



H.F.R.I.
Hellenic Foundation for
Research & Innovation

Description of the funded research project
2nd Call for H.F.R.I. Research Projects
to Support Post-Doctoral Researchers

Title of the research project: A diachronic perspective on Rural Architecture, Settlement Sites and Plant Biodiversity of Therasia Island

Principal Investigator: Konstantinos Athanasiou

Reader-friendly title: Arch2Plant

Scientific Area: Engineering Sciences & Technology

Institution and Country: Aristotle University of Thessaloniki, Greece

Host Institution: Aristotle University of Thessaloniki

Collaborating Institution(s): a) Center for Research and Technology Hellas ([Institute of Applied Bioscience](#)), b) Foundation of Research and Technology Hellas



Budget: 197000

Duration: 3 Years

Research Project Synopsis

The research proposal is a broad and deep interdisciplinary study of the rural architecture, residential and natural environment of Therasia and its two-way relationship with plant biodiversity, adopting a diachronic approach connecting spatial approaches to the countryside with innovative plant identification methods. Therasia, part of the larger Santorini island group, is a unique volcanic environment with particular environmental and architectonic and residential features. It is also associated with an unexplored and unique plant diversity, the result of the volcanic landscape, as well as characteristic cultivation practices and specific agricultural production of the past. This holistic and multilevel research will show that the man-made rural environment and the flora of the island are inextricably linked, having not only contributed to the economic welfare of the inhabitants, but also shaped the island's society diachronically. For this reason, Therasia will be approached from two main directions: it will be studied both over time and on various scales. The research will start from prehistoric settlement at Koimisis, where architectural survey, archaeobotanical study and plant DNA identification will be used to reconstruct the prehistoric rural environment and plant biodiversity, and will end in modern times, with an exploration of the rural architecture, settlement sites and modern flora of the island. Regarding scale, the research will move from the micro level, in which there will be innovative DNA and molecular analysis of plant species, to the macro level, where a spatial analysis of the island will be conducted taking into account both the built and natural environment. The ultimate goal is to reconstruct a comprehensive picture of the island's cultural landscape and plant diversity in relation to rural activity and the changing pattern of the island's inhabited sites diachronically, ultimately shedding light on the emergence of Therasia's uniqueness

Project originality

The innovation of this proposal lies in the particular interdisciplinary approach to the identification of plant diversity from prehistoric to recent times in relation to the man-made built environment and the history of Therasia.

With regard to the anthropogenic built environment and the spatial study to be conducted, the specific use of the tools (maps, drawings, 3D representations) that will be used to highlight the influence of rural architecture on agricultural activity and the island's plant diversity is innovative. Moreover, the study of typology and the traditional construction method of the rupestrian settlements will highlight the interaction of these settlements with arable land and plant diversity, an objective which has not been attempted in the past. Finally, the 3D photogrammetric representation of the landscape can be used to better study the flora of the site, thus providing an innovative, comprehensive tool for the observation and study of plant diversity.

The use of new molecular technologies such as DNA barcoding and Next Generation Sequencing, is the epitome of plant species identification with the main advantage that, due to the small amount of DNA required and the length of the DNA that can be analyzed, it is possible to identify species even in samples with degraded and fragmented DNA. These are therefore very powerful diagnostic tools that can be used to identify and delineate species where other methods are ineffective.

In Arch2plant, DNA Barcoding will be employed for the comparative study of present plant diversity of wild and cultivated species and the archaeobotanical specimens for a systematic identification and characterization of the diachronic plant biodiversity in the island. Beyond the state-of-the-art, one of the innovations in this project is the unique identification of archaeobotanical material in soil samples from prehistoric stratum using technologies such as NGS, to recover plant DNA from a "pool" of ancient genetic material for accurate identification of the plant species, that cannot be identified using standard macro- and microscopic archaeobotanical methods. The analysis of eDNA has great advantages compared to the standard method of analyzing ancient/prehistoric vegetation composition only by using pollen and micro or macro fossils, especially in environments like Therasia.

Expected results & Research Project Impact

The elucidation of the open questions on rural architecture and how it was interrelated with settlement pattern change will allow a better understanding of the influence of the natural landscape, and plant diversity in particular, on the island's settlements.

At the same time, the contribution of the proposal to theoretical and applied scientific knowledge lies in the use of new technologies in the field of molecular genetics, which have significantly contributed to the understanding of the evolution of plants, ecology and archaeobotany. The archaeobotanical research will provide information about crops, land uses, rural architecture, and agricultural practices of the Early and Middle Bronze Age in the Aegean. In addition, the comparative study of the present plant diversity and local varieties and the authentication of such species is expected to have a positive impact in rural development through agricultural tradition, and culture. The correlation of the varieties with the species from the past in a certain region would be of added value for an island, such as Therasia.

It is also important to note that similar studies with this research focus have not been carried out in Greece: the systematic and diachronic investigation of the influence of plant diversity on settlement sites will help shape a model that takes into account all the available plant material per habitation and historical period, enriching not only the physical but also the cultural history of the island. The interdisciplinary study proposed ultimately aims to increase our knowledge not only of the natural and man-made landscape of the island, but also of Therasian society itself, offering a realistic narrative about residential development and lifestyle on the island from prehistoric to modern times.

The importance of this funding

The Arch2plant project offers the research team unique opportunities to further advance their skills. Its profoundly interdisciplinary nature will improve cooperation, organization, leadership and communication skills among the members, each aspect requiring a multidimensional and coordinated approach both within the research team and in each work package. One of the most important advantages is also be involved in research beyond the state-of-the-art. The new and innovative uses of theoretical working tools along with their practical applications will provide excellence in each member's respective field. In terms of future academic careers, the publications, workshop organization and conference attendance will significantly improve members' chances of academic advancement.



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