

ADVANCES IN TAXONOMY & SYSTEMATICS A Mediterranean-European perspective

IAPT EARLY CAREER INVESTIGATOR SYMPOSIUM



**19th PANHELLENIC
SCIENTIFIC CONFERENCE**
Botanical science within the context of modern
challenges: from molecular and physiological approaches
to the conservation and restoration of the Greek flora
VOLOS 2026



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International
Association for
Plant Taxonomy

September 30th - October 3rd 2025 | Volos - GREECE

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A note from IAPT president

The International Association for Plant Taxonomy (IAPT) supports scientific research and scholarship in the field of systematics, including the taxonomy and evolution of plants, fungi, and algae. The IAPT is pleased to join the Hellenic Botanical Society at their XIX Panhellenic Scientific Conference in Volos, Greece.

At this conference, the IAPT is hosting the symposium entitled “***Advances in taxonomy & systematics a mediterranean-european perspective.***” This symposium is part of the “IAPT Early Career Investigator Symposium” series that began at the XII Latin American Botanical Congress in Quito (Ecuador) back in 2018. This symposium series aims to highlight the work of young botanists, mycologists, and phycologists who are conducting groundbreaking research on important topics in our field. Each year the symposium is presented as part of the program of botanical conferences worldwide, covering a variety of cutting-edge themes in our field.

Welcome to the IAPT Early Career Investigator Symposium!



Lúcia G. Lohmann

President of IAPT

Cover photo

Dwarf-shrub vegetation dominated by *Thymra capitata* (L.) Cav. (Labiatae), Crete (Photo: Nick Turland).

A note from the organizers

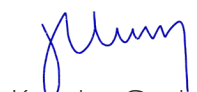
It is our great pleasure to welcome you to the IAPT Early Career Investigator Symposium, hosted this year in Volos, Greece, as part of the 19th Panhellenic Scientific Conference of the Hellenic Botanical Society. We are especially delighted that this symposium is being held in Greece for the first time.

Greece is widely recognized as a biodiversity hotspot and one of the most important centers of plant diversity and endemism in Europe and the Mediterranean Basin. Its exceptional floristic richness, high levels of endemism, and complex biogeographical history make it an ideal setting for discussions on challenges and advances in taxonomy and systematics.

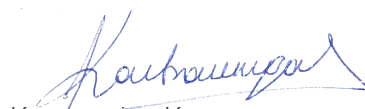
This year's symposium brings together early career researchers from across Europe whose work spans plants, algae, and fungi and encompasses a wide range of approaches and disciplines, from classical and integrative taxonomy, including phylogenetics, phylogenomics, and morphometrics, to comparative genomics, biogeography, and archaeobotany.

We are deeply grateful to the International Association for Plant Taxonomy (IAPT) for making this symposium possible and for its continued commitment to supporting early-career scientists worldwide. We also warmly thank all speakers for their enthusiasm and contributions.

We hope that this symposium will foster lively scientific exchange, new collaborations, and the development of ideas that will inspire future research in systematics.



Katerina Goula



Konstantina Koutroumpa

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A microscopic image showing several long, thin, purple-stained hyphae of Cladobotryum Rhodochroum. The hyphae are branched and have a slightly textured surface. Several oval-shaped spores are visible, some attached to the hyphae and others free. The spores have a distinct internal structure with a darker outer layer and a lighter inner region.

**DESCRIPTION OF *Cladobotryum Rhodochroum*,
A NEW FUNGICOLOUS SPECIES (HYPOCREALES,
ASCOMYCOTA), BASED ON MACRO- AND
MICROMORPHOLOGY, PHYLOGENETICS, AND
COMPARATIVE GENOMICS**

Anastasia Christinaki

Description of *Cladobotryum rhodochroum*, a new fungicolous species (Hypocreales, Ascomycota), based on macro- and micromorphology, phylogenetics, and comparative genomics

Anastasia Christinaki

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Keywords: Fungal biodiversity; *Cladobotryum*; Morphology; Comparative genomics; Phylogenetics; new species

The fungal kingdom encompasses an extraordinary diversity of forms, modes of life, and ecological interactions. In Greece, natural ecosystems harbor hidden fungal diversity, in both macrofungi, like mushrooms, and microfungi, including numerous ascomycetes. Using *Cladobotryum rhodochroum* as a case study, this presentation illustrates the workflow of modern fungal taxonomy, from field collection and isolation to species description through macro- and micromorphology, multilocus phylogenetics, and comparative genomics. Comparative analyses of nuclear and mitochondrial genomes, secondary metabolite biosynthetic gene clusters, and transposable elements provided complementary evidence supporting the identification of a new species within genus *Cladobotryum*. Beyond the description of a single taxon, this study demonstrates how combining classical taxonomy with genomic

approaches enhances our understanding of fungal diversity and evolution. Since, the description of *C. rhodochroum* originated from material collected during a university fungal field excursion, it also emphasizes the value of local biodiversity surveys and educational field activities as drivers of taxonomic discovery, underscoring the need for continued exploration of the largely overlooked fungal diversity of Greece.

