (2 km) of the Gulf of Corinth; more than 96 crossings daily. From Antirrio 40 km to the west Mesolongi is situated, the capital of the nomos Aetolila and Acarnania, which was heroically defended against the Turks during the war of liberation, mainly by Markos Botsaris. On 5 Jan 1824 Lord Byron landed at Mesolongi, but died of fever on 10 April of the same year. In Antirrio we pass the Kastro Roumeli; in Rio the Kastro Moreas (Morea means Peloponnese); these two fortifications controlled the entrance to the inner gulf of Corinth. From Rio it is only a short way to Patras. We may see *Citrus* cultures, especially of lemons. Before reaching the city the buildings of the University of Patras can be seen to the left.

Patras: ⑤ largest town (120000 inhabitants) and principal port of the Peloponnese, capital of the nomos of Achaia, seat of an archbishop. The town was rebuilt after the destruction during the war of independence on a rectangular street layout. After a first



rise at Kalavryta (March 15) and in the Mani the war of independence began at Patras, when the archbishop Germanos consecrated the flag (March 25, 1821; this day is now the festival day of the Greek nation) and then appealed to the country. A declaration of independence followed on March 28 at Kalamata. - In Patras the German method of cultivation and of manufacture of wine was introduced first in to Greece by Mr. Clauss, founder of the Archaia-Clauss wine company.

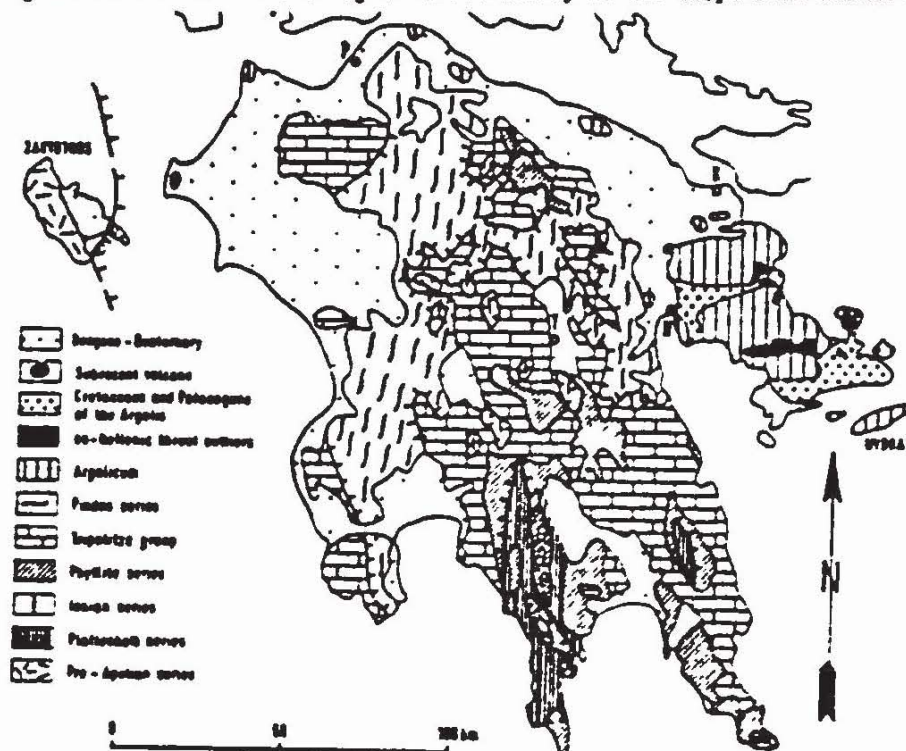




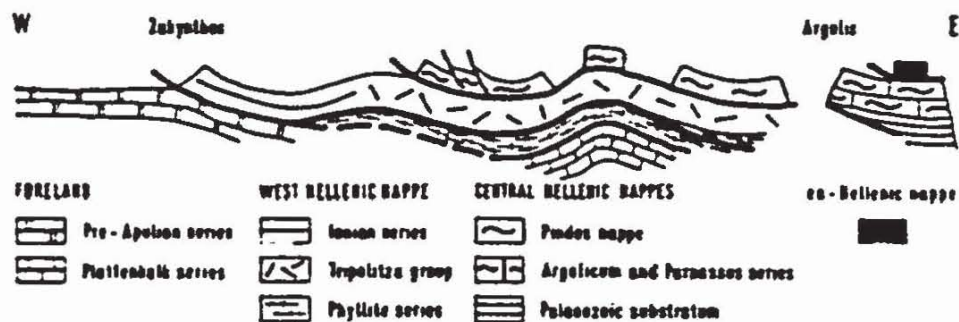
**Peloponnese (Peloponnisos):** This peninsula is the most southern part of the Greek mainland, with which it is linked only by the Isthmus of Corinth. Area: 21 440 km<sup>2</sup> (8280 sq.m). It shows a great variety of landscapes, broken up by hills and mountains. In the centre we find the upland region of Arcadia; the eastern part of the peninsula is known as the Argolid; to the south of Arcadia is Laconia with its capital Sparta. The NW part is the region of Elis, an area of low-lying land with Olympia as best-known place.

The peloponnese is a region rich in myth as well as in history. After the 4th Crusade (1204) it passed into the hands of Frankish knights and in 1453 the Turks arrived. During the war of independence it was the core area of the patriots.

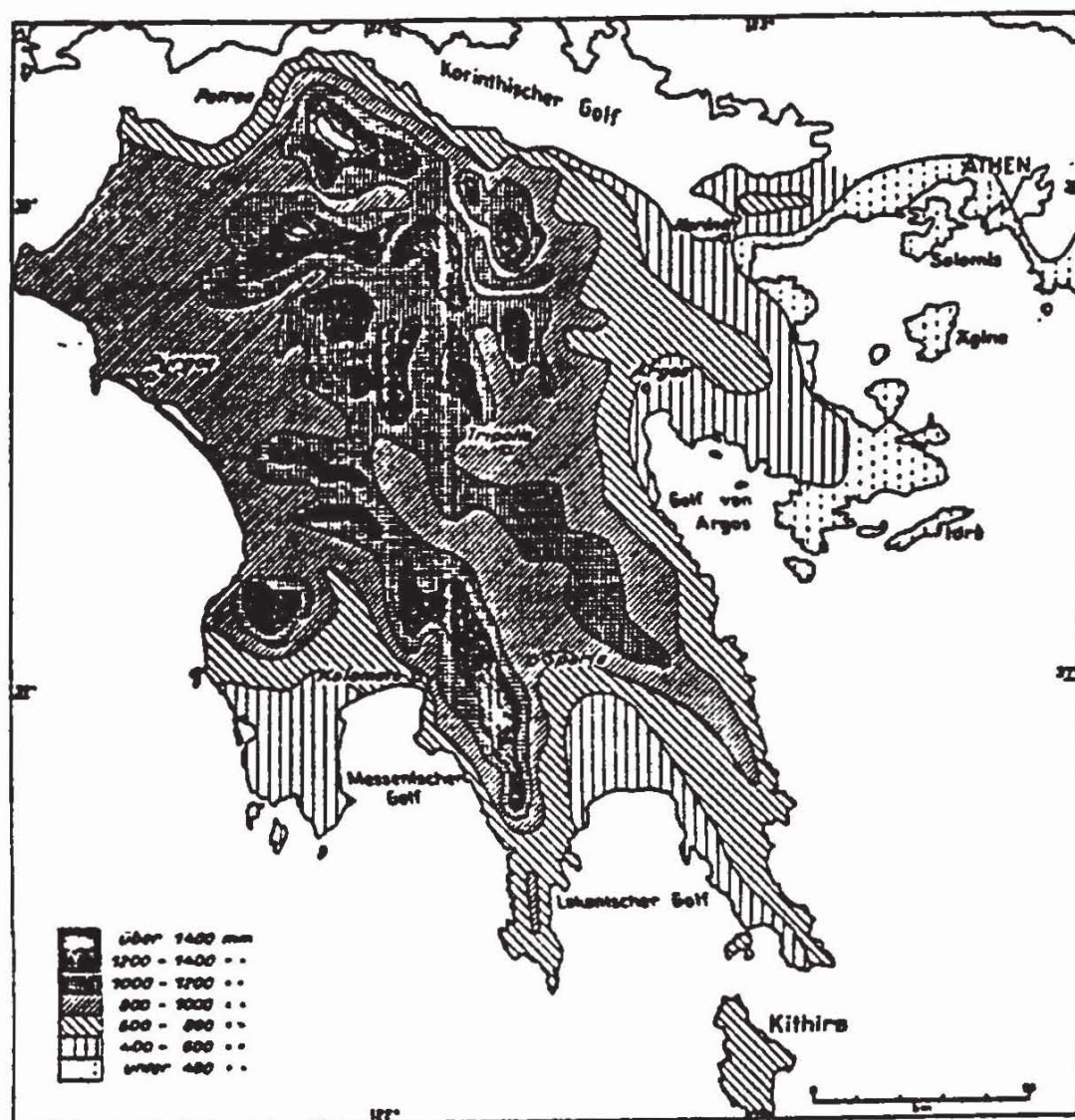
**Geologically,** on the Peloponnese at least four tectonic zones must be distinguished (JACOBSSHAGEN 1978). The lowermost Flattenkalk-series seems to be autochthonous; it is visible e.g. in the Taygetos mts. The second level the West Hellenic nappe system, consists of two units: the lower one is represented by the Phyllite series (which we will cross in the foothills of the Taygetos) the upper one comprises among others the sediments of the Tripolitza zone. These sediments are overlain by the third tectonic unit: the Central Hellenic nappe system, which on the Peloponnese comprises the Pindus nappe and the Argolicum (mesozoic sediments of the peninsula of the Argolid). In Central Greece, the Parnassus nappe and the Pelagonian nappes also belong to the Central Hellenic system. The Argolicum has been overthrust by an ophiolitic nappe (fourth tectonic unit). The sediments of the Tripolitza zone mainly consist of Tripolitza limestone (Triassic to Eocene) with a thickness of about 1500 m and the flysch cover (500-1200 m). The Pindus nappe has moved more than 80 km in a western direction over the Tripolitza series. The mainly carbonatic Pindus series show an arenaceous intercalation of variable thickness in the Cretaceous and at their top a typical flysch (Lower Tertiary). The Pindus rocks form mountain chains in the western part of the Peloponnese and in the Argolid; in the central Peloponnese only some outliers are left by erosion resting on the Tripolitza series.



