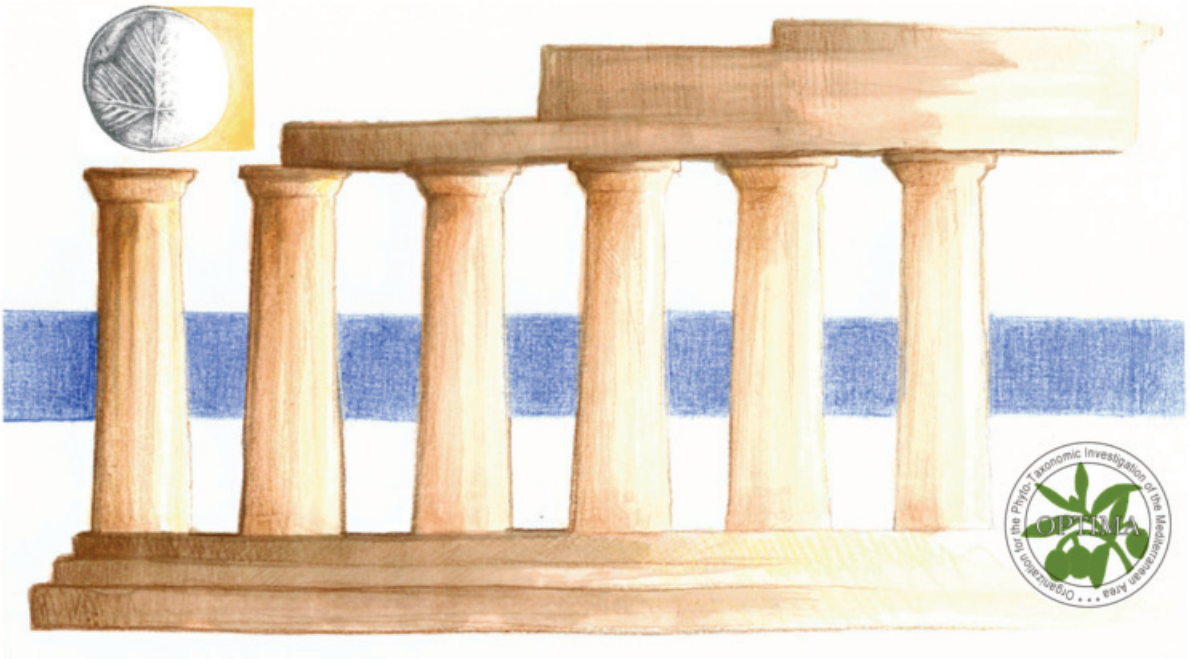

International Symposium

Botany at the intersection of Nature, Culture, Art and Sciences

Archaeological Park of Selinunte, Sicily, 28-30 June 2018

Book of abstracts

Lectures, Oral presentations, Posters

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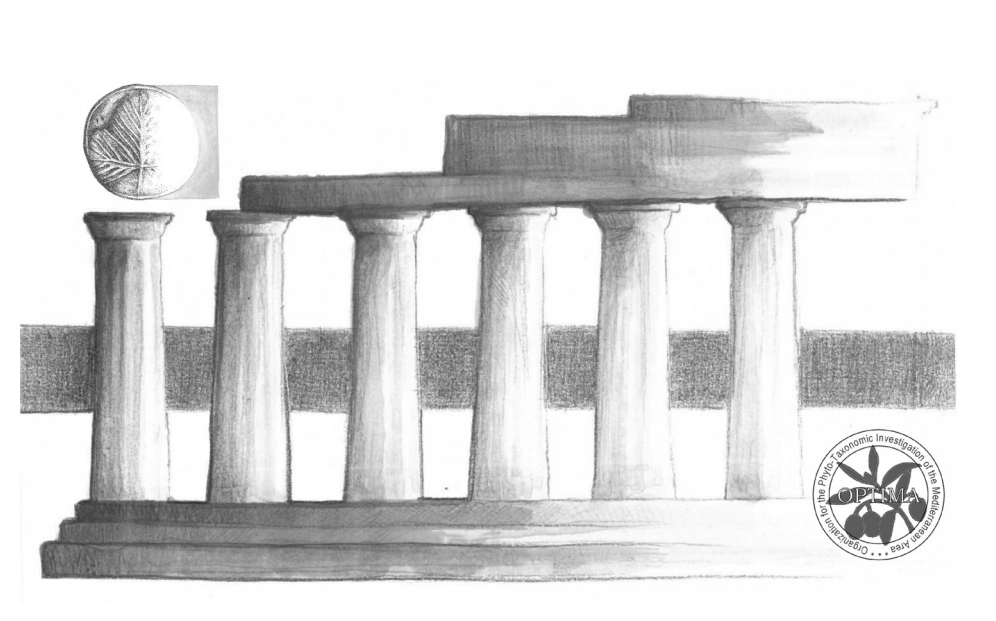

International Symposium

Botany at the intersection of Nature, Culture, Art and Sciences

Archaeological Park of Selinunte, Sicily, 28-30 June 2018

Book of abstracts

Lectures, Oral presentations, Posters

International Symposium

Botany at the intersection of Nature, Culture, Art and Science

Archaeological Park of Selinunte (SW Sicily), 28-30 June 2018

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Lectures, Oral presentations, Posters

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Scientific programme

1st Day 28 June

15h30 Participant registration

17h00 Opening ceremony and institutional greetings

17h15 ***Introductory Lectures***

Chairperson G. Caneva (Italy)

17h20 E. CARUSO (Italy) ***Archaeological landscape of the "Punic Eparchy" of Sicily***

17h50 G. PAMBIANCHI, M. MATERAZZI, F. PALLOTTA (Italy) ***The geomorphological landscape of the archaeological park of Selinunte***

18h20 M. TAYLOR SIMETI (Italy), S. PETTEE (U.S.A.) ***The Garlands of the Gods***

18h40 G. CUSIMANO (Italy) ***The trees of (my) life***

18h55 I. BUTTITTA (Italy) ***Plants in Sicilian holy symbology***

19h10 D. CHIATANTE (Italy) ***The higher plants: beauty and intelligence***

20h00 Welcome buffet

2nd Day 29 June

Chairperson G. Kamari (Greece)

9h00 C. SINISCALCO (Italy) ***From North to South: a voyage through the plant biodiversity in the Italian mountains***

9h30 S. B. PERELMAN (Argentina) ***Major determinants of diversity and floristic composition along a latitudinal gradient in the Rio de la Plata temperate grasslands***

9h50 A. M. MANNINO (Italy) ***Human activities trigger change in marine landscape***

10h10 G. CANEVA, A. MONACO, F. BARTOLI, P. VIRGILI (Italy) ***Reflowering flowers: the hope of an eternal blooming***

10h30 D. SOLOMON (the Netherlands) ***Art to transform ecologies: report from the field***

10h50 V. ROTOLO, M. L. DE CARO, F. PALLA (Italy) ***Solunto Archaeological Park: life under mosaic tesserae***

Chairperson D. Chiatante (Italy)

11h10 I. CAMARDA (Italy) ***La flore des Nuraghes, constructions mégalithiques préhistorique de la Sardaigne (Sardaigne, Italie)***

11h30 C. BLANCHÉ (Spain) ***When Botany and Archaeology meet: The Ancient Catalan Flora Project***

11h50 F. N. ÖZHATAY, E. ÖZHATAY (Turkey) ***Green Heritage of Istanbul***

12h10 S. BENAMAR (Morocco) ***Plant heritage in Fez (Morocco): millenary richness to multi-aspects, botanic, scientific, architectural, cultural***

12h30 G. VENTURELLA (Italy) **Tamarix*, from archaeological to contemporary landscape***

12h50 C. MODÌCA DONÀ DALLE ROSE (France / U.K. / Italy) ***International legal and protection of the landscape and biodiversity: the architecture of the limit between natural culture cultivation and culture***

13h30 Lunch

2nd Day 29 June

Chairperson B. Valdés (Spain)