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I am a biologist by training and a mycologist by passion. I studied Biology and completed my PhD at the National and Kapodistrian University of Athens, where I developed a strong interest in fungal biodiversity, evolution, and omics. My doctoral research focused on the taxonomy, genomics, and secondary metabolism of fungicolous fungi in the order Hypocreales, leading to the description of new fungal species and new insights into fungal genome evolution and the fungicolous lifestyle. I am currently a postdoctoral researcher at Lund University in Sweden, where I study the mechanisms of fungal wood decomposition using vibrational spectroscopy, nanoscale chemical imaging, and synchrotron X-ray microscopy. Driven by a fascination with fungal biodiversity and the mechanisms that shape fungal modes of life, I use molecular and analytical approaches to understand how fungi evolve, interact with their environment, and drive ecosystem processes across biological scales.

Cover photo

Newly described species *Cladobotryum rhodochroum* (Hypocreales, Ascomycota), showing micromorphological characteristics, including conidiophores, conidia and hyphae. The species *C. rhodochroum* was selected as a case study to demonstrate how modern fungal taxonomy and the exploration of local biodiversity contribute to the discovery and description of new fungal species.
(Photo: Anastasia Christinaki)



**INTEGRATIVE TAXONOMY OF BORAGINALES
ACROSS SCALES: RESOLVING RELATIONSHIPS FROM
GLOBAL FAMILY-LEVEL PATTERNS TO SPECIES-LEVEL
DIVERSIFICATION IN MEDITERRANEAN RADIATIONS**

Maria-Anna Vasile

Integrative taxonomy of Boraginales across scales: resolving relationships from global family-level patterns to species-level diversification in Mediterranean radiations

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Keywords: Angiosperms353; Boraginaceae; fruit evolution; Hyb-Seq; morphology; phylogenomics.

Boraginales comprise a subcosmopolitan order of approximately 2700 species whose higher-level classification has long remained in flux. Our recently published global phylogeny, sampling >80% of the genera and based on the Angiosperms353 probe set, largely corroborates previously inferred relationships while improving backbone resolution. Combined with long-standing developmental morphological studies, these results suggest that shifts in placentation, ovule number, and stamen–corolla tube modifications are associated with the evolution of major lineages. Based on this integrative evidence, we recognize nine families within Boraginales, a classification now adopted by the Boraginales Taxonomic Expert Network of World Flora Online. Having established the taxonomic framework at family level, the next challenge is to understand diversification and morphological evolution within species-rich genera of the order. Here, we focus on two predominantly Mediterranean/Tethyan lineages of Lithospermeae (Boraginaceae), *Alkanna* (~ 68 spp.) and *Onosma*

(~ 247 spp.), which exhibit the highest species diversification rates in the tribe. Both genera remain taxonomically challenging, with still unclear species boundaries due to high morphological variability and limited phylogenetic sampling so far. This makes them ideal systems to investigate the interplay between rapid diversification, morphological evolution, and biogeography. To address this, we follow an integrative approach, combining phylogenomics and detailed morphological analyses. We develop a custom probe set for Lithospermeae targeting hundreds of low-copy nuclear genes, enabling phylogenomic analyses at finer taxonomic scales. We are currently assembling a comprehensive sampling across the full distribution range of both genera, using herbarium collections as well as plant material from extensive fieldwork in Greece, one of their endemism centres. Preliminary analyses suggest that several traditionally diagnostic characters (e.g., nutlets, corolla and indumentum) show extensive homoplasy, highlighting the need for an integrative reassessment of species boundaries in both genera.

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Maria-Anna Vasile is currently a postdoctoral researcher at the Berlin Botanic Garden and Botanical Museum (BGBM), Freie Universität Berlin. She earned her BSc from the Agricultural University of Athens in 2016, completed an MSc in Plant Sciences at the University of Bonn in 2019 with a scholarship from the Bodossaki Foundation, and received her PhD from the University of Bonn in 2024. She then held a postdoctoral position at the Bonn Institute of Organismic Biology – Section Plant Biodiversity. Her research focuses on the evolution, systematics, biogeography, and taxonomy of Boraginales. Using an interdisciplinary approach integrating phylogenomics with comparative and developmental morphology, she employs scanning electron microscopy and micro-computed tomography to investigate the evolution of flowers and fruits within the order and their taxonomic significance. Since joining the Plant Research Area at BGBM in September 2025, her research has delved into the species level, focusing on species-rich and rapidly diversifying genera of Lithospermeae (Boraginaceae) in the Eastern Mediterranean. This work aims to shed light on the evolutionary history of these genera and contribute to the Flora of Greece Project by providing taxonomic treatments. She also coordinates the Boraginales Taxonomic Expert Network of the World Flora Online (WFO) project.