Tectonic map of the Peloponnese (from Jacobshagen et al., 1978)

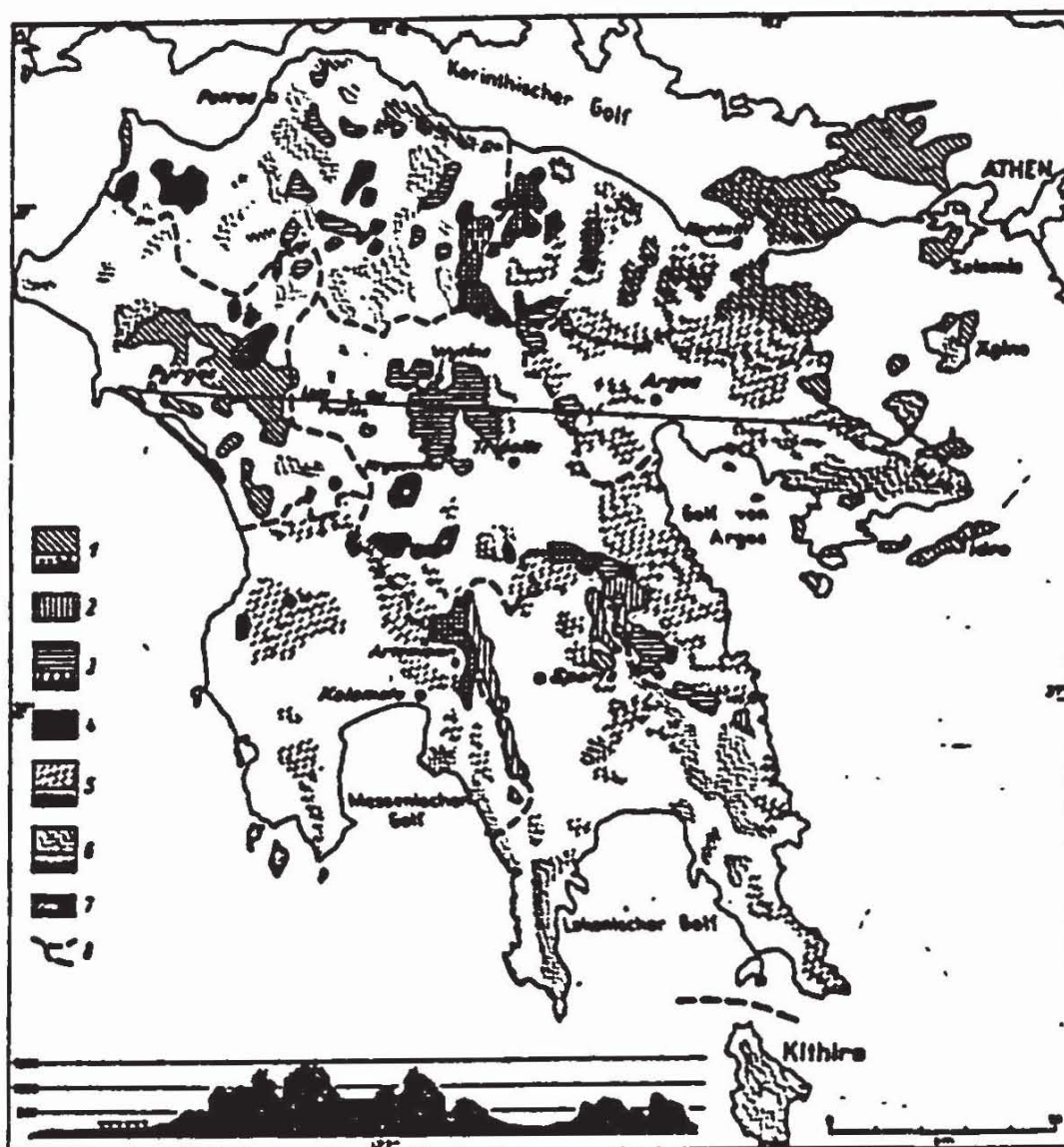


Schematic cross-section through the nappe sequence of the Peloponnese (from Jacobshagen et al., 1978)



Mean annual rainfalls in the Peloponnese (from Beuermann 1956)





Forests in the Peloponnese (from Beuermann 1956)

1 forests and woods of *Pinus halepensis*, 2 forests of *Pinus nigra*, 3 forests of *Abies cephalonica*, 4 woods of deciduous oaks, 5 maquis, 6 "bad" maquis, 7 forests of *Castanea sativa*, 8 borders of the nomoi.

From Patras we are following the road to Pyrgos, first along the sea, then on the new highway through the coastal plain. Near Patras Citrus cultures are frequent; further to the west olive groves and vineyards are dominant. *Cupressus sempervirens* trees, predominantly in the "columnar" form, are planted like hedges as wind-breaks. The columnar form is claimed to have a better fire-resistance than the normal form, which is present in mountain-forests of Crete. Along some roads, *Eucalyptus*-trees are planted. The NW Peloponnese is a very fertile area, because enough water is available (higher annual rainfall than in the East). In

the summer especially maize, tomatoes and water-melons are harvested. In open lands beneath the *Cupressus* already mentioned also *Arundo donax* is used as a wind-break. Crossing the river Pinios we can see that only a small stripe of riparian woodlands has been left along the banks. As seasonal workers in the tomato digesting plants gipsies are frequent in this area.

The little town of Amalias to the left was formed in 1885 by the union of some villages and got the name of the queen Amalia. When we reach the surroundings of Pyrgos, olive cultures and carob trees get more frequently and fields with cotton may be seen. Water-channels and water-pipelines show the possibility of irrigation. Pyrgos is a commercial town and capital of the nomos of Elis, with 23000 inhabitants. South of Pyrgos are many glass-houses; during the spring and in the early summer this area has a garden character. We cross the river Alfios, accompanied by flood-protection dams. In the river-plain water-melons and peanuts are grown. The village of Kallikomon is now a new settlement, erected after destruction by an earthquake.

Near the shore stands of *Pinus pinea* may be observed. This pine with its characteristic shape is not abundant in Greece and only frequent on the west coast of the Peloponnese.

Kaiafas, ⑥ 21 km (13 m) S of Pyrgos on the coast, has been renowned since ancient times for its medicinal thermal springs (38 C, containing hydrogen sulfide). Pollen diagrams from the Lake Kaiafas indicate that the local pine woods had been largely removed by the Late Bronze Age and that between 1100 and 700 B.C. olives were cultivated. In the area of Kaiafas are the northern limits of the natural occurrence of *Ceratonis siliqua* in the phrygana vegetation of the west coast of the Peloponnese. From here to the south the *Olea-Ceratonis* zone is well developed.

Through a pine wood we reach the long sandy beach, where bathing is possible (but there are no douching facilities).

Near the beach an open vegetation (cover about 30%) of typical beach plants is to be shown.



Typical species are:

*Ammophila arenaria*

*Cakile maritima*

*Centaurea sonchifolia*

*Cyperus capitatus* (=mucronatus)

*Echinophora spinosa*

*Eryngium maritimum*

*Euphorbia paralias*

*Lagurus ovatus*

*Medicago marina*

*Otanthus maritimus*

*Pancratium maritimum*

*Salsola kali*

The adjacent small pine wood comprises:

*Pinus pinea*

*Pinus halepensis*

*Dittrichia viscosa*

*Juniperus phoenicea*

*Pistacia lentiscus*

*Quercus coccifera*

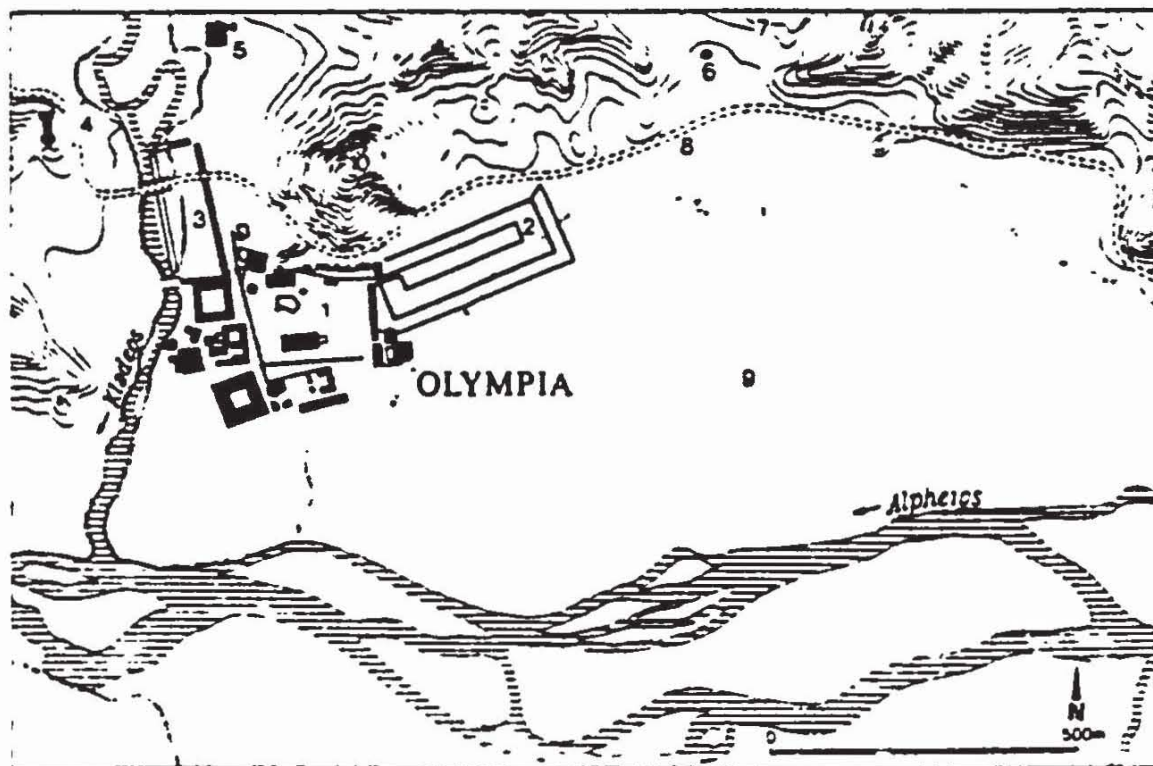
*Rubia peregrina*

*Ruscus aculeatus*

*Smilax aspera*

*Stachys spruneri*

From Kaiafas, we reach Olympia<sup>⑦</sup> in about half an hour.



Area of Olympia: 1 Altis (holy grove), 2 Stadion, 3 Gymnasion (now the entrance area of the Altis), 4 Old Museum, 5 New Museum, 6 Marble stele of Pierre der Coubertin, 7 International Olympic Academy, 8 Modern road, 9 Medieval river-bed of Alpheios, 10 Kronos hill (from Fuchs 1976)

Wednesday, August 5:

Olympia, lying in the angle between the rivers Alpheios (Alfios) and Fladeos, was a great Panhellenic sanctuary, the venue of the Olympic Games. The sacred precinct was brought to light by excavations since 1875; they also led to the growth of the present village of Olympia. A direct consequence of the excavation was the revival of the Olympic Games by Baron Pierre de Coubertin, the first modern Games being held in Athens in 1896. The new museum contains a large collection of sculpture, bronzes and pottery. The Central Hall houses the metopes and figures from the pediments of the temple of Zeus. The rooms are arranged in clockwise order, starting from the left. Most famous pieces - among others - are the terracotta group of Zeus and Ganymede (ca. 470 B.C.), the bronze helmet of Miltiades, the victor of Marathon, and the statue of Hermes with the boy Dionysos, which generally is agreed to be an original work by Praxiteles (c. 350 B.C.).

The sacred precinct, called the Altis (which means sacred grove) is now again planted with trees. The excavations in the Altis were finished in 1890; all the trees must be younger. In the grove of the Altis we find *Pinus halepensis*, *Quercus pubescens* aggr. and *Cercis siliquastrum*.