14h30 V. H. HEYWOOD (United Kingdom) ***The cultural heritage of Mediterranean botanic gardens***

15h00 G. DOMINA (Italy) ***The floristic research in Italian archaeological sites***

15h20 P. L. NIMIS, S. MARTELLOS, E. PITTAO (Italy) ***Ecology and functional traits of lichens in the archaeological areas of Latium***

15h40 M. L. GARGANO (Italy) ***Fungi in archaeological areas***

16h00 C. SALMERI (Italy) ***Plant morphology: outdated or advanced discipline in modern plant sciences?***

16h20 C. KYRIAKOPOULOS, G. KAMARI, I. KOFINAS, D. PHITOS (Greece) **Potentilla greuteriana *(*Rosaceae*), a new species from Mt. Taigetos, S Peloponnisos (Greece)***

Chairperson F. Médail (France)

16h50 S. SAMAROPOULOU, P. BAREKA, G. KAMARI (Greece) ***Biodiversity of the genus* Fritillaria *(Liliaceae) in Greece***

17h10 E. KUZUHAROVA, I. IONKOVA (Bulgaria), F. M. RAIMONDO (Italy) ***Invasive alien species-potential cheap resources of plant substances for medicinal use***

17h50 A. S. FAQI (U.S.A.) ***Botanical Pharmaceuticals: from Bench to Market***

18h10 M. MARIOTTI LIPPI (Italy) ***The contribution of starch and phytolith analyses in reconstructing ancient diets***

18h30 S. RAGUSA, M. GLIOZZI, V. MUSOLINO, V. MOLLACE (Italy) ***Effect of combination of* Citrus bergamia *(*Rutaceae*) and* Cynara cardunculus *(*Compositae*) derivatives in liver dysfunction***

18h50 A. ATTANZIO, L. TESORIERE, M. ALLEGRA, M. A. LIVREA (Italy) ***Phytochemicals and Nutraceuticals: the biochemical core of the Mediterranean plants***

19h10 **Tribute to Prof. Werner Greuter (80th Birthday)**

3rd day 30 June

Chairperson C. Siniscalco (Italy)

9h00 E. CONTI (Switzerland) ***Macro- and micro-evolutionary perspectives on diversification: linking pattern with process***

9h30 C. OBERPRIELER, F. WAGNER, U. LAUTENSCHLAGER, T. OTT, S. TOMASELLO, R. VOGT (Germany) ***Phylogeny, biogeography and species delimitation in the* Compositae-Anthemideae**

9h50 K. MARHOLD, M. ŠLENKER (Slovak Republic), H. KUDOH (Japan), T. MANDÁKOVÁ (Czech Republic), J. ZOZOMOVÁ-LIHOVÁ (Slovak Republic) ***Discovery and introduction of* Cardamine occulta *(*Brassicaceae*) into Europe***

10h10 P. CAMPISI, M.G. DIA, M.L. MARINO (Italy) ***The Bryophyte flora of the Sicilian archaeological areas)***

10h30 E. RAAB-STRAUBE (Germany) ***From Flora Europaea and Med-Checklist to Euro+Med PlantBase: the never-ending task for a happy Sisyphos***

10h50 M. FENNANE, M. REJADALI (Morocco) ***Moroccan Red data book: a basic tool for plant conservation***

Chairperson E. Conti (Switzerland)

11h10 F. MÉDAIL, A. BAUMEL (France), M. BOU DAGHER KHARRAT (Lebanon), K. DIADEMA, M. JUIN, N. LEGALLIOT (France), S. LA MALFA (Italy), F. MIRLEAU (France), G. NIETO FELINER (Spain), L. OUAHMANE (Morocco), S. PIRONON (U. K.), J.-P. SUC, J. VIRUEL, H. SANGUIN (France) ***The Carob tree: biogeography, ecology and cultural history of a neglected Mediterranean tree***

11h30 S. BANCHEVA (Bulgaria) ***Diversity and conservation of subfam.*** **Carduoideae** ***(*****Asteraceae*****) in Bulgaria***

11h50 A. PAPINI, M. VIOLA, V. MAGGINI, C. TANI, F. FIRENZUOLI, S. SCHIFF, R. FANI (Italy) ***Relationship between the cypsela of*** **Echinacea** ***and its endophyte symbionts***

12h10 B. VALDÉS (Spain) ***Progenitors of cultivated plants in the Iberian Peninsula***

12h30 F. PEDROTTI (Italy) ***La Famille des Ombellifères (*****Apiaceae*****) dans le massif de l'Ortles-Cevedale (Alpes Centrales)***

12h50 E. VITEK (Austria) **Gundelia*****, from one to many species – an ignored diversity***

13h10 G. NAKHUTSRISHVILI, M. KHUTSISHVILI (Georgia) ***National Herbarium of Georgia at the Institute of Botany, Ilia State University, Georgia***

13h30 Concluding Remarks

Oral presentations

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Archaeological landscape of the "Punic Eparchy" of Sicily

Enrico Caruso

Parco Archeologico di Selinunte e Cave di Cusa, Castelvetrano, Trapani, Italy. E-mail: enrico.caruso@regione.sicilia.it

Since most ancient times, rarely a land had as many different populations and cultures as Sicily.

The eastern part of the Island was inhabited by Sicels, who had moved native people, the Sicanians, westwards, where Elymians already settled in the cities of Erice, Segesta, Iato and Entella. Sicilian coasts were frequented by Phoenician merchants who, during Greek establishment in the East, firmly settled in the western part, in three cities quoted by Thucydides: Motya, Panormus and Solunto.

The Greeks conquered the eastern coasts and then the northern and southern ones as well; they gradually moved westwards building up two important cities which, being border cities, developed until creating the basis of their own ruin: actually, Himera and Selinunte were destroyed by Carthaginians in 409 B.C. Subsequently, the Syracusan Dionysius besieged and destroyed Motya in 397 B.C , starting his hegemony on almost all Sicily and, mostly, on the *Greek poleis*.

The conquer attempt started by Syracuse tyrant pushed Carthage to strongly settle in the Island and slowly, though unavoidable, to build a kingdom, called Eparchy, which led to the foundation of Lilybaeum, a new defense city close to Motya.

The urban landscape of the Eparchy cities was characterized by a strong penetration with the territory, for the choice of the sites placed on flat peaks of isolated mountains or integrated with the sea.

Phoenician cities were placed on islands, such as Motya, or on promontories, such as Panormus (both ports!), and Solunto, city bathed by the Tyrrhenian Sea and open toward the Greek eastern of Himera. Elymian cities, on the contrary, were placed on suggestive mountains, such as Iaitas, Segesta, Entella and Erice; the last one was the sacred mountain well-known for the particular Astarte-Aprhodite-Venus' Temple of international relevance, as well as for being a reference point for sailors in the Mediterranean Sea.

Moreover, the sites having Greek origin, such as Selinunte, perfectly mixed the residential area and the sea with the two eastern ports, on Gorgo Cottone, and the western one at the mouth of the Selinus river. At last, can be cited the sub colonies of Selinunte: the city of Eraclea Minoa and the ancient Adranon.

Anyway, the capital of the Carthaginian Eparchy, Lilybaeum – with its ports to the South and the West, as well as with the port inherited after the destruction of Motya, was characterized by the most complex defensive works in the ancient times.

The last actions of the possession of Punic Eparchy were the foundation dated 260 B.C. of Drepanon where Amilcare Barca – the founder of the Barcidi dynasty, whose main representative leader was Hannibal – and the deportation of Erice inhabitants and the people exodus from Selinunte to Lilybaeum, where a new residential area was created. These two operations of great and small city planning, made by the Eparchy on its way out, concluded the Carthaginian domination in Sicily, followed by Romans' arrival, who conquered the Island after the Egades battle in 241 B.C.