Cover photo

Alkanna pindicola Hausskn. (Boraginaceae), a likely polymorphic species, photographed near its locus classicus on Mount Agrafa, Greece
(Photo: Maria-Anna Vasile).

BIOSYSTEMATICS AND INTEGRATIVE TAXONOMY OF
Armeria IN THE CENTRAL MEDITERRANEAN

Manuel Tiburtini

Biosystematics and integrative taxonomy of *Armeria* in the central Mediterranean

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Keywords: *Armeria*; Endemism; Gaussian Mixture Models; Integrative taxonomy; Karyology; Mediterranean biodiversity; Morphometrics; Phylogenomics; Reticulate evolution; Taxonomic revision.

Armeria (Plumbaginaceae) is a strictly diploid ($2x = 18$), amphipolar genus with high capacity for hybridization. The central Mediterranean hosts 27 endemic taxa, yet traditional taxonomy yields ambiguous species boundaries. We present an integrative revision combining molecular phylogeny, karyology, morphometrics, and Bayesian Gaussian Mixture Models (GMMs) for species delimitation in central Mediterranean *Armeria*. We found that in the *A. arenaria* complex, we reduce four subspecies to three taxa, excluding one from the Italian flora. For the Sardinian–Corsican hotspot, we proposed the synonymy of *A. leucocephala*/*A. multiceps* and recognize five distinct species. For the Italian peninsula and Sicily, integrative analysis across 21 populations supports ten Italian endemic species; *A. pollinensis* is elevated to species rank and lectotypified; *A. gracilis* subsp. *majellensis* is synonymised with the nominate subspecies. Phylogenomics reveal reticulate evolution in

the *A. denticulata* complex involving ophiolitic substrate specificity and hybridization. Our Bayesian Gaussian Mixture Model framework proved essential for morphometric species delimitation in this genus. New identification keys were provided. These results establish the central Mediterranean as a second global biodiversity hotspot for *Armeria*, hosting ≥ 20 endemic taxa, and demonstrate that integration of molecular, morphological, and statistical methods is essential for resolving complex plant groups.

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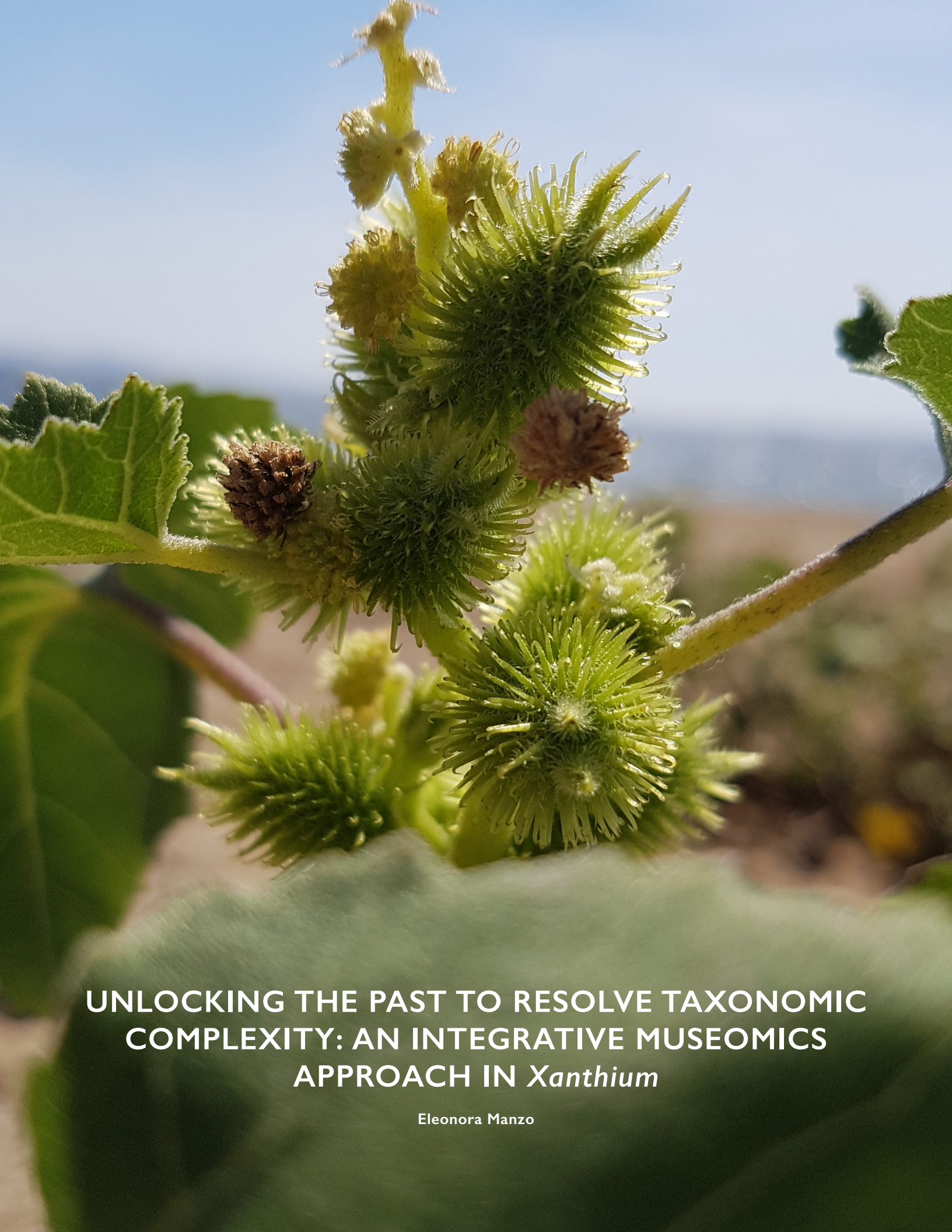


