

University of Groningen

## Late quaternary vegetation history of northwestern Greece

Bottema, Sietse

**IMPORTANT NOTE:** You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

*Document Version*

Publisher's PDF, also known as Version of record

*Publication date:*

1974

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*

Bottema, S. (1974). *Late quaternary vegetation history of northwestern Greece*. s.n.

### Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

### Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

## CHAPTER 1

### INTRODUCTION

#### 1.1. THE INVESTIGATION

This palynological study of the more remote parts of Greece was begun at the request of Prof. Dr. R.J. Rodden (Berkeley). In 1961 and 1963 Prof. Rodden excavated the Neolithic settlement of Nea Nikomedeia in Macedonia (Rodden, 1962, 1964a, 1964b, 1965). To obtain information about the environment at the time of the settlement, test borings were carried out in 1963 in the Plain of Macedonia. Furthermore, the opportunity was seized to expand this program by including borings at Edessa, Khimaditis, Zankliverion, in the Lakes of Volvi and Lankada, and in the former Lake Viviis (Thessaly).

In view of the good results supplementary cores were taken in 1965 in the Plain of Macedonia, Edessa, Khimaditis, the Lakes of Kastoria and Ioannina and the former Lake Xinias. The sediments of Zankliverion, Lankada, Volvi, and Viviis will not be discussed because pollen in this material was either rare or absent. The promising core of Xinias, north of Lamia, is situated outside the area studied and will be treated elsewhere. Samples were also taken from the tell of Nea Nikomedeia while carbonized plant material from this site, collected by Prof. Rodden, was submitted for study. The soil samples did not yield any pollen. The carbonized material was studied and a treatise on this subject has been published (van Zeist & Bottema, 1971).

To study the representation of various plant taxa in the modern pollen rain, long series of surface samples were taken in 1966.

Although it was primarily planned to study the Postglacial vegetational history in order to reconstruct the environment of prehistoric man, especially in the Plain of Macedonia, the opportunity was taken to extend this work over a larger area. On some occasions the material turned out to be of glacial or interglacial age and information on the Late Quaternary in this part of Greece was made available. The period studied includes parts ascribed to the Riss Glacial and Eem Interglacial, most of the Würm Glacial and the complete Postglacial. In addition to the reconstruction of the vegetation, we will attempt to go into the climate, as far as possible. During this study attention was also paid to microfossils other than pollen and spores. Especially the conspicuous

variety of members of the genus *Pediastrum* was observed and their value for environmental research tested.

## 1.2. ACKNOWLEDGEMENTS

The idea to start a palynological study in northwestern Greece was realized by Dr. W.van Zeist (Biologisch-Archaeologisch Instituut, Groningen), not in the least because of his many contacts abroad. I am very much indebted for his help and guidance. His experience in fieldwork made the trips to Greece successful. His interest in the technical aspects as well as the discussions on the scientific part were of great value and an important stimulance for the completion of this work. Next to that I recall with pleasure the various expeditions to little known places where the vegetation was studied but where also opportunity was found to study the fauna. Prof.Dr. R.J.Rodden (Dept. of Anthropology, Univ. of Calif. Berkeley) instigated this study and arranged financial support. I am very grateful for his help during fieldwork and his kind interest in palaeobotany. I enjoyed the stays in Verroia and the hospitality offered by Mrs. J.M.Rodden. Thanks are also due to Mr. Photios Petsas, Ephore of Antiquities for the Greek Archaeological Service (Thessaloniki) and Mr.A.Sordinas of the same Service at Corfu for organisational help and advice. Mr. Ioanni Papadopoulos (Nea Nikomedeia) helped with the fieldwork and acted as a guide and interpreter. I am also very thankful for his and Helena's hospitality in Nea Nikomedeia. I am much indebted to Prof.Dr. H.T.Waterbolk (Biologisch-Archaeologisch Instituut, Groningen), for the discussions, especially on the subject of radiocarbon dating and for his critical reading of the manuscript. I am grateful to Dr. W.A.Casparie for his assistance during the 1965 field campaign and discussions on palynological problems. The radiocarbon measurements were carried out under the direction of Prof.Dr. J.C.Vogel (Groningen and Pretoria) and Dr. W.G.Mook (Groningen) at the Physical Laboratory of the State University of Groningen. I am also grateful for the information on this subject given by Mr. H.J.Steurman. Dr. J.J.Beukema (N.I.O.Z. Texel) kindly gave information on *Cardium* species. The drawing of the diagrams, maps and figures was done by Mr. H.Roelink. I am thankful for his excellent work and his advice. I also wish to acknowledge Mr. J.Klein, Mr. B.Kuitert and Mr. J.Smit for their part in the drawing work. Many thanks go to Miss. G.F.Boers and Miss A.B.de Groot for the typing of the manuscript. Finally grateful acknowledgement is made to Dr. R.R.Newell for his corrections and improvement of the English. The fieldwork and one year of the

laboratory assistance were made possible through National Science Foundation Grant GS-774 to Prof.H.O.'N.Hencken. The publication of this work was made possible by a grant of the Netherlands Organization for the Advancement of Pure Research (Z.W.O.).

### 1.3. SUMMARY

Palynological investigation in northwestern Greece reveals that steppe conditions occurred in the area during large parts of the Riss and the Würm glacial. In the last interglacial *Parrotia*, now typical for the Hyrcanian forest, still occurred in Greece. *Fagus* was found in low numbers in the southwestern part of the Pindus during the Würm glacial. The beech showed its first increase in the interstadial at Ioannina before 40,000 B.P. Contemporary surface samples indicate that at ca. 40,000 B.P. the mountain belt was 500-800 m. lower than at present. A distinct Late-Glacial phase, known from northwestern Europe, was not found. At the beginning of the Postglacial, ca. 10,600 B.P. dry oak forest replaced the *Artemisia*-Chenopodiaceae steppe. From ca. 9,250-8,250 B.P. open oak forests with *Pistacia* and light demanding herbs were found. After this period, coniferous forests expanded in the mountain belt and hazel expanded on lower elevations, at ca. 6,500 B.P. joined by *Carpinus orientalis* and perhaps *Ostrya carpinifolia*. Coniferous forests partially disappeared and were replaced by beech at ca. 4,000 B.P. Thereafter, human influence on the vegetation started, beginning in the northeast. *Juglans*, *Castanea*, and *Platanus* appeared or increased at about 3,200 B.P., probably favoured by man. Clear palynological indications for farming are only visible after this period. Severe deforestations seem to have taken place especially during and after Medieval times.