The geomorphological landscape of the archaeological park of Selinunte

G. PAMBIANCHI, M. MATERAZZI, F. PALLOTTA

School of Science and Technologies (Geology Division), University of Camerino (Italy). E-mail: gilberto.pambianchi@unicam.it

The research, still in progress, is aimed at the reconstruction of the landscape evolution (since early Holocene) in the area of the Archaeological Park of Selinunte. Through field surveys and indirect investigations, it is bringing a fundamental contribution to the knowledge of the natural and anthropic events that characterized the development of the Selinunte's civilization.

The research includes:

a) Geomorphological investigations and landscape evolution during historical times.
   The use of Li.DAR images, aerial photos and field surveys allowed to reconstruct the ancient coast morphology, characterized by wide gulfs at the mouth of the major rivers and to hypothesize the existence of river channels favorable to navigability with small boats for long sectors inward.
b) Climate change and relationships with historical events.
   The geomorphological analyses and the reconstruction of the paleoclimatic context allowed to hypothesize an arid-cold climatic phase in the period of maximum development of the Selinunte's civilization (between 6th and 4th centuries B.C.), which caused, as proven by historical sources, the formation of swampy and unhealthy areas with consequent spread of diseases and pestilences. In this regard, the same studies have also provided a hypothesis on type and location of the famous hydraulic work and reclamation work carried out by Empedocle in 444 BC. (described by Diogene Laerzio in the III century BC).
c) Geological and sedimentological investigations on building materials.
   During the study, numerous rock samples were taken from the main mining areas and subjected to mineralogical-petrographic analyses. The results confirm age and composition of the materials constituting the geological bedrock and are allowing to correlate the different buildings with the areas of origin.
d) Hydrogeological investigations and studies on water resources availability.
   The information gathered on the current water resource availability and hypotheses on the water demand in historical times, allowed to formulate some hypotheses on location, type and consistency of the springs in the period of maximum development of the Selinunte's civilization.
e) Indirect investigations: use of Unmanned Aerial Vehicle (UAV - drones) and geophysical prospecting

The use of drones equipped with photocameras and thermal cameras made it possible to highlight, on the whole area of the archaeological park the presence, on the ground or in the immediate subsoil, of numerous anomalies attributed to anthropic activities and presence of manufacts. These anomalies may be confirmed in the future and investigated through essays or excavation campaigns.

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The Garlands of the Gods

MARY TAYLOR SIMETI[1], SUSAN PETTEE[2]

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For visitors from Northern Europe making the *Grand Tour* during the 18th and 19th centuries, the encounter with the exuberant vegetation of Sicily had almost as great an impact, emotionally and aesthetically, as did the sight of the fallen temples of *Magna Graecia*. The average modern tourist tramps the excavation sites with little botanical baggage of his own and no help offered by those in charge of maintaining the sites, no information that might enable him to share the experience of his predecessors.

Over twenty-five years in the making, and fruit of a collaboration between an American writer living in Sicily and an American botanical illustrator, the idea for "The Garlands of the Gods" has evolved from creating a simple tool for identifying the most common wildflowers growing among the ruins, to including a broader look at these plants in mythological, literary and historical terms, and a brief consideration of what the flower-decked remnants of the classical world meant to visitors over the last centuries.

A small selection of the paintings and their accompanying texts were shown at Harvard's Arnold Arboretum in May of 2017, a larger selection will be exhibited at the Orto Botanico in Palermo next winter, and at that time the entire project will be published in the form of a lightweight and easily transportable volume that examines some one hundred plants—an admittedly arbitrary selection of those deemed most beautiful and most interesting—together with seven of the most frequented sites.

It is the hope of the authors that their efforts may eventually provide some small stimulus towards the establishment of a program for the promotion of botanical tourism, aimed not only at enriching the tourist experience, but also at increasing the awareness of the value, both aesthetic and economic, of Sicily landscape and flora in the minds of those upon whom conservation ultimately depends, the Sicilians themselves.

The trees of (my) life

GIROLAMO CUSIMANO

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On the background of the rebirth of scientific interests by the human sciences towards the peasant knightly world between the Sixties and Seventies, the author traces his relationship with the vine, the olive tree and citrus fruit in key of scientific and personal autobiography. The trees of life but above all powerful mediators between man and territory. The research activity is revealed as a discovery of oneself, but also and above viaticum of ethical values, a message to the new generations in search of a sense of understanding and doing, hope for the future.

Plants in Sicilian holy symbology

Ignazio Buttitta

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Vegetal elements like trees, fronds or fruits are recurrent in traditional Sicilian religious feasts, both as decoration of spaces or festive objects (altars of St. Joseph, votive shrines) and as more or less complex processional artifacts that constitute the main symbol of the feast (the pagghiaru of Bordonaro, the bannera of Cerami, the straula of Ribera, etc.). These are, in most cases, ritual symbols inherited from a remote past, where the strong bond felt by all agrarian civilizations is expressed and renewed, within plants cycles, production cycles and powers transcending the human sphere.

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The higher plants: beauty and intelligence

Donato Chiatante

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Two are the best paradigms used to define the plant's beauty: the colors and the shapes. The color strikes the human imagination directly and it elicits strong emotions. The shapes of plants are less obvious, and only a trained eye is able to separate them from colors. By studying the shapes one realizes that it does not exist randomness in the plant kingdom, but shapes are often characterized by a limitless repetition of units being always the same. The shapes of higher plants can be often mathematically diagrammed onto the Fibonacci Sequence (1, 1, 2, 3, 5, 8, 13,….) and the Golden Ratio (3/2=1.5; 5/3=1.6; 8/5=1.6; 13/8=1.6; ….). Recent studies have shown that these specific shapes represent the result of a long evolutionary adaptation which provides the best developmental conditions that could not be obtained by different shapes. However, one question arises: beside being beautiful, are plants also intelligent living beings? The answer to this question starts with an examination of the most accepted definition of intelligence. A second step forward is represented by a comparison between the most simple living beings (unicellular) that show an intelligent behavior even if they lack a brain tissue. Finally, the presence of intelligence in higher plants is demonstrated with examples of how they are capable of: cognition, communication, information processing, computation, learning, and memory. The hypothesis of occurrence of a plant tissue able to provide intelligent responses to environmental stimuli is presented.

From North to South: a voyage through the plant biodiversity in the Italian mountains

Consolata Siniscalco

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Italy is among the European countries richest in biodiversity, mainly due to a wide variety of geomorphological and climatic conditions.

Its very high plant diversity is also the result of its geographical position, acting as a bridge between Central Europe and the Mediterranean Sea and producing the coexistence of different biogeographic elements with a high contingent of endemic plant species, which amounts to more than 15%. As in many other mountains of the world, both the Alps and the Apennines host an extremely rich flora which forms peculiar plant communities characterizing several priority habitats listed in Directive 92/43/EEC and forming wonderful mountain landscapes, where nature and human work merge increasing biodiversity.

This presentation wants to celebrate the Italian mountain plant diversity through a voyage that chooses some particular areas of our peninsula from the Western Alps, where biodiversity reaches its peak at the union between alpine, steppic and Mediterranean species, to the Northern, Central and Southern Apennines, walking through the forests that are in gradual and continuous expansion, arriving in the subalpine and alpine belts, with their similarities with the Alpine flora, as well as their extraordinary endemic and specific components revealing their recent and ancient events.

The voyage from North to South is an opportunity to observe the responses of plant species and habitats to climate and land use changes that very rapidly are transforming our mountain landscapes, not only at lower altitudes, as expected, but, surprisingly, along the whole altitudinal gradient. Recent results on changes of the summit flora (GLORIA and Summit flora projects), as well as on abandonment of the traditional grazing and forestry activities in some mountain areas and on the spread of non-native species, produced significant changes at levels of species, habitat and landscape. On one hand the responses of plants to these changes confirm that they are a threat for plant biodiversity, but on the other hand that plants have a surprisingly rapid capacity to face abrupt climatic or land use variations.