After the visits of the museum and the archaeological zone, we take the road to Andritsaina. When crossing the Alfios we will stop to have a short visit to the relics of the riparian woodland in the wet zone near the river. ⑧

Here we may find:

*Acer sempervirens*

*Arundo donax*

*Calystegia sepium*

*Datura innoxia*

*Dittrichia viscosa*

*Helictropium europaeum*

*Lythrum tribracteatum*

*Nerium oleander*

*Nicotiana glauca*

*Phragmites australis*

*Platanus orientalis*

*Populus alba*

*Solanum nigrum*

*Tamarix smyrniun*

*Ulmus scabra*

*Vitex agnus-castus*

The road gradually leaves the plains and raises through the hills of the western Peloponnese. Near Diasella, the *Pinus halepensis* forests were damaged by fire a few years ago. The seeds of *Pinus halepensis* after fire germinate quicker than those of most other trees, so these forests recover as pine forests and also in other areas after fire the aleppo pine may become dominant. Near Kallithea ⑨ there is a nice view into the Alfios valley to the left. In this area we will stop for a short trip into a "maquis" vegetation, growing on sandstones of the flysch series. On the sandy



soil *Erica arborea* is a frequent species. Also *Quercus ilex* is abundant in the maquis of the western Peloponnese, caused by the relatively higher annual rainfalls. The difference between the western Peloponnese and the area around Athens (Attica) can also be seen from the percentage of annual (ephemeric) species in the vegetation of the Mediterranean zone (up to an altitude of 750 m): in the W Peloponnese 40-45% of all species and in Attica 60-80% are annuals.

Frequent species of the "maquis":

*Anthyllis hermanniae*  
*Arbutus unedo*  
*Cistus creticus*  
*Cistus salviaefolius*  
*Cistus monspeliensis*  
*Dittrichia viscosa*  
*Erica arborea*  
*Erica manipuliflora*  
*Genista acanthoclada*  
*Hypericum empetrifolium*

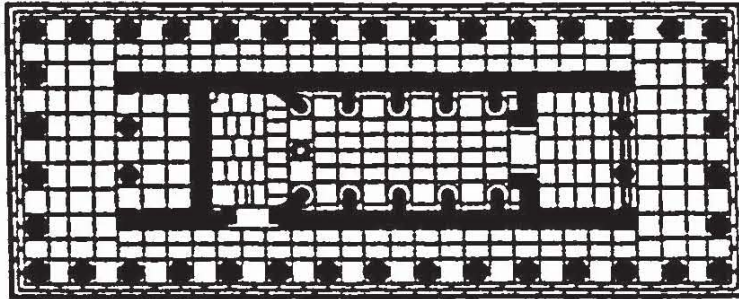
*Lonicera implexa*  
*Myrtus communis*  
*Olea europaea* var. *sylvestris*  
*Phillyrea latifolia*  
*Pinus halepensis*  
*Pistacia lentiscus*  
*Pistacia terebinthus*  
*Pyrus amygdaliformis*  
*Quercus ilex*  
*Sarcopoterium spinosum*

Andritsaina is an old hill village and still some wooden houses may be seen. On the main place, *Platanus orientalis* as shade yielding "village-tree" are planted - as in many hill villages and towns on the Peloponnese.

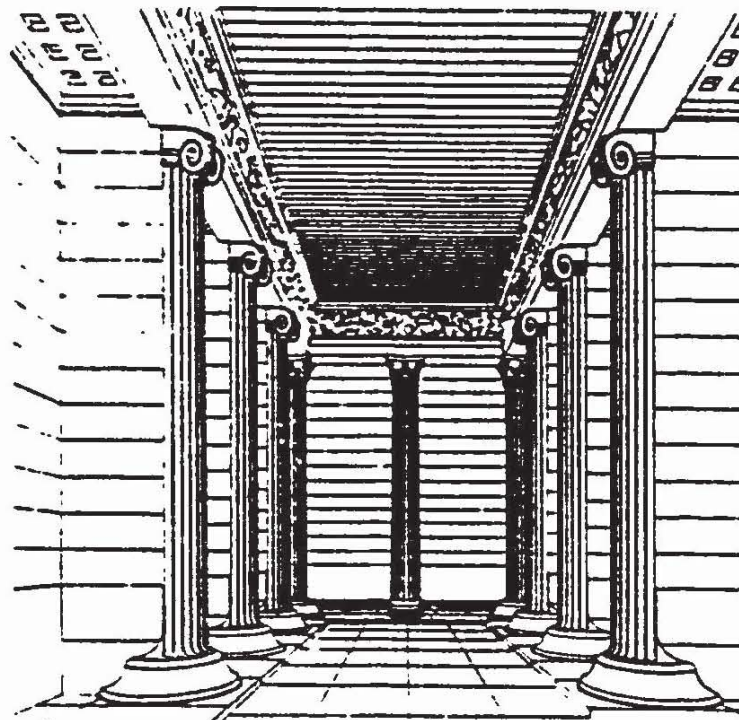
From Andritsaina we follow the road up the mountains to Bassai. Some deciduous oaks (*Quercus pubescens* aggr., perhaps in most cases *Quercus brachyphylla*) and also stands of *Digitalis laevigata* along the road remind us that we have reached the orobiome which is known as the submediterranean vegetation zone. Mesozoic limestones of the Olonos-Pindus series show intense and generally west-vergent folds near the road.

(10)

Bassai (Vassai): The temple of Apollo Epikourios stands on a remote site (alt. 1130 m, 3700 ft.) on the slopes of Mt. Lykaion, 14 km (9 m) from the village of Andritsaina. Rediscovered in 1763, the temple has since been restored and a new thorough restoration is now going on. According to Pausanias, the temple was built (after 430 B.C.) by Iktinos, the architect of the Parthenon of Athens. The temple shows a column ratio 6 x 15, which is a rather archaic pattern and not the classical norm (6 x 13), and it is oriented to the N. While the external columns are doric, the cella has two rows of ionic columns set close to the walls. A frieze (now in the British Museum) ran round the walls of the cella above the columns. This deviates from the previously normal practice of having the frieze on the external walls. At the far end of the cella, at the entrance to the adyton where the cult image of the god was housed, there originally stood a column with a Corinthian capital. That is the earliest known use of this type. The temple thus made use of all three of the Greek orders. The Corinthian capital was present in 1811 but subsequently was destroyed and is known only from a drawing. With its elongated ground-plan and the 6 x 15 columns the temple of Bassai is reminiscent of the temple of Apollo at Delphi, which Iktinos had to reproduce here, reducing it in size by exactly a third.



Temple of Bassai, plan (from Kirsten-Kraiker, according to Cockerell)



Temple of Bassai, reconstruction of the cella (from Kirsten-Kraiker, according to Mallwitz)

The vegetation around the temple is a mixture of Mediterranean and of submediterranean species, as is normally true for grazed areas of the submediterranean zone.



*Acanthus spinosus*  
*Acer sempervirens*  
*Alcea pallida*  
*Campanula topaliana*  
*Carlina coymbosa*  
*Carlina lanata*  
*Carthamus lanatus*  
*Centaurea laconica*  
*Centaurea solstitialis*  
*Convolvulus althaeoides*  
*Consolida ambigua*  
*Crataegus*  
*Eryngium creticum*  
*Juglans regia*  
*Lactuca viminea*  
*Malabaila aurea*  
*Malcolmia*  
*Nigella damascena*  
*Onopordum tauricum*

*Origanum vulgare*  
*Orlaya kochii*  
*Petrorhagia*  
*Pistacia terebinthus*  
*Phlomis fruticosa*  
*Prunus spinosa*  
*Prunus webbii*  
*Prunus cocomilia*  
*Pyrus amygdaliformis*  
*Quercus coccifera*  
*Quercus pubescens aggr.*  
*Rhamnus alaternus*  
*Scrophularia canina*  
*Scutellaria rubicunda*  
*Stachys cretica*  
*Trifolium physodes*  
*Verbascum sp.*

The road from Andritsaina to Karytaina leads through maquis; and several degradation-forms of phrygana and of more or less grazed areas can be observed. Along small water-courses *Platanus orientalis* is growing. The rocks are changing several times from Olonos-Pindus-limestones to flysch sandstones and marls and back. On the sandstones trees of *Castanea sativa* are frequent. On the left there is a geological interesting view on several over-thrusted units of the Pindus zone (with Olonos limestones).

Karytaina is an Arcadian village, situated near the gorge of the Alfios river. Above the village a Frankish castle built in the 13th c. by Hugues de Bruyère, baron of Karytaina. The castle was defended against the Turks in 1821 by Kolokotronis. From the road to Dimitsana a short way behind Karytaina we have a view into the plain of Megalopolis with a huge electric power station at the upper river Alfios.

In the basin of Megalopolis lignitic coal-measures of early pleistocene age are found. From these coals a great number of fruits and seeds of aquatic and marsh-plants were collected (102 species). The majority of the organic substance of the coal originated from *Scirpus*, *Carex* and *Cladium mariscus*. The genera *Brasenia* and *Dryale* present in the coal have become extinct in Europe. Because the latter one is resistant to cold, it should have survived the pleistocene cold periods. So it is more probable, that it became extinct by one of the drying-up periods of interglacial or postglacial times.

The road to Dimitsana leads through an area with much cattle. Along the road we find *Paliurus spina-christi* and Thistles of the genus *Onopordum* and also mulberry-trees. From the village Ellinikon on the way to Dimitsana a variant of Phrygana, developed at higher altitudes, and then the *Abies* forest may be observed. The road crosses afforestations with *Pinus halepensis*. Near Diritsana nuts (*Juglans regia*) are frequently cultivated. In a little valley



along a water-course *Platanus* and *Salix* is growing. When we reach the houses of Karkalou, the valley is flattening because it now reaches the softer flysch sediments of the Tripolitza unit below the Olonos limestone of the tectonically superimposed Olonos-Pindus-unit.

Now we take the road to the Tripolis and stop in the *Abies* forest near the village of Vityna<sup>(1)</sup>. The *Abies* forests form relatively extensive woods in the central Peloponnese. The largest and richest of these forests cover the Maenalon Mts. On a short trip off the road we can only get a cursory impression of this type of forest, here preferably in a northern exposition.

More frequent species in this lower part of the forest are:

|                                   |                                |
|-----------------------------------|--------------------------------|
| <i>Acer sempervirens</i>          | <i>Juniperus oxycedrus</i>     |
| <i>Anthyllis vulneraria</i> aggr. | <i>Lactuca viminea</i>         |
| <i>Asparagus acutifolius</i>      | <i>Lonicera implexa</i>        |
| <i>Centaurea solstitialis</i>     | <i>Pteridium aquilinum</i>     |
| <i>Cephalanthera</i> sp.          | <i>Pterocephalus</i>           |
| <i>Clematis flammula</i>          | <i>Quercus coccifera</i>       |
| <i>Delphinium peregrinum</i>      | <i>Quercus pubescens</i> aggr. |
| <i>Fragaria vesca</i>             | <i>Teucrium polium</i>         |
| <i>Hedera helix</i>               | <i>Trifolium physodes</i>      |

Forests cover about 13% of the total area of the Peloponnese; for a mediterranean area this is a relative high value. Nearly one half of the total forest area are *Pinus halepensis* forests, somewhat smaller areas are covered by *Abies* forests and by *Pinus pallasiana* forests. Additionally, there are small areas of *Castanea* forests in Mt. Parnon and of woodlands of deciduous oaks, principally *Quercus conferta* and *Qu. brachyphylla*. The last great destruction of these oak forests took place during the construction of the Peloponnesian railway. In the Northern Peloponnese mixed *Abies cephalonica* - *Pinus pallasiana* forests can be found in the mountains.