Manuel Tiburtini is an Italian botanist and taxonomist with a PhD in Biosystematics and Integrative Taxonomy from the University of Pisa. His research has focused on resolving taxonomic challenges in *Armeria* (Plumbaginaceae) and reconstructing the evolutionary processes that have shaped the current diversity. His broader interests encompass Italian biodiversity across bryophytes and angiosperms, with particular emphasis on complex, hybridizing taxa and the use of morphological and diagnostic characters in taxonomy. Beyond systematics, his interests include ecology, innovation, biodiversity informatics, spatial methods, artificial intelligence, and philosophy. He approaches taxonomy through a quantitative and statistical framework, aiming to better understand the fundamental units of biodiversity.

His long-term vision is to advance taxonomy as a transparent, rigorous, and data-driven discipline, grounded in explicit criteria and testable hypotheses. Through his research, he seeks to develop robust taxonomic frameworks and identification tools that reveal biodiversity before it is irreversibly lost, thereby supporting its conservation in the Mediterranean region and beyond.

Cover photo

Armeria in rocky Mediterranean pasture at fruiting stage. Mature inflorescences displaying calyces primed for seed dispersal. The morphological diversity of inflorescences represents a key set of diagnostic characters in *Armeria* taxonomy. (Photo: Manuel Tiburtini).

A close-up photograph of a green, spiky seed head of a Xanthium plant. The seed head is covered in numerous fine, green, hair-like spines. Several small, brown, dried flower heads are visible on the stem. The background is a blurred landscape with a blue sky and distant hills.

UNLOCKING THE PAST TO RESOLVE TAXONOMIC COMPLEXITY: AN INTEGRATIVE MUSEOMICS APPROACH IN *Xanthium*

Eleonora Manzo

Unlocking the Past to Resolve Taxonomic Complexity: An Integrative Museomics Approach in *Xanthium*

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Keywords: Integrative taxonomy; museomics; phylogenomics; species delimitation; subspecies; *Xanthium*.

Although natural history collections hold an unparalleled record of biodiversity over time, their full potential for resolving long-standing taxonomic questions has only recently become accessible thanks to advances in genomic technologies. In our studies, we observed how type-inclusive museomics can be integrated with modern taxonomy to clarify species boundaries and reveal hidden diversity in taxonomically complex groups. Our focus was on *Xanthium* subsect. *Campylorrhyncha* (Asteraceae), a historically challenging group for which centuries of taxonomic debate have resulted in multiple competing classifications. We analysed over 140 herbarium specimens, including more than 30 type specimens dating back over 250 years. Our methods included ancient DNA extraction, target enrichment of over 1,000 nuclear loci, plastome sequencing, infructescence morphometrics, population genetic analyses and ecological niche modelling. Integrating coalescent-based

species delimitation, population structure and model selection based on marginal likelihood with morphological and ecological evidence enabled us to recognise four distinct species: *X. campestre*, *X. cavanillesii*, *X. occidentale* and *X. orientale*. Fine-scale analyses further revealed their intraspecific diversity. Our results demonstrated that historical specimens, including centuries-old types, can provide critical genomic and phenotypic evidence to help resolve complex taxonomic issues. This highlights the potential of integrative museomics in connecting historical collections and biodiversity research and provides a robust framework for revising taxonomically complex groups.