Major determinants of diversity and floristic composition along a latitudinal gradient in the Rio de la Plata temperate grasslands

SUSANA B. PERELMAN

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Painters and writers were inspired by the immensity of the Pampean plains, the largest temperate grasslands in South America (28oS - 38oS). Vegetation change along latitudinal gradients now inspires ecologists as a resource to increase knowledge about the potential implications of climate warming. Research on vegetation heterogeneity led by Dr. Rolando Leon over four decades generated an invaluable database of floristic information that allowed answering questions about determinants of diversity at different scales.

We first analysed cross-scale vegetation patterns in a 90,000 km2 area of natural grasslands in the Flooding Pampa, where most of the area was still devoted to extensive rangeland. A large proportion of the entire variation in species composition was observed at very fine spatial scales (0.1–10 km2), associated with subtle topographic features and soil salinity gradients. Species turnover among stands occupying different landscape positions at the same latitude was 50% greater than among inventories encompassing two degrees of latitude. While functional group composition differed widely between native and exotic species pools, the diversity of both groups of species decreased along abiotic-stress gradients.

Secondly, we focus on the zonal community (mesophytic grasslands on fertile soils), which have been largely replaced by crops as consequence of the expansion of agricultural activity. Along a 600 km latitudinal gradient, climatic factors associated to latitude were strong determinants of regional diversity: gamma diversity decreased linearly with increasing distance from the Equator, as did the rate of species accumulation with expanding area; but local species richness was influenced also by landscape fragmentation and remaining grassland cover. Relative importance of C4 grasses and mean percentage exotics showed opposite latitudinal tendencies, the former decreasing and the latter increasing towards the south.

A collaborative in progress work with colleagues from Uruguay and Brazil addresses the identification of diversity drivers at the broadest regional scale.

Human activities trigger change in marine landscape

Anna Maria Mannino

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Coastal areas comprise some of the most productive, diverse and at the same time threatened marine ecosystems. In the last few decades, pollution, overfishing, habitat modification and loss, coastal development, introduction of Non-Indigenous Species (NIS, i.e. organisms introduced outside of their natural range), and climate changes, such as acidification and increases in sea surface temperature, have significantly affected coastal marine areas. Anthropogenic pressures, NIS and climate changes are considered the most serious threats to marine biodiversity and ecosystem functioning. All that is particularly true for the Mediterranean basin, representing a 'biodiversity hotspot', which harbors unique and valuable ecosystems, in terms of structure and functioning, such as the *Cystoseira* sp. pl. (*Heterokontophyta*) forest and the *Posidonia oceanica* (Linnaeus) Delile meadow. In the Mediterranean Sea, human pressures are causing severe changes in the marine landscape. For instance, they are increasingly limiting the distribution of *Cystoseira* populations, particularly sensitive to a variety of anthropogenic stressors. During the last decades they have retracted their ranges, being replaced by less complex communities dominated by turf-forming seaweeds or encrusting calcified corallines (*Rhodophyta*), the so called 'barren ground'. Mediterranean seagrasses, such as *P. oceanica*, are presently experiencing significant regression generally linked to anthropogenic pressures. The introduction of NIS, such as *Caulerpa taxifolia* (M. Vahl) C. Agardh and *C. cylindracea* Sonder, able to enter into competition with native seagrasses, is a major concern. Stressed and degraded meadows constitute a very favourable environment for the development of NIS, and this development could in turn exacerbate the regression of seagrass meadows. Therefore, the synergistic effects of anthropogenic stressors in the coming decades require, as a matter of urgency, a major effort at global scale in order to better assess the putative impact on Mediterranean marine ecosystems, and the goods and services they provide for the benefit of human society.

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Reflowering flowers: the hope of an eternal blooming

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The presence of "reflowering flowers", i.e. artistic representations in which one flower gives birth sequentially to other ones, is clearly detectable in the phytoiconography of the Greek and Roman art. Through a wide analysis of ancient archaeological artworks in the Euro-Mediterranean area, we found the diffusion of the motif starting from the Hellenistic period (IV Century BC). The diffusion of the metamorphic flower motif became a dominant element in triumphal arches, and later also in coffered ceilings, forming the so-called "rosettes". The analysis and identification of the single elements of these phytoiconographic compositions is easier on pottery (among which best examples come from the Apulian and Greek vases) thanks to the presence of vivid colors, but still possible even on carved structures without colors. We studied in detail the botanical elements of these flower compositions in the scrolls of the *Ara pacis* and in the triumphal Arches of *Titus* and *Septimius Severus* in Rome (Italy). The botanical analysis enhanced a great diversity in the flower species, with some recurrent elements, such as flowers belonging to the genera *Lilium*, *Anemone*, *Silene*, *Stellaria*, *Anthemis*, *Calendula*, *Scabiosa*, *Olea*, *Laurus*, *Asphodelus*, *Nuphar*, *Carlina*. This flower motif is linked to the idea of a continuous transformation from an element to another in the world of nature, which was an important leading thread in the Hellenistic culture and in the revived Pythagorism of the Augustan age. These flower compositions were used as a spatial translation of temporal concepts: the absence of an end; death as a prelude to new life. We should increase our understanding of the meanings of plant elements in art and archaeology, since in ancient cultures natural elements were not used only as a mere decorative motive, but were part of a widely shared symbolic language.

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Art to transform ecologies: report from the field

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Experimental methodologies combining art production, activism and science are increasingly accepted as stimulating transformative research, as it has been shown in the areas of urban agriculture and urban political agroecology. Several methodologies informed by contemporary art traditions, such as land art, conceptual art, and art in the public space, are developed and tested within my own praxis of art production and requisite visualisation and dissemination techniques are discussed in this presentation. Some of these artistic methodologies include *Radical Observation* (an embodied-learning, performance-based observation technique), and the use of soil chromatography, i.e. a visual data format, including the author's own technical innovation of magnifying of the soil organic horizon in the visual data. How and why art/activism-based methodologies are fundamentally different from scientific methods, and whether these methodologies are capable of yielding scientifically valid insights will be examined in the presentation. The examples will be juxtaposed with cases of scientific inquiry, such as the biodiversity study of the Urbaniahoeve plant typologies, and methodologies projected onto a 25HA area in *Amsterdam Nieuw West*, and a soil study of Urbaniahoeve's *DemoTuinNoord* topsoil (both conducted by/with Wageningen University and Research) are included in the survey of projects and requisite analyses.

Aside from accommodating different perceptions of biodiversity and soil fertility, it is shown how the freedom of the artistic practice yields new perceptions towards the relationship among humans with regard to the ecosystem species, and that can guide human behaviour. Perceptions yielded through this methodological lens are capable of forming a basis for new forms of policy and governance of, e.g., public space greens, such as in the case of the urban food forestry work of Solomon/Urbaniahoeve (the author). Experimental methodologies such as these have a legacy of empowerment, but are also forms of critical inquiry into neoliberal urbanisation and commodification which strongly affect the public space, the various commons, and the ecosystems that inhabit these spaces.

Solunto Archaeological Park in Sicily: life under mosaic tesserae

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Biodeterioration is a complex of alteration processes induced by the growing and metabolic activity of a wide range of organisms, becoming a reveling problem for the mosaic tesserae of "Casa di Leda" in the *Greco - Roman site of Solunto* in Sicily.

Particularly, a thick biofilm inducing a deep alteration of mortar and consequently the mosaic tesserae dethacment has been highlighted during the restoration project.

The biofilm microbial consortium has been investigated by an integrate approach based on Microscopy analysis (O.M., C.L.S.M.), in vitro culture (Nutrien - Saboraud agar plate) and molecular investigation (DNA in vitro amplification, sequencing). Several microbial taxa have been revealed belonging to bacteria (*Bacillus*) and fungi (*Alternaria*, *Aspergillus*, *Fusarium*), besides cyanobacteria (*Chroococcus*) and green algae (*Chlorella*).

In order to control the biofilm colonization two essential oils (EO), *Thymus vulgaris* and *Origanum vulgare*, have been utilized and their antimicrobial activity, preliminarily in vitro (agar disc diffusion methods) and thereafter in situ (applying the EOs at different concentration on biofilm) tested.

