

ECOLOGY LAB: PROJECTS 2019-2020

1: Environmental history: Monumental trees in the cultural landscapes of Epirus

If you like libraries, old maps and photos, this is for you.

Monumental trees are prominent features of cultural landscapes, wildlife habitats, living records of past climate and often historical monuments that connect Nature and Culture. During the project THALIS-SAGE "Conservation Through Religion. The Sacred Groves of Epirus", (2012-2015), we carried out extensive surveys of Sacred Natural Sites and their associated trees. The purpose of this project is to search representations of monumental trees in literature, texts of travelers in Epirus, paintings, old photographs and toponyms collections aiming to verify if some of them still exist in modern landscapes. Special attention will be given to oriental plane trees or trees related to historic personalities. Especially for the town of Ioannina we will attempt to place all information in Google Maps in an effort to investigate the town's history and compare past and present landscapes.



Fig.1. (Left) A solitary pine (*Pinus heldreichii*) near Metsovo, (Right) The poster published by THALIS project included in public awareness material on ancient trees.

Goals and Timeline:

- (a): Literature review and data collection in libraries and archives
- (b): Data analysis and investigation of trees in the field
- (c): Writing and presentation.

Why Take this Project?

- Get to know the Epirus region via landscape history
- Get involved in an interdisciplinary project
- Learn how to study environmental history
- Possibility of presenting the work in a scientific conference.

Partners/Supervisory team: Kalliopi Stara, JM Halley (BET)

References:

- 1 Stara K, Vokou D. 2015 (eds). The ancient trees of Zagori and Konitsa. University of Ioannina, Ioannina, Greece [in Greek]
- 2 Stara K, Tsiakiris R, Nitsiakos V, Halley JM. 2016. Religion and the management of the commons. The sacred forests of Epirus, pp. 283-302. In Agnoletti M, Emanuelli F (eds). *Biocultural Diversity in Europe*. Springer Verlag
- 3 Stara K, Tsiakiris R, Wong J. 2015. The trees of the Sacred Natural Sites of Zagori, NW Greece, *Landscape Research* 40 (7), 884-904.

2: Environmental history: Raptors and vultures cultural histories

Raptors or birds of prey include all birds that primarily consume animals, i.e eagles, hawks, falcons, owls or vultures. The conservation status of most raptor species indicates a very high risk of extinction in the wild, making their future in our world uncertain. Vultures, because of their role as carrion eaters, have a very special position in the symbolic lore of local communities, which makes them unique exemplars for the study of the relationship between birds and people. The purpose of this project is to search for vulture conceptualizations in literature and analyze data of a past research focused on the critical endangered *Egyptian vulture (Neophron percnopterus)*. Based on the idea that social dimensions of globally endangered species are often overlooked, the aim of this project is to compare different views, perceptions; interests and needs of stakeholders in biodiversity conservation and relate them to protection of endangered species.



Fig.2. (Left) Hunters using eagles in Mongolia featured in the book *Birds and People*. (Right) poster published by BirdLife in order to focus attention on the Asian Vulture crisis (caused by veterinary non-steroidal anti-inflammatory drugs).

Goals and Timeline:

- (a): Literature review of vultures' status, conservation and ethnoornithology
- (b): Data collection
- (c): Data analysis
- (d): Writing and presentation

Why Take this Project?

- (1) Get to know vultures, threatened but charismatic birds
- (2) Get involved in an interdisciplinary project
- (3) Learn more about ethno-ornithology and relate social data with conservation
- (4) Possibility of publishing the work in a scientific journal

Partners/Supervisory team: Kalliopi Stara, JM Halley (BET)

References:

- 1 Stara K, Sidiropoulos L, Tsiakiris R 2016. Bound Eagles, Evil Vultures and Cuckoo Horses. Preserving the Bio-Cultural Diversity of Carrion Eating Birds, *Human Ecology* 44:751-764
- 2 Panagiotopoulou M, Azmanis P, Tsiakiris R, Stara K, Carry on Carrion: the Fall of the Scavenger. In: Butterworth A (ed) *Animal Welfare in a Changing World*, CABI, UK, pp 57-67, 2018
- 3 Andevski J (ed) *Vulture Conservation in the Balkan Peninsula and Adjacent Regions. 10 Years of Vulture Research and Conservation*. Vulture Conservation Foundation, pp 20-23, 2013.

