

The unique petrified forest of Lesvos

20 million years of evolution in the Greek Aegean basin

Twenty million years old tree trunks, many standing upright, scattered over the infertile soil of volcanic rock, lying along the seaside and submerged in the surrounding blue sea. In particular this unique picture illustrates the western part of the Greek island of Lesvos. Imagine the sequoia's that grow in California to day once flourished in Greece along with laurel, cinnamon, but also the alder, poplar and pine. Now, they are standing there for countless years, petrified. Their colors are wonderful, dark red, brownish, yolk-colored, purple, black, green and deep blue, colors that attract the visitor's eye immediately. These various colors distinguish them from the surrounding pale-greenish and grey colored volcanic stones. This publication deals with the creation of the Lesvos petrified forest, the various types of trees that can be found, its significance and how the area can be visited.



Marine expedition down the drain

In 1985 I was working for an oil company in Athens, Greece. Knowing of the existence of the petrified forest at Lesvos, of course I took the first opportunity to see it. There, in the little town of Sigri, petrified trunks in varying sizes were in front of the Greek tavernas, everywhere. In walking there, I met an old shepard and with the two words Greek I managed to say 'sto apolithomeno (στο απολιθωμένο)', meaning 'to the petrified forest'. From his gunny bag he took a few pieces of petrified wood and presented them to me. When diving enormous amounts of tree trunks could be seen under the water surface. However, the area where most of the trunks could be found was desolated and could only be reached by hours walking long distances, without any signs, under the heat of the sun and temperatures rising over 45° C. Then the petrified forest of Lesvos was not protected by Greek law, as it is in Arizona. This caused many of these unique woods just 'disappeared'. In this period, by coincidence I got involved in a possible marine expedition guided by Jacques Cousteau, whose ship and equipment were nearby. Unfortunately it went wrong, just because of the slow decision making process of the Greek bureaucracy, a missed opportunity. In 1997, when I came back, the marine and three land areas had become a Greek heritage and as such protected. There were no more petrified pieces in the villages, at least not in the direct view of visitors.

Metershoge opstaande
versteende stam
Foto: Walter Hinke

The island of Lesvos

The island of Lesvos, by the Greek called Mytilini, is the third largest Greek island after Crete and Euboea and is situated northeast in the Aegean Sea under the coast of Turkey and covers an area of 1630 square kilometers. The east coast of Lesvos is separated from the west coast of Asia Minor by the Mytilini strait. The island can be divided into four main parts: a. the southeaster part with the Olympus mountain range, b. the Kalloni Gulf grabben. c. the central mountainous region, including the chain of the main volcanic center and d. the hilly western part which is composed of pyroclastic rocks. The western part of the island is infertile and presents an undulating wavy regional geomorphology (the shape of the earth) due to the intense erosion of these pyroclastic rocks. The latter are also the part where remains of fossil plants appear within the volcanic rocks. The fossilized tree trunks comprise the well known 'Petrified Forest of Lesvos'. The island of Lesvos became known worldwide and reputed by the poet Sappho (ca. 615-562 BC), the first literary lesbian. In antiquity her poems were known across the Mediterranean and her work was inspired by female companions. Legends exist about the manner of her death.

The creation of the Petrified Forest

Analysis carried out in Lesvos showed that several successive tectonic events took place during the Cainozoic period (ca. 60 million years before present, the period when mammals developed). It was also concluded that Lesvos suffered from three post-volcanic events since Miocene (ca. 15 - 20 million years



before present). The Petrified Forest of Lesvos was created in this period. This in contrast to most well known fossilized forests on Earth, which developed in earlier geological periods.

The formation of the petrified forest is directly related to intense volcanic activity. They produced lavas, pyroclastic materials and volcanic ash, which covered the vegetation of the area. The rapid covering of tree trunks, branches, and leaves led to isolation from atmospheric conditions. Along with the volcanic activity, hot solutions of silicon dioxide penetrated and impregnated the volcanic materials that covered the tree trunks. Thus, the major fossilization process started with a molecule by molecule replacement of organic plant by inorganic material. In the case of the Petrified Forest of Lesvos, the fossilization was perfect due to favorable conditions. Therefore morphological characteristics of the tree trunks such as the annual rings, barks, and also the internal structure of the wood, are all preserved in excellent condition.

The petrified forest of Lesvos differs with the one in Arizona in many aspects. Firstly, the latter dates back to ca. 225 million years before present, where as the Lesvos is only 15 -20 million years old. The petrification processes of the two differ. On Lesvos many standing trunks with their root systems can be found, in Arizona all trunks are lying down and do not show the roots. The colors in Greece are much more different and more brilliant. The plant structures in Greece are more clear which makes identification easier and the variety of trees differs between the two. Of course, scientists are able to present many more differences.