We hypothesize the possible use of EOs to contrast the microbial colonization, implementing possible Green methods with low impact on human health and the environment, replacing the traditional biocides, known for their toxicity.

The authors are indebted to Laura Di Leonardo of Solunto Archaeological Park for the faithful collaboration.

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La flore des Nuraghes, constructions mégalithiques préhistorique de la Sardaigne (Sardaigne, Italie)

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Les nuraghes sont des constructions mégalithiques préhistorique de la Sardaigne, environ 7.000 bâtis de XVII jusqu'au X siècle, qui caractérisent l'ensemble du territoire. Leur structure est très variée et va de petites tours à de grands complexes entourées de bastions et murs puissants. Les nuraghes plus grandioses sont bâtis surtout avec des roches de basalte.

Un grand nombre de nuraghes est identifié localement avec des noms de plantes (exemples: *Cherchizzu = Quercus*, *Sambinzu = Viburnum tinus*, *Elighes = Quercus ilex*, *Ozzastru = Olea sylvestris*, *Rudas = Ruta chalepensis*, *Murta = Myrtus communis*. Toutes ces plantes, en plus de donner le nom au toponyme, sont également présentes sur les nuraghes. De plus, 16 nuraghes sont nommés *Ruiu* (rouge) attribuable à l'abondance de *Xanthoria ochroleuca*, qui prévaut souvent sur la roche de basalte.

Dans le fouilles les archéologues ont donné peu d'attention à l'égard de la flore. En référence spécifique, en dehors des travaux sur les lichens sur les nuraghes il n'y a pas d'autres études botaniques. Ces enquêtes sur la flore vasculaire ont été principalement concentrées sur les tours de pierre basaltiques, présente à la fois sur les murs et sur le toit des tours. Les plantes qui vivent à la base des nuraghes, souvent fortement influencées par la présence d'animaux domestiques, n'ont pas été prises en compte.

Les recherches menées sur une dizaine de nuraghes ont enregistré environ 150 espèces, parmi lesquelles prédominent les thérophytes, suivi par les hémicryptophytes et les géophytes. Les espèces les plus représentées sont *Avena barbata, Bromus sterilis*, *Hordeum leporinum*, *Lamarckia aurea*, *Vulpia myuros*, *Dactylis hispanica*, *Sonchus tenerrimus*, *Umbilicus rupestris*, *Sedum cœruleum* et les fougères, *Polypodium australe* et *Asplenium obovatum*. Parmi les arbres et les arbustes les plus communs sont *Quercus ilex*, *Pistacia lentiscus*, *Hedera helix*. Une certaine différence est observée entre la flore des murs et celles des toits.

When Botany and Archaeology meet: the Ancient Catalan Flora Project

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The During the last 25 years, archaeological activity dramatically increased in Catalonia where up to 12.000 sites have been inventoried (although not all fully excavated). The amount of data obtained gives useful information to build a Catalogue of Ancient Catalan Flora. Initial tests started in 2014 as pilot plans with BSc D projects and full development began in 2017.

For each taxon, information is collected from the following sources: (i) archaeobotanical data (presence of macroscopic and microscopic plant fragments, phytoliths, chemical traces, etc. recovered from sites), (ii) biological material (mainly pollen) from paleovegetation and paleoclimatic studies, (iii) archaeological objects with plant information: iconographic (representations and illusions) illustrations of plants in ceramics, paintings, sculptures, coins and all other objects of utilitarian, representation, religious, etc. uses, and (iv) epigraphic (inscriptions on all types of substrates) and written (from classical literary, scientific, technical, agronomical, etc. texts). The considered chronological period ranges from Protohistory to late Antiquity (roughly c. 500 BC – 500 AD), the territorial scope and the botanical thesaurus are those of *Flora dels Països Catalans*. The collected information, obtained from fieldwork, bibliographic sources, documentation repositories and museums, is stored in a database in Miscrosoft Access format.

At present, the database includes 1.189 documented citations and data obtained from 193 sources, from 255 taxa, mainly spermatophytes, although records of algae, fungi, bryophyte and pteridophyte have also been captured. Records come from 54 (= 63%) *comarques* (counties) and mainly from Iberian and Roman cultural contexts. 42 % are from archaeological objects, whereas 58 % are biological samples.

Examples of catalogued Orientalizing plant elements will be shown, including both artistic/religious illustrations and true plant remains documenting the presence of eastern plants in the W. Mediterranean Catalan Countries, mainly of Phoenician/Punic origin, dating back to VI-IV centuries BC.

Green Heritage of İstanbul

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To the South of Istanbul lays the Marmara Sea, and to its North the Black Sea. The watercourse that divides Istanbul is the Bosphorus. It is located at 41° N 29° E, on the Bosporus strait, and encompasses the natural harbor known as the Golden Horn, in the northwest of the country. It extends both on the European (Thrace) and on the Asian (Anatolia) side of the Bosporus.

The wide diversity of unusual habitats has allowed development of an astonishingly rich flora. The province cover just 5110 sq.km yet supports a remarkably high diversity of plant species with 2300 vascular plant taxa. This paper based on several years interested on İstanbul floristic richness of the authors and recently carried out the project titled ‘’Inventory and Monitoring Project of Istanbul that is part of the National Biodiversity Inventory and Monitoring of Turkey .Project supported by the Ministry of Forestry and Water Management 1. Regional Directory. This project report covers the natural heritage interests based on field works (105 days) collected 3500 specimens during February 2016 and November 2017 and related literature. Five habitats (grassland, forests, heatlands, sand dunes and other coastal habitats and wetlands) are of high national or even international importance to nature conservation. Of particular importance to nature conservation are the province‘s rarer species. Over 270 species that are regarded as nationally rare and /or threatened occur, of these 40 species abound here than anywhere else on earth. The checklist of Vascular flora of İstanbul have been updated with 62 endemic taxa .As result of the project, 13 new records are added to the İstanbul flora, 2 species have been reported as new record for Turkish flora. Finally a new autumnal allium, *Allium istanbulense* Özhatay, Koçyiğit, Brullo & Salmeri has been described as a new species for plant science.

Plant heritage in Fez (Morocco): millenary richness to multi-aspects, botanic, scientific, architectural, cultural

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The historical city of Fez (Morocco) has been classified as "World Heritage" by UNESCO since 1981 in recognition of its twelve centuries of multidimensional civilizational influence: science, spirituality, architecture, crafts, art of living, gardening, etc. Its geography and bioclimatic conditions have provided to the city and its region a great botanical diversity, particularly in endemic plants such as the genus *Fezia* (*Brassicaceae*) and medicinal and aromatic plants (MAPs). The wild MAPs have been meaningfully used in culinary art and in traditional medicine that have flourished in the city through the centuries. In addition, architecture typical of the homes of Fez, with inner gardens, has permitted the development of the MAPs culture in indoor gardens and in terraces and of the flourishing of the art of gardening. The use of the MAP, beyond empiricism, was supervised by the scientific knowledge accumulated in the scientific environment of Fez provided by Al-Quaraouiyine, prestigious and oldest university in the world. A strong testimony of this scientific support is given to us by the important work of the illustrious doctor and botanist born in Fez in the 16th century, Al Wazir Al Ghassani. The study of one of his manuscripts, preserved in the library Al-Quaraouiyine, entitled "The garden of flowers for the description of herbs and simples" revealed us throughout its 166 pages, in addition to its medical scope, its innovative character in the Botany field. The work presents for each plant a detailed description of the terms of use as a medicinal, preceded by that of its botanical and ecological characteristics. Due to the methodology, the diversity and accuracy of terminology and the completeness of the inventory, this manuscript provides an undeniable step forward in the historical development process of description and classification of plants and represents the first thematic regional Flora of Morocco.