The lower parts of the *Abies* forests show a submontane, partly rather submediterranean character. Herbaceous species of the submediterranean zone of deciduous oaks are frequent. The upper limits of the forests are depressed by man as already mentioned for Parnassus. In earlier time especially the shepherds burnt down the uppermost forests to get areas for summer-grazing. Thereby the timberline was depressed. The deforestation on the Peloponnese began in early history and continued until recent times. Wood for ship-building was gained through centuries; and destructive war-raids were effective on to the second World War.



Vityna, a mountain village, is famous for its honey and its yoghurt. From Vityna to Levidi a new road is under construction. On the right we see the Maenalon Mts., built up of Tripolitza limestone, covered by *Abies* forest. Near the road: phrygana vegetation of the higher altitudes, with *Arbutus andrachne* (stems and twigs with red bark). Near Levidi we can see flowering fields of *Lavandula angustifolia*, which is cultivated for the perfume industry. The hills on the left side are covered by typical phrygana vegetation; some big trees of *Quercus coccifera* show that this usually shrubby species may form typical oak trees. Then we reach the plain of Tripolis (central Arcadia). The northernmost part of the plain around the old settlement of Mantinea was a forest area still around 1800, as is documented by a map of 1804. Now this area is totally deforested! Mantinea, some km to the left of our route, harbours the remains of the ancient city of Mantinea. The battle of Mantinea, 362 B.C., ended the predominance of Thebes in the Peloponnese.

Thursday, August 6:

Tripolis, capital of the nomos Arcadia, has about 20000 inhabitants and is the centre of the surrounding agricultural region. It was founded on the central Arcadian plain by settlers from Albania in the 14th c. During the Turkish period under the name of Tripolitza it was seat of the Pasha of the Morea (=Peloponnese). The town was captured by Kolokotronis in 1821, but destroyed by Ibrahim Pasha in 1828. The name of the town commemorates the fact, that it is built on the territories of three ancient cities (Mantinea, Pallantion, Tegea).

Arcadia (Arkadhia): is the upland region of the central Peloponnese. In the north the nomos comprises the mountains of Erymanthos, Chelmos, and Kyllini. The most important river is the Alfios with its tributaries. Some areas in the central part have no overground drainage to the sea and form large karstic basins; they also led to the formation of bogs which were finally drained in our century. The region until recent times was rather isolated and so already in the ancient period it had become the setting for pastoral poetry. Now, an extensive programme of road-building has it made easy to reach central Arcadia rather quickly. The Arcadian plateau is an area of agriculture and fruit-culture. The potatoes of this area belong to the best of Greece. Olive-trees are rare, because of the episodic but sometimes severe frosts in the winter. Cherries, apples, pears, peaches, nuts and almonds are grown; mulberry trees can be seen along roads.

Tegea, 8 km (5m) ESE of Tripolis, comprises sparse remnants of a



sanctuary of Athena with a temple erected by Skopas about 350 B.C. In this area scattered *Quercus brachyphylla* trees show that we are in the submediterranean zone of the deciduous oaks. The village of Kersitsa is named after the cherries (*Prunus cerasus*). The submediterranean phrygana is dominated by shrubby *Quercus coccifera*. The areas far from greater settlements, as e.g. south of Manthytrea, are now pasture-land; in former times they were used for agriculture.

Near the border of the nomoi Arcadia and Laconia large areas are covered by phrygana, in most cases on Tripolitza limestone with terra rossa soils. Near the road to the left two memorials for partisans of the Second World War, who were fusilladed in these localities. The typical phrygana vegetation on limestone is to be shown here. ⑬

The frequent species are:

*Anthyllis hermanniae*

*Arbutus andrachne*

*Arbutus unedo*

*Cistus*

*Coridothymus capitatus*

*Cotinus coggygia*

*Dorycnium hirsutum*

*Euphorbia myrsinites*

*Fumana thymifolia*

*Genista acanthoclada*

*Globularia alypum*

*Helianthemum nummularium*

*Hypericum empetrifolium*

*Odontites linkii*

*Onosma erecta*

*Phillyrea latifolia*

*Pistacia terebinthus*

*Prunus webbii*

*Quercus coccifera*

*Rubia peregrina*

*Silene vulgaris*

*Stachys chrysantha*

*Teucrium polium*

Continuing the journey, we can see new afforestations with *Pinus* (*Pinus brutia*?) near the road. When the road runs downwards into the lower areas of Laconia, we reach another centre of olive growth. As between Delphi and Itēa, here also table olives are grown. North of the village of Sellasia the battle of Sellasia 221 B.C. took place, in which the united Macedonians and Archaeans finally broke the power of the Spartans.

Crossing the river Efrotas (Eurotas) we reach the town of Sparta. On the banks of Efrotas sparse remnants of the riparian forest with deciduous trees (poplars, willows, plane-trees) and with oleanders.

Sparta (Sparti) is the capital of the nomos Laconia (Lakedaemon), about 12000 inhabitants. It is situated in the fertile Efrotas-plain between the Taygetos mountains (2404 m = 7888 ft) in the West and the Parnon mountains (1937 m = 6355 ft) in the East. The town was refounded on the ancient site in 1834 by King Otto with streets in a rectangular manner. In the North of the Town the low acropolis hill is situated, it shows some insignificant ancient, mostly Roman, remains. They were excavated by the British Archaeological



School. Sparta was the main center of the Dorian Greeks, who arrived at about 950 B.C. It developed into a military state in which art played a less important role than in Athens. During the classical Greek period no walls surrounded the town which included many gardens. The first defensive town-walls were built at about 200 B.C. In the 13th c. Sparta was replaced by the newly founded town of Mistra.

Turning to the west, we reach the foothills of the Taygetos-range, which traverses the southern Peloponnese from N to S, separating the regions of Laconia and Messenia. It is built up mainly of limestones, dolomites and marbles of the Plattenkalk series. In the eastern flanks deep gorges were engraved, through which the snow-melt water comes down in the spring. The gorges are of high botanical interest. The largest one is the gorge of Langhadia which is easily accessible because the only well-engineered road passes through the Taygetos range on this way, largely following the old mule-track. At the entrance of the gorge the village of Trypi is situated. Here, in the foothills of the Taygetos phyllites and mica-schists of the phyllite series locally form acid soils, therefore *Castanea sativa* is growing.

At some points in the gorge, <sup>(H)</sup> were stops of the bus are possible, we will have glimpses on the vegetation. Along the narrow valley floor *Platanus orientalis* is frequent and also *Acer sempervirens*, *Nerium oleander*, *Ostrya carpinifolia* and *Cercis siliquastrum* can be observed. The most interesting plants are growing on the cliffs.

Near the road we may see:

*Acanthus mollis*  
*Adiantum capillus-veneris*  
*Alcea pallida*  
*Arbutus andrachne*  
*Asplenium trichomanes*  
*Ballota acetabulosa*  
*Bupleurum fruticosum*  
*Calicotome villosa*  
*Campanula rupestris* aggr.  
*Campanula versicolor*  
*Centaurea mixta*  
*Centranthus ruber*  
*Coronilla emerus*  
*Dittrichia viscosa*  
*Euphorbia characias*  
*Erica manipuliflora*  
*Ficus carica*  
*Helichrysum stoechas*  
*Hypericum empetrifolium*

*Inula candida* aggr.  
*Malabaila aurea*  
*Onosma erecta*  
*Parietaria judaica*  
*Petrorhagia glumacea*  
*Phagnalon graecum*  
*Phillyrea latifolia*  
*Phlomis fruticosa*  
*Pistacia terebinthus*  
*Quercus coccifera*  
*Quercus ilex*  
*Scabiosa crenata* ssp. *breviscapa*  
*Scabiosa ochroleuca*  
*Scrophularia canina*  
*Scutellaria rubicunda*  
*Silene gigantea*  
*Spartium junceum*  
*Stachys candida*



From the end of the gorge proper the road climbs up through a *Platanus* wood and then a forest of *Pinus nigra ssp. pallasiana* which is visited near the pass (about 1280 m) from the place of a little hotel which is open only during the summer. The ridge here is covered with dense black-pine forests. Near the road perhaps *Genista acanthoclada* perhaps is still in flower. (5)

On clearings and along forest-paths may be found:

|                                 |                              |
|---------------------------------|------------------------------|
| <i>Achillea ligustica</i>       | <i>Lactuca viminea</i>       |
| <i>Anthemis cretica</i>         | <i>Linaria pelisseriana</i>  |
| <i>Aristolochia pallida</i>     | <i>Onopordum</i>             |
| <i>Briza maxima</i>             | <i>Origanum vulgare</i>      |
| <i>Campanula spatulata</i>      | <i>Osyris alba</i>           |
| <i>Centaurea triumphetti</i>    | <i>Petrorrhagia velutina</i> |
| <i>Clematis flammula</i>        | <i>Phlomis samia</i>         |
| <i>Dianthus viscidus</i>        | <i>Picnemon acarna</i>       |
| <i>Eryngium amethystinum</i>    | <i>Potentilla recta</i>      |
| <i>Fragaria vesca</i>           | <i>Pteridium aquilinum</i>   |
| <i>Galium rotundifolium</i>     | <i>Quercus coccifera</i>     |
| <i>Helianthemum nummularium</i> | <i>Rosa</i>                  |
| <i>Hieracium pilosella</i>      | <i>Scrophularia canina</i>   |
| <i>Hypericum olympicum</i>      | <i>Spartium junceum</i>      |
| <i>Juniperus oxycedrus</i>      | <i>Trifolium physodes</i>    |
|                                 | <i>Verbena officinalis</i>   |

We take the same road back to Trypi and then from Sparta we reach Mistra (6) on a foothill of the Taygetos, formed of Tripolitza limestone. Mistra shows magnificent ruins of a medieval byzantine town and provides the most complete picture we have of such a town. The ruined Franco-Turkish castle on the top of the hill is a wonderful viewpoint. In the little new village of Mistra we pass the monument of the last Byzantine Emperor Konstantinos IX Palaiologos Dragases who, before getting Emperor was Despot of Mistra and was crowned in the Mitropolis of Mistra.

The castle of Mistra was built in 1249 by Guillaume II de Villehardouin; but in 1263, he was compelled to yield it up to the Byzantine Emperor Michael VIII. Thereafter, until the Turkish conquest in 1460, Mistra was ruled by Byzantine princes, who bore the title of a Despot.