The Petrified Forest and its significance

The first references to the petrified forest date back from 1844 by F. Unger and in 1898 by Flinche. Since then, it obtained the interest from nature-lovers and scientists. The high proportion of upright petrified tree trunks (the highest measures 4.80m and the widest 2.60m in diameter), with well-preserved roots in the fossilized soil, allow Greek scientists to infer that the petrified forest of Lesvos represents a complete autochthonous (fossilized *in situ*) ecosystem. According to recent scientific data, the composition of the fossil flora is characterized by a high proportion of angiosperms (flowering plants) and gymnosperms (conifers), and a low proportion of Pteridophytes (ferns). The silicified tree trunks and their organs - especially the woods are very well preserved. Furthermore, fossilized leaves, cones and seeds provide the raw data for important scientific studies. Taxonomic study of the flora shows that they do not grow today in the Mediterranean, but only in tropical to subtropical regions such as Asia and America.

All of the above-mentioned criteria certify that the petrified forest of Lesvos represents an important stage of the earth's evolutionary processes. It is considered as a unique natural geological monument which offers rare scientific information, like no other analogous monument from this time period and stage of plant development which ever existed.

The trees of the Petrified Forest

The systematic study of the petrified forest, in which Prof. E. Velitzelos of the University of Athens plays an important role, has not yet been completed. Nevertheless, the classification of the fossils permits one to draw certain conclusions. All the genera and species determined, belong to higher plant groups: *Angiospermae* and *Gymnospermae*. Complete development of the flora was achieved in the presence of Angiosperms, the most evolved plants.

The following species have been determined: 1. *Cinnamomum polymorphum*, 2. *Laurus* sp., 3. *Litsea primigenia*, 4. *Lindera ovate*, 5. *Oreodaphne heeri*, 6. *Quercus apocynophyllum*, 7. *Quercus crutiata*, 8. *Carpinus pliofaurei*, 9. *Carpinus uniserata*, 10. *Alnus cycladum*, 11. *Populus balsamoides*, 12. *Populus* sp., 13. *Tilia* sp., 14. *Diospyros brachysepala*, 15. *Myrsinites* sp., 16. *Rhus* sp., 17. *Daphnogene polymorpha*, 18. *Pinoxylon paradoxum*, 19. *Pinoxylon pseudoparadoxum*, 20. *Taxaceoxylon biseriatum* and 21. *Taxodioxylon gypsaceum*.

From the point of view of the geographical distribution of plants the above mentioned plants can be distinguished into two main groups. The first group contains subtropical plants like *Laurus* (laurel),

Cinnamomum (cinnamon), whose related species are found in the forests of southeastern Asia. The second group includes plants which prefer mild temperatures like *Alnus* (alder), *Carpinus* (hornbill), *Populus* (poplar), *Quercus* (oak), *Pinus* (pine), *Taxodioxydon gypsaceum* (sequoia), etc. Related vegetation flourishes today in the warm continental zones of South-eastern Asia and North America. A comparison of the stratigraphic (the arrangements of rock-layers) development of the plant fossils with other European flora and with the Palaeoflora (the plants of the past) of Greece leads us to the conclusion that the Palaeoflora of Lesvos developed during Late Oligocene - Lower Miocene (about 23,7 to 36.6 million years), under subtropical or warm temperate seasonal climatic conditions.

Preservation, protection and education

Because of the exceptional geological and palaeontological value of the petrified forest the Greek state has declared the petrified forest a monument of nature that requires preservation. This decree covers one marine area and four areas of land which are included in the greater surface of 150.000 acres in the areas of the municipalities of Sigri, Andessos and Erossos as well as the individual appearance of trunks in other areas.

In 1994 the Museum of Natural History of the Petrified Forest of Lesvos was founded in Sigri. The building of the museum covers a surface of 11.005 m², which was donated by the municipality of Sigri. The building consists of an one floor high architectural structure made of volcanic grey stones from the environment which is dominating the area. In total the museum covers an area of 1597m² and includes exhibition areas, library, workshop areas, storage rooms, a multiple purpose room to accommodate scientists and visitors.

Visit the actual site or the website

Visitors of Lesvos have several options to see the various collections of petrified trunks by either selecting the classical way of visiting the park 'Pali Alonia' and the little island of Nisiopi or selecting walking a specific route for those who like walking, climbing mountains in combination with knowing the virgin physical environment and their monuments. Another option is to go to Sigri at the west of Lesvos from where you can go by a little boat to Megalonissi or Nisiopi. There you will have the opportunity to enjoy the nice land and sea-areas covered with petrified trunks, Angiospermae and conifers. The same applies for the peninsula of Sarkines. Petrified trunks can also be found along the road to Sigri as well as to Molyvos.



The park, under guidance of Mr. Nikos Zouros, operates a website (<http://www.lesvosmu-seum.gr/site/home.csp>) on Internet providing an excellent service with explanations and backgrounds of the forest, pictures of different petrified trees, digital satellite images of the island, activities, news and overviews. Overviews show in the first place the enormous efforts of Prof. E. Velitzelos in exploring petrified forests in Greece and furthermore show in clear text and nice pictures (made by Mr. Sykas) the various types of petrified trees such that all those people, sitting in an easy chair and who cannot visit the site, can enjoy the beauty of the petrified trees of Lesvos. 

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