Tamarix, from archaeological to contemporary landscape

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One of the most well-known references to the presence of *Tamarix* species in ancient times is reported in Genesis (21:33). At that time, the tamarisks were used as decorative elements in oaths, purification, and divination. The tamarisk leaves were also used in concoctions and to ward away evil influence, and the branches to construct magic circles. The landscape surrounding the Abraham well in Beersheba is still characterized by the presence of *Tamarix nilotic*a (Ehrenb.) Bunge. This species is particularly widespread along the banks of the sacred Jordan and Jabbok Rivers. In some old and recent paintings we can recognize habitus, habitat and, morphological features of tamarisk species such as *Tamarix aphylla* (L.) H. Karst, *T. usneoides* Bunge, *T. gallica* L., and *T. africana* Poir. Most Egyptian timber consists of tamarisk and their wide use and distribution in the territory can be identified in relief sculptures and paintings. Recently, in the Hamriyah area of Sharjah (United Arab Emirates), old *T. aphylla* trees have been recognised as worth of protection and a link between the old and new generations. The genus *Tamarix* L. occurs naturally from western Europe and the Mediterranean to North Africa, northeastern China, Mongolia, India and, Japan. In North and South America, tamarisks werespread as ornamental plants for gardens during the 1800 and 1900's. The seeds escaped cultivated areas and the plants are currently mainly located over the banks of streams and rivers. Tamarisks are distributed in Italy as wild and ornamental plants. They cannot be identified by leaves and racemes but only from a careful observation of the floral disc under the microscope. Tamarisk trees characterize the landscape of many archaeological sites including those of Neapolis (Syracuse) and Selinunte in Sicily. One of the biggest problems now, particularly in America, is their invasiveness.

International legal and protection of the landscape and biodiversity: the architecture of the limit between natural cultivation and culture

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The growth and spreading of environmental lawfor scientific and health protection, - together with the landscape that responds to more historical, aesthetic and cultural principles, represent an evolution of living law directly proportional to the ability of right operators to share with the scientific community the multiple problems and reflections of development risks . The right balance between scientific and technological evolution and the management of its voluntary or involuntary, regulated or regulated introduction into nature are the main challenges of scale application of what has become one of the fundamental principles of international law and single Nations: the precautionary principle.

The precautionary principle appears in the middle of the last century in Germany with the *vorsorgeprinzip*, authorization of the public authority to take all necessary and reasonable measures to cope with the possible scientific and environmental risks even in absence of proven scientific knowledge or necessary to establish the actual existence. Actually this principle had already taken the first steps in the philosophies of the German Hans Jones who, taking up the themes treated by his teacher Heidegger, outlined an ethical theory impregnated with general ecological principles and destined to the future technological civilization in contrast with the roots of humanism.

Sicily and the park of Selinunte tell us through the variety of its plants a part of history: the anthropological and zootechnical passage of the human and animal migratory flows that have characterized the testimony of the past. The environmental changes have been voluntary, responding to aesthetic decisions and in other cases occasional and voluntary. The biodiversity of this park is an embryo of the largest biodiversity present in Sicily, a reversible treasure as to its original consistency and constantly subjected to potential natural or anthropic changes.

The environmental and biodiversity protection, expressed in national and international law, are today the main tools to manage risks with prudence and potential forecasts.

The natural landscape, emblem of what is historically presumed to have been ab origine in comparison with the cultural landscape, i.e. the intertwining of the many human passages that have intervened over the centuries, offers an important starting point for study and reflection to refine the scientific and regulatory techniques of nature protection. Art that knows no linguistic and national boundaries, filled with the pollen of a flower, interprets that universal language best explaining the risks and instruments of protection and the enhancement of both environment and nature.

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The cultural heritage of Mediterranean botanic gardens

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Mediterranean botanic gardens represent a rich and diverse cultural heritage, both tangible and intangible. They include spectacular landscapes such as that of the Giardino botanico Hanbury, La Mortola, the Jardim Botânico da Ajuda, Lisbon with its view to the river Tagus; the richness and layout of their plantings, including hundreds of monumental trees and celebrated features and sights such as the avenue of Ceiba speciosa in the Orto botanico Palermo, Wisteria sinensis covering the great iron gazebo in the Jardín Botánico-Histórico La Concepción, Malaga. The plantings include many important introductions of both ornamental and economically important species. The gardens also contain many buildings of great architectural merit, some historic, some modern, such as the Pabellón de Villanueva in the Real Jardín Botánico de Madrid, the Orangerie La Gardette, Jardin des Plantes, Montpellier, the Gymnasium, Calidarium and Tepidarium of Palermo and the 1930s cubist garden in the Jardin Majorelle Marrakesch. Also important are the historic glasshouses and shade houses such as the Grandes Serres du Jardin des Plantes, Paris, L'Umbracle, Jardí botànic, Valencia, Spain and the futuristic Nuova serra Biosfera of the Orto Botanico di Padova. Many of these gardens contain important herbarium collections that have served a key role in the preparation of Floras and major botanical libraries containing historical works of great value, as well as works of art, sculptures paintings, drawings, and other illustrations and invaluable historic archives. The intangible cultural heritage of these gardens is represented by the impact that they have had on the inhabitants of the cities and towns in which they are located and on generations of visitors – students, professionals and the public. With the decline of teaching and research in botany as a university discipline, some of these collections are at risk of dispersal or an even worse fate. Consideration should be given to compiling an inventory of these historically important buildings, libraries, works of art and archives.

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The floristic research in Italian archaeological sites

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In Italy occur about 240 archaeological areas or parks and more than 1500 main monumental complexes; the number of individual monuments would exceed several thousand. The interest on the flora of archaeological sites in Italy dates back to the XVII Century. The scope of floristic inventories can be limited to the mere list of the plants growing into the area or this list can be accompanied by indication of the dangerousness for the monument represented by single species and the indications for their management. For this review the basic references concerning the flora of archaeological sites located in Italy were listed and classified by publication date, area, and main historical period or civilization to which the complex refers.

Overall 96 references have been collected (73 full articles, 10 chapters of book and 13 conference abstracts) referring to 47 sites. The large part of these contributions was published between 1990 and 1999. The most investigated regions are Lazio and Sicily. The complexes belonging to the Roman civilization were the most studied. This even if, in many cases, it is not easy to attribute a monument to a precise historical epoch because different buildings, over time, have been re-adapted and used by the civilizations that have succeeded each other. From what has been stated above it is evident that the botanical prospecting in archaeological areas is still very limited, lacking entirely in several regions. With the exception of the single Flavian Amphitheatre in Rome (the Colosseum), which has become a case study, there are no studies published on most of the sites and monuments in Italy. This review can be a stimulus for scholars and managers in order to undertake targeted campaigns of prospecting of the biological component occurring in these areas and of deepening knowledge on its management in order to preserve this historical and artistic heritage.

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Ecology and functional traits of lichens in the archaeological areas of Latium

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A matrix of the 263 species of saxicolous lichens known to occur in the archaeological areas of Latium and ecological data plus morpho-biological traits, retrieved from ITALIC (the Information System of Italian Lichens), was submitted to multivariate analysis (classification and ordination). The species are ordered along a complex gradient whose main drivers are increasing aridity (paralleled by increasing light intensity) and pH of the substrates. The occurrence of endolithic lichens (mainly on limestone) and of sorediate lichens (mainly in shaded and/or eutrophicated situations) requires special attention whenever their removal is attempted. The use of biocides in the presence of endolithic lichens may cause irreversible damage to the rock surfaces, while mechanical removal of sorediate lichens may increase their further spreading. Heat shock treatments may prove to be the most effective and less harmful strategy for the removal of lichens from monuments, but their growth rates should be always taken into consideration when attempting such measures, which often prove to be ineffective within short time-spans. However, the high lichen diversity of archaeological areas, mainly due to the presence of widely different allochtonous substrata, should be considered as a value in itself. Removal of the lichens should be attempted only when strictly necessary, and their diversity should be highlighted as an added value to the cultural interest of archaeological sites.