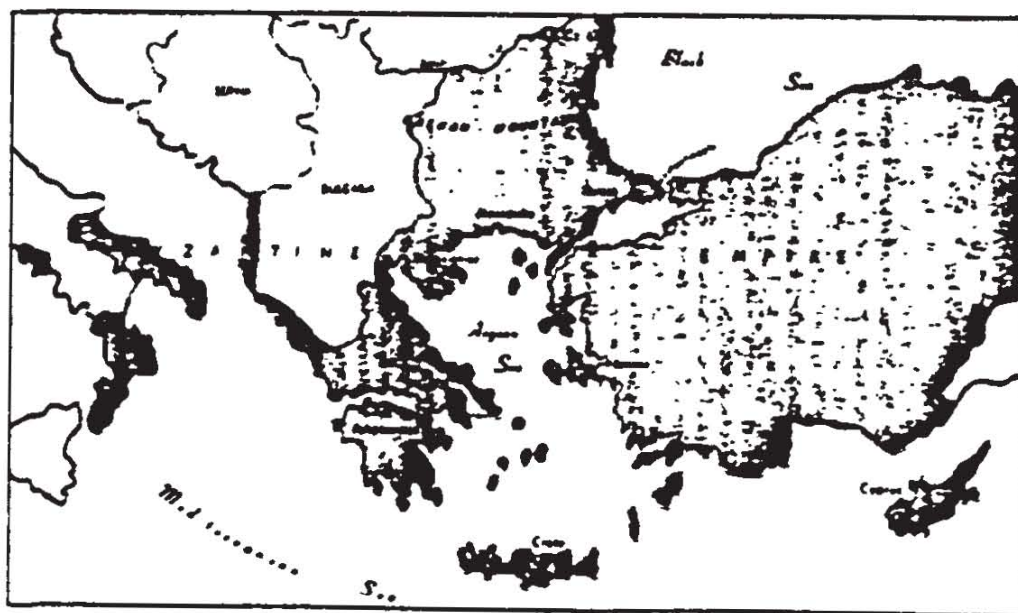
Below the Frankish castle on the summit of the hill there grew up first the upper and then the lower town. The Despot's palace became the centre of a splendid court and an active intellectual life, particularly when Georgios Gemisthos Plethon developed his neo-Platonic philosophy here in the 15th c., contributing significantly to the development of the Renaissance in Florence. This, combined with the marriage of one of the Despots to a Malatesta princess, was the motive which led Sigismondo Malatesta in 1464 to thrust down through Turkish-occupied territory to Mistra in order to bring back Plethon's remains to Rimini, where they were deposited in the church of San Francesco, the "Tempio Malatestiano". After the Turkish conquest in 1460 the town declined. When, after the liberation of Greece, the population moved in 1834 to the newly founded town of Sparta, Mistra shrank to a small village below the town walls.



The ruins of Mistra form a natural rock-garden which especially in the spring is rich in flowers, because until now no herbicides were used to clear the ruins of "weeds", as was done in the majority of the classical sites. In the summer-months only relatively few of the plants may be identified:

*Acer sempervirens*  
*Alcea pallida*  
*Anagyris foetida*  
*Asplenium ceterach*  
*Centranthus ruber*  
*Cercis siliquastrum*  
*Citrus sinensis*  
*Citrus limon*  
*Clematis flammula*  
*Cupressus sempervirens*  
*Ecballium elaterium*  
*Ephedra fragilis*

*Eriobotrya japonica*  
*Euphorbia characias*  
*Ferula communis*  
*Ficus carica*  
*Hedera helix*  
*Nerium oleander*  
*Onosma erecta*  
*Parietaria judaica*  
*Phlomis fruticosa*  
*Pistacia terebinthus*  
*Sarcopoterium spinosum*  
*Vitex agnus-castus*



The Byzantine Empire, 11th Century  
 (from Area Handbook of Greece, 1977)

Friday, August 7 :

We leave Tripolis crossing the Arcadian plateau (with cultures of potatoes, onions, garlic, apples and pears) and on a newly constructed road we reach the Achladokampos<sup>(13)</sup> pass near the border between the nomoi of Arcadia and the Argolid. On the Olonos-Pindus limestones, which in some areas are overlain by flysch sediments, a phrygana with additionally some submediterranean species ("mountain phrygana") is developed. On the pass there is a stand of *Juniperus drupacea*, which is an Asiatic species occurring in Europe only in few places in the Peloponnese.

The phrygana of Achladokampos pass comprises:

|                               |   |
|-------------------------------|---|
| <i>Acer sempervirens</i>      | <i>Olea europaea</i> var. <i>sylvestris</i> |
| <i>Anthyllis hermanniae</i>   | <i>Phillyrea latifolia</i>                  |
| <i>Arbutus unedo</i>          | <i>Phlomis fruticosa</i>                    |
| <i>Asparagus acutifolius</i>  | <i>Pistacia lentiscus</i>                   |
| <i>Calicotome villosa</i>     | <i>Pistacia terebinthus</i>                 |
| <i>Cistus creticus</i>        | <i>Prunus webbii</i>                        |
| <i>Coridothymus capitatus</i> | <i>Pyrus amygdaliformis</i>                 |
| <i>Crataegus</i>              | <i>Quercus coccifera</i>                    |
| <i>Cyclamen</i>               | <i>Sarcopoterium spinosum</i>               |
| <i>Juniperus drupacea</i>     | <i>Vinca maior</i>                          |

The road down into the Argolid leads through phrygana vegetation. The Argolid played a central part in the history of Greece. Already settled in Neolithic times, it was occupied by the Archaeans around 2000-1900 B.C., and during the Mycenaean period (1580-1100 B.C.) was the most densely populated part of Greece. Mycenae, Tiryns and Argos were centres of power and of a rich culture. The excavations carried out from 1874 onwards led to the rediscovery of this forgotten world. Many of the Greek myths were associated with this region. So, this day is mainly devoted to the archaeology of this area.

We reach the Argolid plain (and the sea) near the village of Myli. On the right side, close to the sea, the excavations of Lerna are situated. Lerna was a site occupied from Neolithic times onwards. In the Greek myth, this was the place of the Hydra or Lernean serpent, which is associated with one of the 12 labours of Herakles.

The road to Argos leads through apricot cultures. Argos in the fertile Argolid plain is a country-town of about 17000 inhabitants. The castle hill bears the acropolis of Argos and remains of a medieval castle. Argos is the centre of the Citrus cultures of the Argolid. Few km N of Argos we reach the village and the ancient site of Mycenae (Mikinaï) : <sup>(14)</sup>

The fortified city of Mycenae gave its name to the Mycenaean civilisation. They were made known by Heinrich Schliemann's excavations, which carried the history of Europe far back into the Bronze Age of the 2nd millennium B.C.; and although many other strongholds and settlements of the same period



have since been discovered Mycenae still retains its pre-eminence. The first Greeks coming into this region about 2000 B.C. settled on the hill which now is known as the Citadel hill. The Early Mycenaean cultural period began about 1580 B.C.; it is notable for the wealth of gold found in the shaft graves including the famous gold mask laid over the face of some dead prince and wrongly identified by Schliemann as belonging to Agamemnon. From the Middle Mycenaean period (1500-1425) date the older walls and the early tholos tombs. The Late Mycenaean periods (1425-1100) yielded many finds. In the 14th c.B.C. the later Tholos tombs, including the "Treasury of Atreus" were built. The later palace (Megaron) and the famous Lion Gate were built about 1250 and thereafter the walls were strengthened. On the left of the road which runs up from the village is the famous tholos tomb, known as the "Treasury of Atreus". From there is also an excellent view on the Citadel and the hills (Triassic and Jurassic carbonate rocks) behind it. On the way to the Citadel on the right side of the road some Mycenaean houses. Botanically, in the summer months, the archaeological site is rather unattractive. Some wild pear trees, *Pyrus pyraster*, may be noted.

After the visit of Mycenae we turn to the south and driving round Argos we reach Tiryns, <sup>(15)</sup> another Mycenaean citadel, standing on an isolated rock of Cretaceous limestone of only 25 m (80 ft) height. This hill dominates the surrounding alluvial plain; so from here we have a good view over the Citrus cultures of the Argolid. These cultures need artificial watering during the summer. In some areas of the plain there exist already problems because more water is pumped from the underground than is supplied during the rainy season and as a consequence sea water is infiltrating the karstic limestones. - Cypress trees, planted in a hedge-like fashion are used as wind-breaks.

Tiryns was occupied from Neolithic times. The Mycenaean citadel was excavated by Schliemann and Dörpfeld from 1884 onwards and some sections of the cyclopean walls were re-erected. Its history shows many parallels with Mycenae. The first fortress was erected in the 16th c.B.C.; then in the 14th and 13th c. the walls and bastions on the S and E sides were built in their present form. The ramp on the E side and the new palace also date from this Late Mycenaean period. Recent excavations have shown that the lower part of the Citadel to the N was not, as had long been supposed, merely a place of refuge for the population of the surrounding area but was densely built up and remained inhabited after the fall of Tiryns (c.1125 B.C.).

From Tiryns, we can see the little town of Nafplion under the rocky promontory of Akronafplion (85 m - 280 ft) and the fortified hill of Palamidi (216 m - 710 ft). The fortifications were built by Turks and Venetians. The town was captured by the Greeks in 1822 and in 1828 became the first capital of Greece. The first president of Greece, count Kapodistrias, was murdered here in 1831 in an act of private revenge. On 25 Jan. 1833 the 18 year old King Otto, son of Ludwig I of Bavaria, landed here to take up his new kingdom. In 1834 the capital was moved to Athens.

Epidaurus (*Epidaurios*). <sup>(16)</sup> The famous sanctuary of Asklepios, the god of healing, lies in a beautiful setting between the hills of the Eastern Argolid. In early Greek times it was a sanctuary of Apollo,



then he was joined by his son Asklepios. Every four years games were held in honour of the god, and from 395 B.C. there was also a dramatic festival. On the evidence of the votive inscriptions the priest-doctors were already practising psychotherapeutic methods of treatment. A thermal spring was also used.- The theatre of Epidauros, built against the lower slopes of the hill, is remarkable for its state of preservation and for its acoustics. In its present state, it dates from the 2nd c.B.C., when the upper part was added giving the theatre a capacity of 14000 seats.

The area of Epidauros is the type locality of the orchid *Ophrys sphegodes* ssp. *aesculapii* which of course only may be found during the spring. The Theokasta hill nearby is famous for the quarries in the "Asklepieion limestone", a red limestone of the Upper Trias with a rich fauna of ammonites ("Hallstaetter facies").

From Epidauros we continue our journey through the eastern Argolid on a road built about 15 years ago, which leads through *Pinus halepensis* forests growing near the coast. (24)

This rather open woodland in the Olea-Ceratonia zone is formed nearly exclusively by pine trees. The most trunks show cuts, from which the resin is collected by tins or similar containers. They are attached to the trunks and especially during the summer the resin oozes down into them. Pine resin gained from *Pinus halepensis* was used already in ancient times, and according to Dioskorides a wine flavoured with resin (retsina in Greek) is more digestible. (It is hoped that the participants by then will have tested this assertion in spite of the fact that the first taste is not very pleasant to most travellers). Today, in Greece yearly about 3000 t of *Pinus* resin are used for wine resining. In the pine forest near the pine trunks often shrubs of *Pistacia lentiscus* are growing, sometimes replaced by other species. These shrubs use the shade of the pine and additionally the water running down from the trunk when it is heavily raining. Further frequent species of the *Pinus halepensis* wood are:

*Asparagus acutifolius*

*Juniperus phoenicea*

*Brachypodium retusum*

*Olea europaea* var. *sylvestris*

*Cistus creticus*

*Phillyrea latifolia*

*Cistus salviaefolius*

*Pistacia terebinthus*

*Coridothymus capitatus*

*Quercus coccifera*

*Euphorbia acanthothamnus*

*Smilax aspera*

*Globularia alypum*

*Teucrium polium*

*Urginea maritima*

Continuing our journey along the sea-coast, we reach the region of Isthmia near the south-eastern end of the Corinth Canal (see below) with the remains of the ancient sanctuary of Poseidon, which have been excavated since 1952 by American archaeologists. This sanctuary was the scene of the Isthmian games, which were held every second year from 582 B.C. onwards. The prize of the victors was a crown of wild celery or spruce.