3: Cultural Ecology and Ethnobotany of orchids

Nowadays, orchids are characterized as rare and charismatic plants that are placed high among conservation priorities. By the time of Darwin, with their peculiar morphology and showy inflorescence, orchids had already allured many plant scientists and amateur naturalists and were among the more appreciated species of plants. Indeed their looks and properties had always attracted the attention; Theophrastus and Dioscorides were among the first that attributed certain medicinal and aphrodisiac qualities to these organisms, even if orchids were used much earlier in Chinese and Ayurvedic medicinal traditions. The aim of the project is to investigate the use of orchids in traditional medicine and cuisine, as well as the historical aspect, symbolism, and other conceptualizations. Research will be based on historical texts, botanical illustrations, folklore collections, and texts of great botanists in Greece, accompanied with ethnographic research.



Fig.3. (a-d) Orchid illustrations in literature, (b-c) Salep, a product made of ground orchid tubers, as a traditional beverage known even in England of the 18th century (old sketches from UK).

Goals and Timeline:

- (a): Literature review of orchids' history, conservation and ethnobotany
- (b): Ethnographic survey on medicinal and other uses using specific species plant vouchers or photos
- (c): Data analysis and interpretation
- (d): Writing – presentation

Why Take this Project?

- (1) Experience the beautiful and strange world of orchids, a great evolutionary success story
- (2) Get involved in an interdisciplinary project
- (3) Learn more about ethnobotany and relate historical and social data with conservation
- (4) Possibility of presenting the work in a scientific conference
- (5) Experience the exciting company of the Ecology Lab!

Partners/Supervisory team.: Kalliopi Stara, Martha Charitonidou, John M. Halley (BET)

References:

- (a) Pant B. Medicinal orchids and their uses: Tissue culture a potential alternative for conservation. *African J Plant Sci.* 2013;7 (10): 448–467.
- (b) Bulpitt CJ. The uses and misuses of orchids in medicine. *QJM An Int J Med.* 2005;98: 625–631. doi
- (c) Kreziou A, De Boer H, Gravendeel B. Harvesting of salep orchids in north-western Greece continues to threaten natural populations. *Oryx.* 2016;50: 393–396.

4: Morphometrics of the genus *Ophrys* (Orchidaceae) on Uni. Of Ioannina campus

If you like fieldwork and orchids this is for you!

The *Ophrys* genus are also called "bee orchids" because of their similarity with the bees (and other insects that they mislead in order to pollinate). Recently, there was a heated debate about how many different species there are in the genus *Ophrys*. Published estimates range from only 16 to 252 species. There are 6 different types of *Ophrys* on campus Ioannina, including *O. helenae* and *O. mammosa* that are common on campus. The taxonomic uncertainty has great consequences in for the conservation of species. Prof. R. Bateman of Kew Gardens in London, has said that there has been "plenty of genetic research" (i.e. nothing new) and "not enough morphometric research" on the orchids. Hence morphometrics. The aim of the project is to compare the variability of morphometric characteristics of *Ophrys* on campus from plants located in different locations on campus and farther away. Coordinates based on GPS, and the different characteristics will be measured and analyzed at the University of Ioannina. These will then be compared with samples taken from other areas of Ioannina and elsewhere in Greece. Using special software, we will measure the characteristics and will then apply analysis on different scales of distance to see whether the variation is local or spread over larger scales. We will investigate the ecological and evolutionary origins and interpretation of this morphology.