Fungi in archaeological areas

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The most renowned examples of the prehistoric use of mushrooms are represented by the stone paintings from Saharan aboriginal tribes of North Africa (ca. 9000 BC.) and the rock paintings of religious rituals in Spain (ca. 6000 years ago). The symbols, statues and paintings created by the Mayas and the Aztecs indicate the consumption of psilocybin mushrooms, especially during religious rituals, as a way to communicate with deities. Other tribes originating in Central America were also involved in magic mushrooms use for similar reasons. In northeastern Greece, western Turkey, and Bulgaria, in the regions known in antiquity as Macedonia, Anatolia, and Thrace, numerous megalithic natural rock formations resemble mushrooms. The monuments resembling mushrooms are sometimes ornamented with carvings or paintings, or associated with folkloric motifs that indicate that the fungi were used as hallucinogenic. In southern India, megalithic monuments (kuda-kallu) of the archaeological site of Aryannoor in Kerala, belonging to the Iron Age, resemble to parasol mushrooms. This representation has been recently taken up by the Berlin architect Jürgen Mayer for the construction of the Metropol Parasol in Seville (Spain). Anthracological researches pointed out the presence of *Basidiomycetes*, *Ascomycetes*, and *Deuteromycetes* (*Imperfect fungi*) which attack both Angiosperms and Gymnosperms in the remains of wood charcoals from archaeological excavations and natural deposits. More recently, the soil bacterial, archaeal and fungal communities inhabiting archaeological human-impacted layers at Monte Iato settlement in Sicily has been characterized. The use of mushrooms in human diets and in the treatment of diseases are also discussed in an archaeological context. Finally, data on the presence of fungi in the Archaelogical Park of Selinunte are here provided.

Plant morphology: outdated or advanced discipline in modern plant sciences?

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Despite an increasing societal awareness and sensitivity about biological diversity and nature conservation as pivotal matters for human survival and well-being, plant systematics has gone through a steady decline in interest, and researches on these topics are often neglected. This particularly applies to plant morphology in its broad sense (i.e. including anatomy, histology, micro-morphology), which has increasingly become marginalized and considered less important than other scientific methods in plant biology. Notwithstanding, even in the current times of genomics (plus other "omics" topics) and functional ecology, when trait-based approaches are essential for studying and understanding plant functions and species relationships, comparative morphology as integrative discipline still assumes a pivotal role, remaining fundamentally relevant to nearly all fields of plant biology.

Lots of studies have demonstrated how vegetative and reproductive characters, and their anatomical and/or micro-morphological structures, can be informative for phylogenetic studies and helpful to solve taxonomic problems at various levels. Most phenotypic traits show adaptive variation and different range of plasticity which have proved to be of great ecological and physiological significance and useful, for instance, in reconstructing plant adaptation to past climatic conditions or establishing defence mechanisms and structural changes in response to stress and climate changes, which all are basic information for nature conservation. Meanwhile, understanding patterns and origins of such morphological modifications is crucial to address main evo-devo questions. The role in other applied sciences, as agriculture, bioengineering, and forensic botany, is no less important.

Contrary to common belief, plant morphology is not a conservative finished science, but, like other sciences, it is open to constant innovations involving concepts (e.g. the shifting from structure-based to function-based evolutionary perspective) and methods. Actually, plant morphology has changed over time and improved its analytical approaches embracing new technologies and tools, without neglecting traditional methods. Examples of such applications will be provided and discussed.

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Potentilla greuteriana (*Rosaceae*), a new species from Mt. Taigetos, S Peloponnisos (Greece)

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Potentilla L. is one of the largest genera in the *Rosaceae* family. Generally, it has a Holarctic distribution, though some taxa are also found in the montane biomes of Southeast Asia. It includes ca. 300 species, distinguished into two sections (*Potentilla tichocarpae* and *P. gymnocarpae*) and several subsections, based mainly on the shape of the style and anthers.

In Greece, 26 *Potentilla* taxa (8 taxa in the Peloponnisos) occur, three of which are endemic: the semi-mountainous *Potentilla arcadiensis* from E Peloponnisos and two mountainous species, *P. kionea* from Mt. Giona, Sterea Hellas and *P. deorum* from Mt. Olimbos, Thessalia.

Potentilla greuteriana Kyriakopoulos, Kamari, Kofinas & Phitos (*Potentilla* sect. *Plumosistylae*), is described as a new species from two localities (Langada and summit Xerovouni) on Mt. Taigetos (S Peloponnisos). The biotope of this new *Potentilla* species is black bituminous, deeply karstified limestone.

The closest relative of *Potentilla greuteriana* is *P. arcadiensis*, which is distributed on the neighbouring Mt. Parnon (E Peloponnisos), but belongs to the sect. *Crassinerviae*. The main morphological differences of the new species from all its related taxa of the sect. *Crassinerviae* (*P. ulrichii*, *P. nerimaniae*, *P. davisii*) and sect. *Plumosistylae* (*P. libanotica* and *P. isaurica*) are discussed. Additionally, the conservation status of the new species is also provided.

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Biodiversity of the genus *Fritillaria* (*Liliaceae*) in Greece

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Fritillaria L. is a genus of perennial bulbous plants, very important from a taxonomic, pharmaceutical, horticultural and karyological point of view. Greece has been characterized as an evolutionary centre of the subgenus Fritillaria L. since there are at least 31 taxa, most of them endemic to the country. Following both morphological and biogeographical data, Greek Fritillaria taxa can be classified into smaller groups.

The chromosome number $2n = 2x = 24$ is common among Greek representatives of the genus, except from *F. montana* ($2n = 2x = 18$). The karyotypes are asymmetrical, consisting of one metacentric and one submetacentric chromosome pair, while the rest are acrocentrics and subtelocentrics. In order to define the differences among the generally similar karyotypes, differentiations such as the presence and morphology of satellited chromosomes, secondary constrictions and B-chromosomes are always emphasized and chromosomes characterized as meta- and submetacentric, satellited or bearing secondary constrictions, are studied as markers. Moreover triploidy ($2n = 3x = 36$ and $2n = 3x = 27$) has been referred for a few Greek *Fritillaria* taxa.

Hybridization in the genus is reported as rare, however in Greece hybrids have been found at areas where two or more taxa co-exist. These hybrids are characterized by morphologically intermediate forms and karyologically different karyotype morphology, ploidy levels and number of B-chromosomes.

The morphological and karyological variety prove the genus is evolving. Hybridization is a very important key to evolution as it can lead to gene flow and consequently to many possible genotypes, sometimes more adaptable to the environment than their parents. In addition, B-chromosomes and polyploidy lead to important genome size variation and consequently to speciation. But what remains as a question is whether these procedures are responsible for the great number of *Fritillaria* taxa in Greece.

Invasive alien species – potential cheap resources of plant substances for medicinal use

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Some alien species demonstrate rather invasive behaviour. They have high tolerance of various habitat conditions and potent propagation ability. They not only over-compete the local vegetation but suppress the seed development of the native plants. In the newly invaded habitats they might not have suitable herbivores to control their populations. The only effective enemy might be *Homo sapiens*. Humans are known with their destructive power once an object has become significant for industrial utilization.

The aim of this study is to review research data and reveal the potential of *Ambrosia artemisiifolia* L., *Erigeron canadensis* L., *Xanthium strumarium* L. and *Dittrichia graveolens* (L.) W. Greuter, as cheap sources of compounds with valuable pharmacological activities.

Ethnobotanical data from their habitats reveal promising medicinal potential. A growing body of scientific literature points to their therapeutic properties. Valuable chemical constituents of these alien invasive species are sesquiterpene lactones, essential oils etc. They possess different activities such as anticancer activity, as well as antitussive, antifungal, antiinflammatory, antinociceptive, hypoglycaemic, antimitotic, antioxidant, antitrypanosomal, CNS depressant activity, diuretic effects, contact dermatitis, insecticidal and herbicidal activities, hepatoprotective and hypolipemic activities etc.

Due to the fact that these are aggressive invasive species, they can provide abundant and cheap resources reach of plant chemical constituents which can be utilized for therapeutic purposes. Additionally, exploitation of the biomass for medicinal use might contribute to relieving the destructive impact of these species on natural habitats.