For some kilometers we follow the highway in western direction, passing the town of Corinth. This town was transferred to the new place in 1885 after a severe earthquake and was rebuilt after a further earthquake in 1928. It now has about 20000 inhabitants and an important harbour near the entrance of the Corinth canal. The site of Ancient Corinth<sup>2</sup> (and the town until 1858) is excavated since 1896 by the American school and lying 7 km south-west of the new town at the foot of the hill of Acrocorinth, which is formed of Jurassic limestones, surrounded by marls of Pliocene age. The ancient town is situated on the coastal plain of Tyrrhenian age (Lower Pleistocene); the highway runs on a lower alluvial plain. During the antiquity, great earthquakes in this area were in 420 B.C., 77 A.C., 521 A.C. Nearly all remains of the ancient town are from the Roman period, because 146 B.C. it was destroyed by the Romans and remained in a state of ruin until Caesar rebuilt the town in 44 B.C. In the years 51-52 A.D. the apostle Paul lived in Corinth. The excavation area comprises the centre of the ancient city and is dominated by the only significant Greek building, the imposing ruins of the archaic temple of Apollo. In the archaeological area many plants of *Capparis spinosa* may be seen.

Corinth owed its great importance in ancient times to its situation. The hill of Acrocorinth provided a strong acropolis. The town controlled the 6 km (4m) wide Isthmus, the only land route into the Peloponnese, and with its two harbours, Lechaion in Gulf of Corinth and Kenchreai in the Saronic Gulf, also controlled the movement of goods between the two gulfs. The site of Corinth - the name of which is pre-Greek - was already occupied in Neolithic times. In historical times it attributed its foundation to Korinthos, son of Marathon, and to Sisyphos. About 1000 B.C. Doric settlers established themselves here beside a Phoenician trading post. During the reign of the tyrant Periandros (from about 628 B.C.) the archaic culture of Corinth reached its apogee, the city's power being matched by its cultural achievement. Here the Doric temple reached its classical form, and - according to Vitruvius - the Corinthian capital was invented by Kallimachos during this period.

After the visit of Ancient Corinth we turn eastward and get to the Corinth Canal. The canal is 6,3 km long, has a width of 23 m and a depth of 8 m. It was constructed from 1882 to 1893. The bridges cross the canal in a height of 52 m. From these bridges in the vertical walls the limestones and marls of the Pliocene and in Northern direction the deposits of the Tyrrhenian, overlain by red clay sand may be observed. The sediments are cut by many faults. We now use the National Highway to Athens. The Geraneia Mts. reach close to the sea; the narrow pass for roads and railway is called the Kaki Skala, and was known to the ancients as the Skironian Cliffs.

The next plain which we reach is the plain of Megara, planted with olive-trees and wine. The small town of Megara is built on the site of the ancient city of the same name, from which only a few remains are left and were excavated.

On our right we have a view to the island of Salamis and the bay



of Elefsis, which can be entered only through two narrow channels between the island and the mainland. The famous naval battle of Salamis, when the Athens guided by Themistokles defeated the Persian fleet (480 B.C.), took place in the more easterly of these channels. Aeschylus took the battle as the theme of his tragedy "The Persians" which was performed in Athens for the first time in 472 B.C.

Eleusis (Elefsis) is a rather dirty industrial town west of Athens. Within this area the site of ancient Eleusis is located, the home of the Eleusinian mysteries and important sanctuary dating back to Mycenaean times. The road now raises to a pass in the Egalean hills. In this place, the monastery of Dafni is situated and here we reach the border of Greater Athens.

The monastery of Dafni was built in about 1080 on the road to Elefsis and is famous for its 11th c. mosaics. Since the earthquake of 1982 it is in restoration and closed to the public. The name refers to a shrine of Apollo, which once stood on the site. To Apollo the bay or laurel (*Laurus nobilis*), in Greek: "daphne" was sacred. From July to September the Tourist Pavillion at Dafni is the scene of a wine festival, with wine-tasting and music. From here it is about 10 km to reach the centre of Athens through the western, mainly industrial and therefore dirty suburbs.

Saturday, August 8 :

This day is given to the surroundings of Athens and their vegetation. Our first stop will be at the monastery of Kaisariani,<sup>(23)</sup> situated in a valley on the reafforested lower slopes of Mt. Hymettos. Mt. Hymettos, east of Athens, rising to 1027 m (3370 ft), is built up from limestones and Hymettian marble. In ancient times it was covered with forest. Now, most slopes bear a phrygana vegetation with abundant *Coridothymus capitatus*, from which the famous honey of the Hymettos is gathered by the bees. In recent decades afforestations have been made, particularly around Kaisariani monastery. Its name comes from a spring which belonged to a shrine of Aphrodite. From this sanctuary the Roman Emperor Hadrian caused an aqueduct to be built to Athens, thereafter the spring was known as imperial (kaisariane). It was and is credited with healing powers, particularly for women who desire to bear a child. The water of the abundant spring still flows from an archaic ram's head.

Ovid wrote of this site: "... the purple heights of flowery Hymettos where lies a sacred spring enclosed by soft green turf. Low growing pine trees, mixed with thick foliaged Box trees and fragile Tamarisk adorn the spot. Most fragrant breathe the aromatic tribes, arbutus, rosemary, dark myrtle, and bay, that dapple the green earth." Around the monastery there is a rich vegetation also



in the summer because of irrigation and care, and it is possible to see *Arbutus unedo*, *Rosmarinus officinalis*, *Myrtus communis*, *Laurus nobilis* as in the days of Ovid.

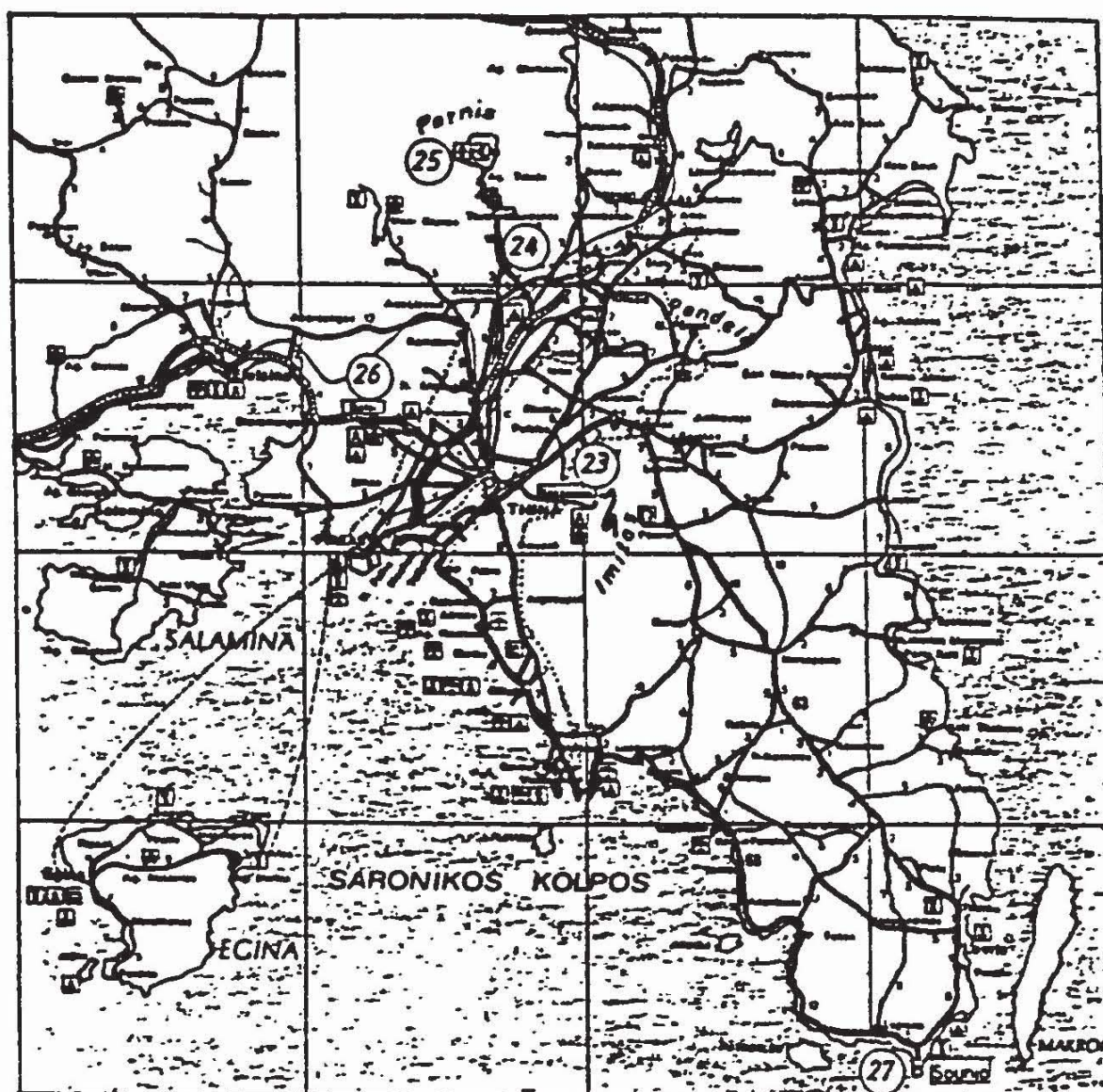
Some common or peculiar species (including the cultivated):

|                                  |   |
|----------------------------------|---|
| <i>Acanthus mollis</i>           | <i>Nerium oleander</i>                      |
| <i>Adiantum capillus-veneris</i> | <i>Olea europaea</i> var. <i>europaea</i>   |
| <i>Agave americana</i>           | <i>Olea europaea</i> var. <i>sylvestris</i> |
| <i>Ailanthus altissima</i>       | <i>Parkinsonia aculeata</i>                 |
| <i>Asparagus acutifolius</i>     | <i>Phagnalon graecum</i>                    |
| <i>Asplenium ceterach</i>        | <i>Philadelphus coronarius</i>              |
| <i>Brachypodium retusum</i>      | <i>Phillyrea latifolia</i>                  |
| <i>Carpobrotus acinaciformis</i> | <i>Pinus halepensis</i>                     |
| <i>Capparis spinosa</i>          | <i>Pistacia lentiscus</i>                   |
| <i>Ceratonia siliqua</i>         | <i>Pittospermum tobira</i>                  |
| <i>Cercis siliquastrum</i>       | <i>Platanus orientalis</i>                  |
| <i>Cerinthe major</i>            | <i>Pyrus amygdaliformis</i>                 |
| <i>Cistus salviaefolius</i>      | <i>Quercus cocciifera</i>                   |
| <i>Coridothymus capitatus</i>    | <i>Rhamnus alaternus</i>                    |
| <i>Cupressus sempervirens</i>    | <i>Robinia pseudoacacia</i>                 |
| <i>Eriyobotrya japonica</i>      | <i>Ruscus aculeatus</i>                     |
| <i>Eucalyptus camaldulensis</i>  | <i>Sarcopoterium spinosum</i>               |
| <i>Euphorbia characias</i>       | <i>Selaginella denticulata</i>              |
| <i>Ficus carica</i>              | <i>Smyrniolum olusatrum</i>                 |
| <i>Genista acanthoclada</i>      | <i>Teucrium fruticans</i>                   |
| <i>Globularia alypum</i>         | <i>Thapsia garganica</i>                    |
| <i>Hyoscyamus albus</i>          | <i>Umbilicus horizontalis</i>               |
| <i>Hypericum empetrifolium</i>   | <i>Vinca major</i>                          |
| <i>Juglans regia</i>             | <i>Vitis vinifera</i>                       |
| <i>Ligustrum lucidum</i>         |   |
| <i>Medicago arborea</i>          |   |