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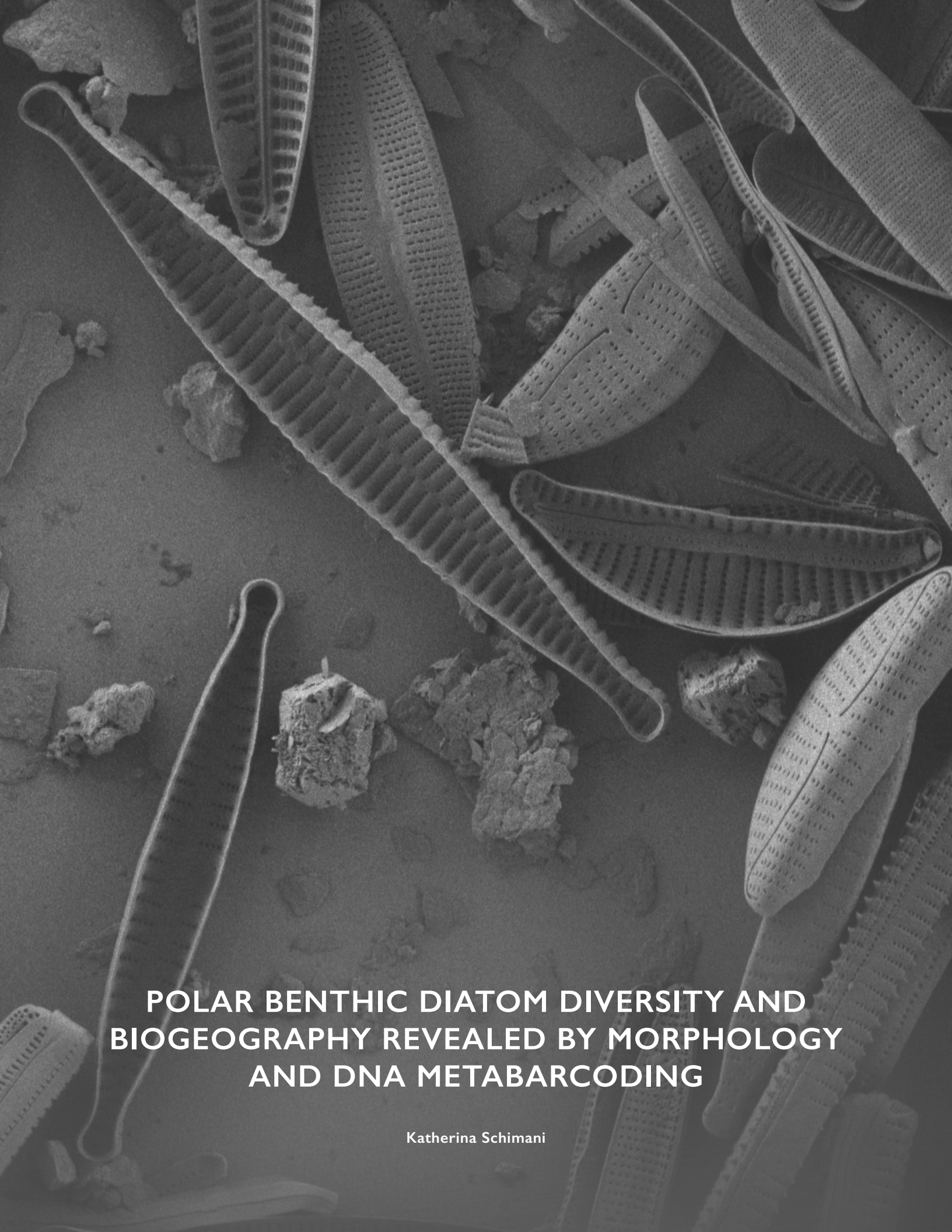
I am a botanist fascinated by the diversity, evolution, and history of plants, with a particular interest in museomics and the potential of natural history collections for modern biodiversity research. My work explores how historical specimens can be combined with genomic, morphological, and ecological data to uncover patterns of plant diversity and evolution. I am particularly interested in applying ancient DNA and genomic approaches to historical and type material, integrating them with morphometrics and computational methods. During my PhD, I studied the diversity and evolution of *Xanthium* (Asteraceae) using herbarium specimens spanning more than two centuries, including historical type material. I am now applying similar approaches in my postdoctoral research on *Ranunculus* sect. *Euromontani* (Ranunculaceae). More broadly, I am interested in bridging natural history collections and cutting-edge technologies to unlock new biological information from historical specimens and develop innovative approaches to understanding biodiversity.

Cover photo

Flowering branches of a *Xanthium orientale* subsp. *italicum* individual, showing both staminate and pistillate inflorescences and the characteristic morphology of the burs (pistillate inflorescences), a key feature historically used to distinguish species within the genus.