Fig. 4. Representatives of the *Ophrys* genus found on Ioannina University campus. Starting from the left: *O. ferrum equinum*, *O. sicula*, *O. rheinholdi*, *O. attica*, *O. helenae*, *O. mammosa*

Goals and Timeline:

- (a): Preparations for sampling, assessment of sampling effort
- (b): Measurements in the Field
- (c): Further data analysis and interpretation
- (d): Writing and presentation

Why Take this Project?

- (1) Field protocols for this lab are ready, and existing data. It needn't be a difficult project
- (2) Make contacts with other experts including Kew group who have an interest in this work
- (3) Improve your spoken and written scientific English

Partners/Supervisory team: M. Charitonidou, JM Halley (BET)

References:

- (1) Devey DS, Bateman RM, Fay MF, Hawkins JA. Friends or relatives? Phylogenetics and species delimitation in the controversial European orchid genus *Ophrys*. *Ann Bot.* 2008;101: 385–402.
- (2) Bateman RM, Rudall PJ. Evolutionary and morphometric implications of morphological variation among flowers within an inflorescence: A case-study using European orchids. *Ann Bot.* 2006;98: 975–993.

5: Molecular identification and discrimination of pollinator species of orchids

Does the so-called “Helen’s bee orchid”, *Ophrys helenae*, share more pollinators with *Serapias bergonii* than its sister species *Ophrys mammosa* because both are “shelter mimics”? Or does it still have an element of sexual deception as with *O. mammosa*? Students will concentrate on the orchids’-pollinators interactions, in specific species of the genus *Ophrys*. Our aim is to study this hypothesis, starting with an analysis of morphological characters of the pollinators, and then to proceed with molecular analysis. Why molecular analysis? In the case of insects, their taxonomy based on morphological markers has reached a point that it is no longer sufficient; to that end, a genetic approach would provide a more accurate result as for the discrimination between species. This project is based on both fieldwork and lab analyses: Sampling of orchid pollinators will be placed within the University of Ioannina Campus, and the collected specimens will be studied using molecular techniques at the Forest Institute, Thessaloniki. Students should spend a two-months time at the Forest Institute, in order to complete their molecular analyses of the specimens collected (so students that come from Thessaloniki have a small priority for this particular project).



Fig. 5. (a) *O. helenae* with its pollinator *Eucera longicornis*, (b) *O. mammosa* with its pollinator *Andrena fuscosa*.

Goals and Timeline:

- (a): Preparations for sampling, assessment of sampling effort
- (b): Measurements in the Field
- (c): further data analysis and interpretation of field data
- (d): Molecular Analysis
- (e): Writing and presentation

Why Take this Project?

- (1) Experience the beautiful and strange *Ophrys* orchids, a great evolutionary success story
- (2) Get involved with Pollination Ecology and study the co-evolution of orchids and insects
- (3) Learn about fieldwork, and work on molecular techniques for identification
- (4) Improve your spoken and written scientific English
- (5) Experience the exciting company of the Ecology Lab!

Partners/Supervisory team: M. Charitonidou & JM Halley (BET), Dimitris Avtzis (Forest Institute, Thessaloniki)

References: (a) Vereecken NJ, Wilson CA, Hotling S, Schulz S, Banketov SA, Mardulyn P. Pre-adaptations and the evolution of pollination by sexual deception: Cope’s rule of specialization revisited. *Proc R Soc B Biol Sci.* 2012;279: 4786–4794.

(b) Vereecken NJ, Dorchin A, Dafni A, Hötling S, Schulz S, Watts S. A pollinators’ eye view of a shelter mimicry system. *Ann Bot.* 2013;111: 1155–1165.

(c) Breitkopf H, Onstein RE, Cafasso D, Schlüter PM, Cozzolino S. Multiple shifts to different pollinators fuelled rapid diversification in sexually deceptive *Ophrys* orchids. *New Phytol.* 2015;207: 377–389.