The monastery church of Kaisariami is of the domed cruciform type. It was erected around 1000 on the site of an earlier church, and is therefore rather older than the buildings of this type in Athens itself. The dome is borne not on the walls but on four columns, giving the interior an air of lightness. The painting is much later than the church, having been done in the 16th c., during the Turkish period, probably by a monk from Athos. It is in strict accordance with the rules for the hierarchical disposition of the various themes - Christ Pantokrator in the dome, with the Prophets below him and the four Evangelists in the pendentives; the Mother of God enthroned in the apse, with angels, the Communion of the Apostles and the Fathers of the Church below her; and on the barrel vaulting of the arms of the cross the various church festivals. In the porch is a fine representation of the Trinity. The porch, like the S chapel dedicated to St. Antony, was added in the late 17th c. There are considerable remains of the conventual buildings. Entering by the main entrance, to the E, we see on the left a building which was originally a bath-house and later housed oil-presses. Beyond this, set back a little, are a two-storied range of cells and a tower house. In the right-hand corner are the kitchen and refectory, now housing a small museum.

Passing over the vastly extended northern suburbs of Athens we reach Acharnes and the Mt. Parnis. This limestone mountain north





of Greater Athens has a height of 1413 m (4640 ft) and shows the xeric series of the altitudinal zonation of the vegetation rather well. Its upper parts are covered with large coniferous forests and frequently bear a thin layer of snow well into the spring. On the summit there was an ancient shrine of Zeus; now this area is used for military purposes. The mountain is now a popular resort, thanks to its climate and the views which it affords. A cable railway and a road with many hairpin-bends lead to the forest area, which now is a wild-life reserve.

Our first stop will be at the foot of the mountain-slope<sup>(24)</sup> at about 440 m in an area partly afforested with *Pinus halepensis* and *Cupressus sempervirens* (In some other areas there are also afforestations with *Pinus nigra*). The rich phrygana vegetation includes:



|                                      |   |
|--------------------------------------|---|
| <i>Anthyllis hermanniae</i>          | <i>Odontites linkii</i>                     |
| <i>Anthyllis vulneraria</i>          | <i>Olea europaea</i> var. <i>sylvestris</i> |
| <i>Asparagus acutifolius</i>         | <i>Orobanche ramosa</i>                     |
| <i>Ballota acetabulosa</i>           | <i>Pallenis spinosa</i>                     |
| <i>Cistus salviaefolius</i>          | <i>Phagnalon graecum</i>                    |
| <i>Cistus creticus</i>               | <i>Phillyrea latifolia</i>                  |
| <i>Convolvulus althaeoides</i>       | <i>Phlomis fruticosa</i>                    |
| <i>Coridothymus capitatus</i>        | <i>Psoralea bituminosa</i>                  |
| <i>Cotinus coggygria</i>             | <i>Ptilostemon chamaepeuce</i>              |
| <i>Daucus</i>                        | <i>Quercus coccifera</i>                    |
| <i>Dittrichia viscosa</i>            | <i>Sarcopoterium spinosum</i>               |
| <i>Erica manipuliflora</i>           | <i>Satureja thymbra</i>                     |
| <i>Fumana thymifolia</i>             | <i>Scolymus hispanicus</i>                  |
| <i>Globularia alypum</i>             | <i>Teucrium divaricatum</i>                 |
| <i>Helichrysum stoechas</i>          | <i>Teucrium polium</i>                      |
| <i>Hypericum empetrifolium</i>       | <i>Thymelaea tartonraira</i>                |
| <i>Lactuca viminea</i>               | <i>Tragopogon porrifolius</i>               |
| <i>Lomelosia brachiata</i>           | = <i>Tremastelma palaestinum</i>            |
| <i>Lomelosia (Scabiosa) hymettia</i> | <i>Verbascum</i> sp.                        |

In August, the leaves of the *Cistus* species, which are malacophyllous mediterranean shrubs, are withering or already dry. Further up the slopes along the road *Cotinus coggygria* and *Ficus carica* (both summergreen) and *Arbutus andrachne* may be observed. Our next stop will be between 700 and 800 m. The southern exposition in the dry eastern part of mainland Greece allows the existence of a typical and fully mediterranean phrygana, rock and scree vegetation in this height.

Frequent or peculiar species:

|                                  |                              |
|----------------------------------|------------------------------|
| <i>Asplenium ceterach</i>        | <i>Putoria calabrica</i>     |
| <i>Bupleurum fruticosum</i>      | <i>Rubia peregrina</i>       |
| <i>Campanula rupestris</i> aggr. | <i>Salvia pomifera</i>       |
| <i>Centaurea attica</i>          | <i>Salvia ringens</i>        |
| <i>Cephalaria flava</i>          | <i>Satureja graeca</i>       |
| <i>Cerastium candidissimum</i>   | <i>Scolymus hispanicus</i>   |
| <i>Cerinthe major</i>            | <i>Scutellaria rubicunda</i> |
| <i>Euphorbia myrsinites</i>      | <i>Sedum anopetalum</i>      |
| <i>Inula verbascifolia</i>       | <i>Stachys tetragona</i>     |
| <i>Iris pumila attica</i>        | <i>Verbascum undulatum</i>   |
| <i>Lonicera implexa</i>          | <i>Verbena officinalis</i>   |
| <i>Nepeta sibthorpii</i>         |                              |
| <i>Pistacia terebinthus</i>      |                              |

On the following few km we may see the rather sharp transition into the submontane/montane *Abies cephalonica* zone. A short trip at about 1070 m near a water reservoir will lead us into the

*Abies* forest and a clearing therein. Some characteristic species of this site are: (25)

|  |  |
|--|--|
| <i>Armeria canescens</i>                     | <i>Picnemon acarna</i>                 |
| <i>Ballota acetabulosa</i>                   | <i>Pistacia terebinthus</i>            |
| <i>Berberis cretica</i>                      | <i>Polygala major</i>                  |
| <i>Campanula spatulata</i>                   | <i>Potentilla reptans</i>              |
| <i>Carlina</i>                               | <i>Prunus spinosa</i>                  |
| <i>Centaurea raphanina</i> ssp. <i>mixta</i> | <i>Quercus coccifera</i>               |
| <i>Cephalanthera rubra</i>                   | <i>Quercus ilex</i>                    |
| <i>Convolvulus althaeoides</i>               | <i>Quercus pubescens</i>               |
| <i>Doronicum</i>                             | <i>Rosa</i> cf. <i>rubiginosa</i>      |
| <i>Dorycnium</i>                             | <i>Sanguisorba minor</i>               |
| <i>Euphorbia rigida</i>                      | <i>Scabiosa ochroleuca</i>             |
| <i>Fragaria vesca</i>                        | <i>Silene bupleuroides</i>             |
| <i>Galium rotundifolium</i>                  | <i>Thesium humile</i>                  |
| <i>Juniperus oxycedrus</i>                   | <i>Thymelaea tartonraira</i>           |
| <i>Lactuca viminea</i>                       | <i>Trifolium uniflorum</i>             |
| <i>Lonicera implexa</i>                      | <i>Verbascum</i> sp.                   |
| <i>Phlomis fruticosa</i>                     | <i>Viscum album</i> (on <i>Abies</i> ) |

Continuing the journey we take the road round the summit area having nice views into the plains to the east and to the north of Mt. Parnis. Where small water courses are running down, always *Platanus orientalis* and some *Tilia* trees with their summer green leaves are growing, contrasting with the dark and evergreen *Abies* and in lower areas with the also evergreen phrygana vegetation.

Sunday, August 9 :

After a short drive round the city of Athens we will visit the Ancient (Greek) Agora and the Acropolis. Description of these most famous sites cannot be given here.

On the Agora near the "Theseion" (Hephaisteion) myrtle, pomegranate and other bushes grow in rows. They are thriving in the original ancient planting pits cut from the solid rock. The area of the Agora harbours a rather rich vegetation also in the summer, composed partly of planted trees and shrubs:

|                                       |                             |
|---------------------------------------|-----------------------------|
| <i>Acanthus mollis</i>                | <i>Nerium oleander</i>      |
| (planted around a Corinthian capital) |                             |
| <i>Capparis spinosa</i>               | <i>Parkinsonia aculeata</i> |
| <i>Ceratonis siliqua</i>              | <i>Pistacia lentiscus</i>   |
| <i>Cistus monspeliensis</i>           | <i>Pistacia terebinthus</i> |
| <i>Cupressus sempervirens</i>         | <i>Platanus orientalis</i>  |
| <i>Cynanchum acutum</i>               | <i>Punica granatum</i>      |
| <i>Eryngium</i>                       | <i>Quercus coccifera</i>    |
| <i>Ficus carica</i>                   | <i>Quercus ilex</i>         |



*Heliotropium europaeum*  
*Laurus nobilis*  
*Limoniastrum monopetalum*  
*Myrtus communis*

*Quercus pubescens*  
*Teucrium fruticans*  
*Tribulus terrestris*

After leaving the Acropolis we will have a short visit to the Botanical Garden of Athens at Dafni. The first Botanical Garden in Europe of which we know was established by Aristotle in Athens near the Ilissos river more than 2000 years ago. But since the end of the ancient times until 1969 there was no Botanical Garden of any importance in Greece. For this reason, Julia and Alexander Diomidis decided to start a foundation for a great garden. Being familiar with the Botanical Garden of Munich, A. Diomidis used this garden as a model for the new garden to establish near Athens:

#### BOTANICAL GARDEN "DIOMIDI" ②⑥

Address: Botanikos Kipos Athinon, Diomidi; 405, Hiera Odos,  
 Dafni/Athens, Greece

The establishment began in 1969 in the area of Dafni, about 10 km W of the centre of Athens. All resources come from the interest of the Diomidis-foundation which amounts to about US-\$ 150000 a year. From this money all costs - personal salaries and building of houses, paths etc. - have to be paid. The garden was planned by two German garden-architects, Prof. H. Hammerbach (open-air constructions) and B. Hermkes (glass-houses - not yet realized). It covers an area of about 150 ha; thereof three quarters remain as original vegetation existing of *Pinus halepensis* forest and phrygana. This part contains a wild flora of about 175 species. It is planned to label plants along some paths through the "natural vegetation" of the garden.