The photograph was chosen as an example of the morphology and diversity which underlies the long-standing taxonomic complexity of *Xanthium*.

(Photo: Natascha Wagner)

A scanning electron micrograph (SEM) showing a dense collection of diatom frustules. These are the silica-based cell walls of diatoms, which exhibit a wide variety of intricate, symmetrical patterns. Some frustules are elongated and ribbed, while others are more rounded or have a lattice-like structure. The background is a textured, granular surface, likely sediment or a mounting medium.

POLAR BENTHIC DIATOM DIVERSITY AND BIOGEOGRAPHY REVEALED BY MORPHOLOGY AND DNA METABARCODING

Katherina Schimani

Polar benthic diatom diversity and biogeography revealed by morphology and DNA metabarcoding

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Keywords: Antarctic; Arctic; benthic diatoms; biodiversity; biogeography; DNA metabarcoding.

Benthic diatoms are among the most diverse and ecologically important primary producers in polar coastal ecosystems. Despite their key role in aquatic food webs, the diversity and distribution of polar benthic diatoms remain insufficiently understood. This study presents an integrative investigation of benthic diatom communities from the Arctic (Kongsfjorden, Svalbard) and the Antarctic (Potter Cove, King George Island), combining classical taxonomy, scanning electron microscopy, phylogenetics and DNA metabarcoding. Morphological and molecular investigations resulted in the description of two new species and significantly expanded the current knowledge of polar diatom diversity. The integration of molecular markers with detailed morphological observations proved essential for resolving diversity and improving reference libraries for DNA-based biodiversity assessments. Metabarcoding revealed highly diverse benthic communities and demonstrated

a clear separation between Arctic and Antarctic assemblages, emphasizing the importance of historical and biogeographical processes in shaping protist distributions. Furthermore, a considerable proportion of detected sequence variants could not be assigned even to higher taxonomic levels, highlighting substantial gaps in our current taxonomic knowledge. These findings demonstrate that integrating taxonomy and molecular biodiversity assessment provides new insights into the phylogeny, diversity, and biogeography of polar benthic diatoms and establishes a framework for future biodiversity monitoring in rapidly changing polar ecosystems.

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My research focuses on diversity, phylogeny and biogeography of diatoms (Bacillariophyta). During my PhD at the Botanic Garden and Botanical Museum Berlin, I investigated marine and freshwater diatom communities from the Arctic and Antarctic. As a postdoctoral researcher, my focus has shifted to terrestrial diatoms, where I study soil biodiversity and the ecological roles of diatom communities. I combine classical light and scanning electron microscopy, DNA metabarcoding, and cultivation-based approaches to investigate diatom diversity, species boundaries, and evolutionary relationships. More broadly, I am interested in understanding how diatom communities are shaped by evolutionary history and environmental change, and how integrative taxonomy can improve biodiversity assessment and biomonitoring.

Cover photo

*Scanning electron micrograph of a diatom community from a small pond at Kongsfjorden, Svalbard, Arctic.
This image highlights the remarkable diversity and intricate morphology of benthic diatoms
(Photo: Katherina Schimani)*



BEYOND PHYLOGENY: EVOLUTIONARY INSIGHTS INTO ANTHEMIDEAE AND ASTERACEAE LINEAGES

David Criado Ruiz

Beyond phylogeny: evolutionary insights into Anthemideae and Asteraceae lineages

David Criado Ruiz

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Keywords: diversification; hybridization; island biogeography; Mediterranean; phylogenomics

The Asteraceae is one of the largest and most diverse families of flowering plants, providing a valuable model for investigating the evolutionary processes that generate biodiversity. Over recent years, we have combined phylogenomic, population genomic, ecological modelling approaches, among others, to explore these mechanisms across different lineages of the family. We investigated evolutionary relationships within Anthemideae, one of the most diverse tribes of Asteraceae, comprising more than 1,800 species and showing remarkable diversity across the Mediterranean Basin. Using targeted sequencing of hundreds of nuclear loci and complementary plastid data, we have reconstructed a robust phylogenetic framework for the tribe, resolved the placement of several taxonomically challenging taxa, and revealed signatures of cytonuclear discordance and ancient hybridization. We also focused on the Iberian endemic genus *Phalacrocarpum*

(Anthemideae), a lineage restricted to the northwestern Iberian Peninsula and occurring at the transition between the Temperate and Mediterranean macrobioclimates. Genomic analyses uncovered a complex evolutionary history shaped by ecological divergence, geographic isolation, and recurrent hybridization. More recently, we have expanded these approaches towards whole-genome analyses and island systems. Current research on *Scalesia* (Heliantheae), an Asteraceae lineage endemic to the Galápagos Islands, aims to investigate patterns of diversification and colonization associated with island evolution. Together, these studies illustrate how genomic and other approaches can provide new insights into plant systematics and evolution across different temporal and geographic scales.

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David Criado Ruiz is a postdoctoral researcher at the Swedish Museum of Natural History (Stockholm, Sweden), supported by a Wenner-Gren Postdoctoral Fellowship. He obtained his PhD in Biology from the Autonomous University of Madrid after conducting doctoral research at the Royal Botanic Garden of Madrid - CSIC (Madrid, Spain). His research focuses on plant evolution, with a particular interest in understanding how hybridization contribute to diversification. His work has primarily focused on the daisy family (Asteraceae), including phylogenomic studies of the tribe Anthemideae and evolutionary analyses of the Iberian endemic genus *Phalacrocarpum*. He is currently investigating the evolutionary history and biogeography of island plant lineages, including *Scalesia* in the Galápagos and *Tribulus*, using genomic approaches to understand patterns of colonization and diversification.

Cover photo

Inflorescence of Phalacrocarpum oppositifolium Willk. (Asteraceae, Anthemideae), a representative of the Iberian Peninsula Flora analyzed in this talk
(Photo: Lourenço Falcão Rodrigues)

A close-up photograph of a Pistacia tree branch. The branch features several bipinnate leaves with elongated, serrated leaflets. Small, round, green and yellowish fruits are clustered along the stems. A delicate spider web is visible in the center of the frame, draped across the leaves and branches. The background is a soft-focus view of more tree branches and foliage.

**BIOGEOGRAPHY, EXPLOITATION, USES, AND
MANAGEMENT OF *Pistacia* RESOURCES IN THE
MEDITERRANEAN: INSIGHTS FROM THE PAST,
THOUGHTS FOR THE FUTURE**

Maria Rousou

Biogeography, exploitation, uses, and management of *Pistacia* resources in the Mediterranean: insights from the past, thoughts for the future

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Keywords: Archaeobotany; biogeography; ethnobotany; traditional uses.

Pistacia is one of the emblematic genera of the Mediterranean flora, comprising three indigenous species—the Atlas pistachio (*P. atlantica*), terebinth (*P. terebinthus*), and lentisk (*P. lentiscus*)—as well as the cultivated pistachio (*P. vera*). This presentation brings together the latest results from interdisciplinary research integrating archaeobotany, ethnobotany, and dendro-anthracology to reconstruct the past biogeography of the genus and investigate the exploitation, uses, and management of wild *Pistacia* resources by Neolithic communities (10th–6th millennia BCE). The presentation introduces new data on the biogeography and distribution of a fourth wild species, *P. eurycarpa*, including new records from the Aegean and mainland Greece. Particular attention is given to the traditional uses of wild *Pistacia* species, with a focus on the origins of Pistacia fruit oil extraction. Finally, the presentation examines how the integration of archaeobotanical and

ethnobotanical evidence can contribute to addressing contemporary challenges related to climate change, sustainable agriculture and forestry, and biodiversity conservation by providing historically informed perspectives on the long-term management and resilience of Mediterranean plant resources.

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Maria Rousou is an archaeologist and archaeobotanist specialising in the analysis of archaeological seed and fruit (carpological), and wood charcoal (anthracological) remains. Her research explores long-term human–environment interactions in the Eastern Mediterranean, with a particular focus on island and coastal landscapes, vegetation history, agricultural economies, and the exploitation of plant resources. She received her PhD in Archaeobotany from the Muséum national d'Histoire naturelle (France) and the University of Cyprus in 2022. Since 2022, she has been a postdoctoral researcher at the Malcolm H. Wiener Laboratory, investigating the origins of Pistacia oil production in the Mediterranean and the agricultural economy of Iron Age Cyprus. She has also worked as a freelance archaeobotanist, served as an Archaeological Officer at the Department of Antiquities of Cyprus, and as an external collaborator with the Mediterranean Agronomic Institute of Chania (CIHEAM-MAICh). She has extensive expertise in the archaeobotany and ethnobotany of the *Pistacia* genus in the Eastern Mediterranean and the Near East, and she developed the first identification key for archaeological *Pistacia* endocarps. Her interdisciplinary research integrates carpology, anthracology, experimental archaeology, ethnobotany, and wood anatomy to investigate environmental change, plant exploitation, and agricultural practices. By combining archaeobotanical and ethnobotanical evidence, she seeks to understand how past societies managed and utilised plant resources, generating long-term perspectives that can inform contemporary challenges in sustainable agriculture, forestry, and biodiversity conservation.