In that part of the garden, which is to be established, three areas are already existing: the section of ornamental plants, the historical section and the section of medicinal plants. An arboretum already has been planted to some extent, showing different parts: Mediterranean Europe, Mediterranean vegetation of North America, of South Africa and of Australia, East Asia.

The next project is to establish a breeding-nursery which will also provide rooms for the gardeners. Until today there is only a temporary nursery station consisting of two small plastic-houses and the area around them.

The plan to construct huge glass-houses perhaps cannot be realized without the help of additional funds. Another problem encountered is the lack of qualified gardeners in Greece, which is due to the non-existence of a technical school for horticulturists in the country.

In the established part of the garden it is a problem having a green grass-cover of the area during the summer months without a



heavy and continuous irrigation which would need much time of the few servants. The experiments performed by the gardener Mr. G.Priebe showed that the species *Oryzopsis miliacea* can be used as a cover because it is relatively drought-resistant and when drying it stays rather greenish.

The hills around the Botanical Garden belong to the chain of hills bearing the name Mt. Egaleo. The highest point reaches 468 m. It is known that the hill-chain was partly covered by woodland 2000 years ago. Today, the Egaleo in most places lacks a complete vegetation cover at all, due to intense grazing and fires.

In the area of natural vegetation in the Garden we can see *Pinus halepensis* forest, whose old trees show the cuts in the trunks from former resin-gathering and open phrygana. Parts are afforested with *Cupressus sempervirens*, *Pinus brutia* and locally some *Quercus ilex* and *Quercus trojana*. In depressions of the gentle slope in northern exposition water is available in the soil; in these places *Robinia pseudoacacia* has run to seed, forms thickets and is still green in August. *Prunus dulcis* is also growing in these sites.

Species along the paths in the part of the garden with "natural vegetation":

|  |   |
|--|---|
| <i>Alcea pallida</i>                               | <i>Lomelosia brachiata</i>                  |
| <i>Anthyllis hermanniae</i>                        | <i>Nigella arvensis</i>                     |
| <i>Asparagus acutifolius</i>                       | <i>Olea europaea</i> var. <i>sylvestris</i> |
| <i>Asphodelus aestivus</i>                         | <i>Osyris alba</i>                          |
| <i>Asteriscus aquaticus</i>                        | <i>Pallenis spinosa</i>                     |
| <i>Atractylis cancellata</i>                       | <i>Phagnalon graecum</i>                    |
| <i>Ballota acetabulosa</i>                         | <i>Phillyrea latifolia</i>                  |
| <i>Brachypodium retusum</i>                        | <i>Phlomis fruticosa</i>                    |
| <i>Capparis spinosa</i>                            | <i>Picnemon acarna</i>                      |
| <i>Carthamus dentatus</i>                          | <i>Pinus halepensis</i>                     |
| <i>Centaurea affinis</i>                           | <i>Pistacia lentiscus</i>                   |
| <i>Centaurea solstitialis</i>                      | <i>Pistacia terebinthus</i>                 |
| <i>Centaurea tymphaea</i>                          | <i>Prunus dulcis</i>                        |
| <i>Cistus creticus</i>                             | <i>Prunus webbii</i>                        |
| <i>Cistus monspeliensis</i>                        | <i>Pyrus amygdaliformis</i>                 |
| <i>Convolvulus dorycnium</i>                       | <i>Quercus coccifera</i>                    |
| <i>Coridithymus capitatus</i>                      | <i>Reseda alba</i>                          |
| <i>Cyclamen graecum</i>                            | <i>Reseda luteola</i>                       |
| <i>Delphinium staphisagria</i>                     | <i>Rhamnus alaternus</i>                    |
| <i>Ephedra fragilis</i>                            | <i>Ruta chalepensis</i>                     |
| <i>Echinops ritro</i>                              | <i>Satureja juliana</i>                     |
| <i>Echium angustifolium</i> ( <i>E. diffusum</i> ) | <i>Scolymus hispanicus</i>                  |
| <i>Euphorbia acanthothamnus</i>                    | <i>Stachys cretica</i>                      |
| <i>Ficus carica</i>                                | <i>Stachys spruneri</i>                     |
| <i>Fumana thymifolia</i>                           | <i>Teucrium divaricatum</i>                 |



*Helichrysum stoechas*  
*Heliotropium europaeum*  
*Hypericum empetrifolium*  
*Iris pumila* ssp. *attica*  
*Lagurus ovatus*

*Teucrium polium*  
*Thymelaea tartonraira*  
*Tordylium apulum*  
*Tragopogon porrifolius*

In the late afternoon our last point of destination will be Cape Sounion. We take the road along the coast ("paralias") and cross those suburbs of Athens, where the beaches are crowded in the afternoons. Views to the hills on our left side show the total deforestation of this part of Attica, which took place in ancient times and was already bewailed by Platon. - Near Anavissos on the left side some cultures of pistachios, *Pistacia vera*, can be observed. Approaching to Sounion, we may see some areas which were devastated by fire in 1985.

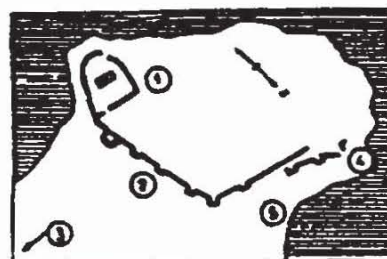
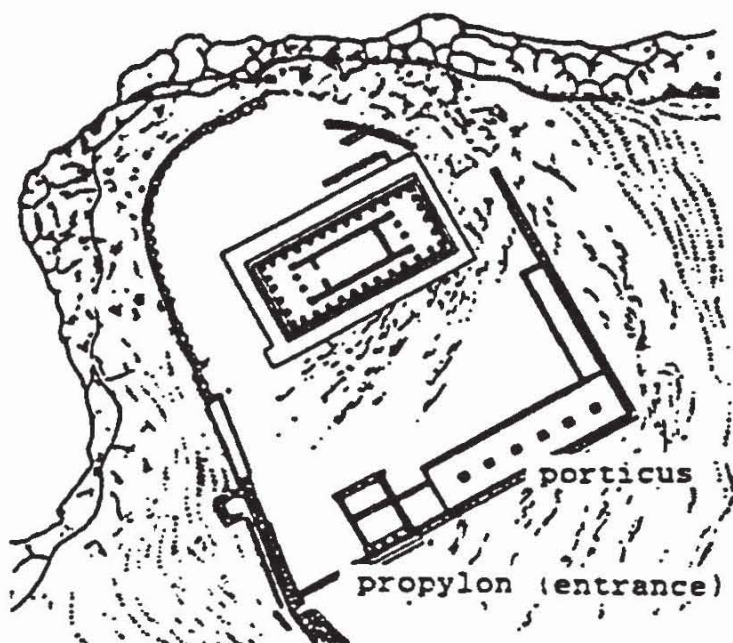
Cape Sounion (Sunion)<sup>Ⓢ</sup>, in earlier times also called Cape Colonna, at the southern tip of Attica (60 km - 37 miles from Athens) is famous for its temple of Poseidon, magnificently situated on the edge of a precipituous crag. On the substructure of an earlier temple destroyed in the Persian War, the present marble temple was erected about 449 B.C. with 6x13 exceptionally slender Doric columns as a peripteral temple. It stands on a terrace which was artificially enlarged, and to which a propylon gave access. The whole area was surrounded by a fortified wall (413 B.C.). The walls of the Temple were used during the 19th c. by many visitors to engrave their names; so did Lord Byron, who in "Child Harold" expressed the opinion: "in all Attica, if we except Athens itself and Marathon, there is no scene more interesting than Cape Colonna". Looking northward from Sounion we see the metalliferous hills and valleys of Laurion (Lavrion) with their ancient mines. During the antiquity silver was the only product of mining; now lead, zinc, arsenic, bismut and manganese are the main products. In the east we have the Aegean Sea with some of the Kyklade islands (Keos, Theria, Seriphos) and Euboea, Andros and Tenos in the background (in the case of clear weather). In the west the view comprises a great part of the Saronic Gulf with Aegina and the mountains of the Argolid peninsula behind.

Near the entrance of the archaeological zone *Medicago arborea* and *Agave americana* are planted. Other planted species include *Myoporum tetrandrum* and *Nerium oleander*. From the propylon on the right side downward the slope a phrygana of the coastal area, in this place dominated by *Cistus*, is developed. On the cliffs near the temple some of the typical coastal plants, e.g. *Limonium* sp., *Crithmum maritimum*, may be seen and also *Ephedra fragilis* is growing.

## Further frequent species:

*Alcea pallida*  
*Asparagus acutifolius*  
*Ballota acetabulosa*  
*Brachypodium retusum*  
*Calicotome villosa*  
*Carpobrotus acinaciformis*  
*Coridothymus capitatus*  
*Echinops ritro*  
*Eryngium campestre*  
*Euphorbia acanthothamnus*  
*Fumana thymifolia*  
*Hypericum empetrifolium*  
*Juniperus phoenicea*  
*Lagurus ovatus*  
*Limonium sinuatum*  
*Matthiola sinuata*  
*Mesembryanthemum nodiflorum*  
*Olea europaea* var. *sylvestris*

*Paronychia argentea*  
*Phagnalon graecum*  
*Pinus halepensis*  
*Pistacia lentiscus*  
*Prasium majus*  
*Psoralea bituminosa*  
*Quercus coccifera*  
*Reseda alba*  
*Rubia peregrina*  
*Sarcopoterium spinosum*  
*Scolymus hispanicus*  
*Smilax aspera*  
*Sternbergia*  
*Teucrium fruticans*  
*Tordylium apulum*  
*Urginea maritima*



Sounion, plan of the temple of Poseidon and of the whole excavation area (1 temple of Poseidon, 2 walls, 3 temple of Athena, 4 ship-houses, 5 building of unknown function) (from Kirsten-Kraiker)



Fill high the bowl with Samian wine !  
On Suli's rock, and Parga's shore,  
Exists the remnant of a line  
Such as the Doric mothers bore ;  
And there, perhaps, some seed is sown,  
The Heracleidan blood might own.

Place me on Sunium's marbled steep,  
Where nothing, save the waves and I,  
May hear our mutual murmurs sweep ;  
There, swan-like, let me sing and die :  
A land of slaves shall ne'er be mine—  
Dash down yon cup of Samian wine !

BYRON.  
*Isles of Greece.*

The nodding promontories, and blue isles,  
And cloud-like mountains, and dividuous waves  
Of Greece, basked glorious in the open smiles  
Of favouring Heaven : from their enchanted caves  
Prophetic echoes flung dim melody.  
On the unapprehensive wild,  
The vine, the corn, the olive mild,  
Grew savage yet, to human use unreconciled ;  
And, like unfolded flowers beneath the sea,  
Like and man's thoughts dark in the infant's brain,  
Like aught that is which wraps what is to be,  
Att's deathless dreams lay veiled by many a vein  
Of Parian stone.

SHELLEY  
*Ode to Liberty*

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