Cover photo

Pistacia atlantica Desf. is traditionally used for the extraction of fruit oil.
(Photo: Konstantinos Petropoulos)

**DISENTANGLING THE EVOLUTIONARY
HISTORY OF THE *Dianthus fruticosus*
AND *D. juniperinus* COMPLEXES**

Georgia Fassou

Disentangling the evolutionary history of the *Dianthus fruticosus* and *D. juniperinus* complexes

Georgia Fassou

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Keywords: *Dianthus*; endemic; Greece; phylogeny; taxonomy.

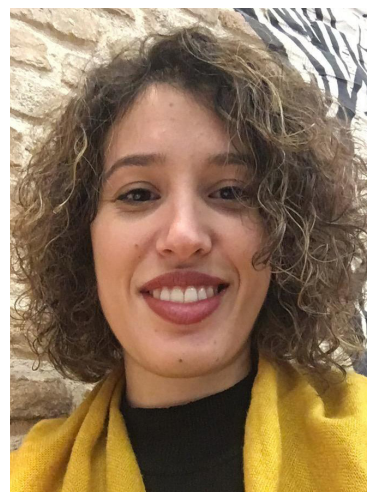
The genus *Dianthus* L. includes many narrow endemics and taxonomically complex species groups, particularly in the Mediterranean region, where historical geographical fragmentation has promoted diversification. Among these, the Greek endemic *D. fruticosus* and the Cretan endemic *D. juniperinus* complexes have long posed taxonomic challenges due to their morphological variability, geographical isolation, and uncertain relationships. This study investigates the evolutionary and taxonomic structure of these two complexes using an integrative framework focused on molecular phylogenetic and morphological evidence. Phylogenetic analyses were based on plastid and nuclear datasets, including broader sampling within *Dianthus* to place the focal taxa in a wider evolutionary context. Morphological variation was assessed using quantitative and qualitative characters covering vegetative and floral traits. The combined evidence reveals closely related

but complex lineages, with partial incongruence among datasets and morphological patterns that only partly correspond to current taxonomic circumscriptions. Several taxa show evidence of geographical structuring and intermediate positions, highlighting the role of regional differentiation in the Aegean area. Overall, this work contributes to a clearer understanding of diversification and taxonomic complexity in *Dianthus* and provides a basis for future taxonomic revision and conservation assessment.

Georgia Fassou

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I am a biologist with a focus on plant taxonomy and recently completed my PhD at the Laboratory of Botany, Department of Biology, University of Patras, Greece. My doctoral research focused on the systematics, phylogenetic relationships, morphological variation, and conservation of taxonomically complex groups within the genus *Dianthus*, with particular emphasis on Greek and Cretan endemic taxa. I am also an IUCN Red List trainer; and I am especially interested in integrative taxonomy, Mediterranean plant diversity, conservation, and the evolutionary history of island endemics. Beyond research, I love travelling and exploring natural landscapes, which continues to inspire my interest in plant diversity.

Cover photo

Dianthus fruticosus subsp. carpathus Runemark
(Photo: Georgia Fassou)

**ADDING NEW PIECES TO THE PUZZLE:
AN INTEGRATIVE APPROACH TO DECIPHERING
THE GREEK *Campanula***

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Adding new pieces to the puzzle: An integrative approach to deciphering the Greek *Campanula*

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Campanula L. (Campanulaceae) represents one of the most speciose and taxonomically challenging lineages in the Greek flora, characterized by narrow endemism and complex evolutionary patterns. This study presents a comprehensive overview of research initiated by exploring phylogeny and biogeography of *Campanula* sect. *Quinqueloculares* (Boiss.) Phitos and continued through investigations into broader taxonomic questions within the family, alongside targeted systematic studies of individual species and complex groups. Until now, our findings have revealed the non-monophyly of traditional sections and provided new insights into the conservation and genetic diversity of rare Greek endemics, such as *Campanula papillosa* Halácsy. More recently, a comprehensive palynological survey has been conducted using Scanning Electron Microscopy (SEM), representing almost all major clades within the Campanulaceae. These pollen characters are currently being assessed

for their potential to provide critical diagnostic data and clarify the evolution of morphological traits within the family. By employing an integrative approach, our research continues to piece together the complex evolutionary history of *Campanula* in Greece and beyond.

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I am a postdoctoral researcher at the University of Patras (Greece), where I currently teach various botanical courses. My research interests encompass the phylogeny, biogeography, conservation, and integrative taxonomy of Mediterranean flora. For over a decade, my work has centered on *Campanula*, employing a multi-disciplinary approach, from morphology to phylogenetic tools, to resolve complex evolutionary patterns.

Cover photo

Campanula pelviformis Lam. endemic to Crete (Aegean), representative of the evolutionary complex lineages investigated in our study of the Mediterranean bellflowers (Photo: Eleni Liveri)



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