Botanical Pharmaceuticals: from Bench to Market

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Plants have a long history of use in Medicine and have been used by all cultures or ethnic groups throughout history of humanity. They have always been a common source of medicine either in the form of traditional preparations or as pure active principles. Their use is similar to the way modern pharmaceutical are used today. Many botanical medicines contain curative principal active substances, which have proven to be valuable as primary or supplemental therapies when carefully applied. Plants are an essential source for the discovery of novel pharmacologically active compounds, with many blockbuster drugs being directly or indirectly extracted from plants. Medicinal plant drug discovery continues to provide new and important leads against various pharmacological targets including cancer, HIV/AIDS, Alzheimer's, Malaria and Pain. Approximately 75% of the new chemical entities (NCE's) reported between 1981 and 2006 resulted from studies of natural products.

Botanical drug development is challenging as the inherent nature of these products is that they are generally, extracts of plants rather than chemically pure compounds. The objective of this presentation is to discuss botanical drug development from lead identification, optimization and development to Nonclinical and Clinical Drug Development and regulatory submission and review to marketing approval.

The contribution of starch and phytolith analyses in reconstructing ancient diets

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The dietary practices of ancient populations are the subject of research by archaeobotanists, archaeozoologists and anthropologists. Regarding plant exploitation, assemblages of seeds and fruits in archaeological contexts offer evidence of their use, but this kind of finding is not always available. Therefore, plant micro-remains – mainly pollen, starch grains and phytoliths – constitute a suitable alternative. Starch grains and phytoliths are often found trapped in dental calculus or on the surface of lithic grinding tools. More specifically, dental calculus may be considered a real archive of microscopic food debris, efficiently preserved into a mineral matrix. On the other hand, grinding tools preserve traces of starch-rich plant portions selected, collected and processed to produce flour.

In the last decades, investigation on grinding tools has revealed the exploitation of numerous plants during the Palaeolithic, in particular wild grains and underground storage organs. In these studies, the most ancient evidence of wild cereal processing was found in southern Italy, dating around 32,600 BP. The state of preservation of the micro-remains may also suggest the existence of specific processing; for example, a pre-grinding heat treatment of the grains was likely performed to speed up their drying process and to make grinding easier and faster. Starting with the Neolithic period, populations have progressively enriched the list of food plants, following the dietary changes introduced by agriculture and domestication. Differences in diet habits was proven to occur among populations, in accordance with other archaeobotanical data.

New analyses and more detailed studies of the morphology of these micro-remains are necessary to reach more accurate identifications. The field of morphological research is largely neglected and a standard nomenclature has yet to be definitively established. Consequently, the inherent difficulties in analysing these remains are augmented by a widespread lack of knowledge and scholarly consensus on nomenclature.

Effect of combination of *Citrus bergamia* (*Rutacae*) and *Cynara cardunculus* (*Compositae*) derivatives in liver dysfunction

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Non-alcoholic fatty liver disease (NAFLD) is a metabolic disorder which is considered the hepatic manifestation of the metabolic syndrome, being often related with diabetes and obesity. The development and the progression of NAFLD represents a continuum of events characterised by excessive hepatic fat accumulation (steatosis) in the absence of significant alcohol consumption, which can progress to nonalcoholic steatohepatitis (NASH); fibrosis, cirrhosis, and in some severe cases hepatocellular carcinoma (HCC). Although the evolution of NAFLD have been widely described, to date the molecular mechanisms triggered by an impaired lipid metabolism have not well understood and, as a consequence no approved therapy for NASH currently exists. Bergamot (*Citrus bergamia* Risso & Poiteau) has a particular composition of flavonoids and glycosides in its juice and albedo and it has been shown to have anti-oxidative and anti-inflammatory properties in patients suffering from metabolic syndrome. Moreover, Cynaropicrin, a sesquiterpene lactone of a guaianolide type isolated from artichoke (*Cynara cardunculus* L.) is a potent antioxidant and hence it can play a supportive role for liver in different hepatic diseases. Here, to investigate the protective effect of an innovative and unique combination of Bergamot polyphenol fraction (BPF) and *Cynara cardunculus* extract, known as Bergacyn, against pathological features of NASH, we used the better defined animal model of diet-induced non-alcoholic fatty liver disease (DIAMOND) that mimics the key physiological, cell-signalling, transcriptomic, metabolic and histologic modifications observed in humans suffering from progressive NASH.

Phytochemicals and Nutraceuticals: the biochemical core of the Mediterranean plants

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The Mediterranean lands are ideal sites for providing any kind of green food. In this scenery Sicily may really be considered a Treasure Island. The known benefits from Mediterranean diet, and the ever-increasing awareness of the benefits from consumption of fruits and vegetables, generated a great input in researching about typical Sicilian species and their impact on human health. We first investigated properties and bioactivity of **cactus pear fruits** [*Opuntia ficus-indica* (L.) Mill.] and its characteristic phytochemicals, betanin and indicaxanthin. The latter, only occurring in the cactus pear among the edible fruits, has been the object of most of our research. Chemical, physico-chemical, antioxidant and reducing properties, as well as bioactivities, from anti-inflammatory to anti-proliferative, have been described in various systems, cell cultures and animal models. Moreover, we ascertained that indicaxanthin is highly bioavailable in man, making a real link between experimental set-ups and potential activity in the body.

In other studies on bioactive polymeric proanthocyanidin components of **Sicilian pistachio** [*Pistacia vera* L.], we observed inhibition of the inflammatory response triggered by cytokine IL-1B in human intestinal epithelial cells, suggesting beneficial effects for the gastro-intestinal pathophysiology.

Other investigations on extracts of **caper** [*Capparis spinosa* L.] showed antioxidative activity of caper, including the capacity of reducing the highly reactive hypervalent-iron heme, a radical formed in red meat during cooking. In addition, the extract components from a serving size (8.6 g capers) prevented the autoxidation of meat in a simulated gastric digestion.

Finally we are studying composition, reducing power, antioxidant potential, anti-inflammatory and anti-proliferative activity of **manna**, the product of spontaneous solidification of the sap pouring from appropriate incisions on the bark of the trunk and main branches of two different native species of **ash** [*Fraxinus ornus* L. and *F. angustifolia* Vahl] cultivated in North Sicily (Madonie). In addition, we patented a method to purify, and then re-qualify the waste matter from manna remaining adherent to the bark of the tree.

Macro- and micro-evolutionary perspectives on diversification: linking pattern with process

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Recent reviews have addressed the state of our knowledge on angiosperm evolution, focusing primarily on macroevolutionary patterns. What is still largely missing is the link between macroevolutionary outcomes (in other words, the patterns that we can observe in the distribution of diversity across lineages) and the processes that generate these outcomes. For example, once we identify a genomic, morphological, ecological, or distributional change that appears to be correlated with a shift of diversification rates in a phylogeny, can we discover how the change affected processes of speciation and extinction? What are the likely intrinsic and extrinsic drivers that shape biological variation and species divergence in sympatry vs. allopatry? What is the relationship between species integrity and gene flow at that most challenging of hierarchical levels, where microevolution meets macroevolution? In this talk, I argue that one way of linking macro- and microevolution is by combining studies at multiple hierarchical scales in focal taxa, de facto turning them into model lineages for evolutionary biology. I will refer primarily, but not exclusively, to my work on primroses, where I try to accomplish the goal of relating macroevolutionary patterns to microevolutionary processes. The interconnections between these hierarchical levels can best be elucidated by investigating target taxa and integrating evidence from a range of methodological approaches, including phylogenetics, population genetics, comparative genomics, experimental and functional studies, and morphological and modeling analyses. I will conclude by highlighting current challenges to a more holistic understanding of evolution before suggesting possible ways forward.

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Phylogeny, biogeography and species delimitation in the *Compositae-Anthemideae*

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The chamomile tribe of the sunflower family (*Compositae*, *Anthemideae*) provides a plethora of examples for Biology´s Second Law, which complements Biology´s First Law (´In the absence of selection and constraint, complexity – in the sense of differentiation among parts – will tend to increase.´) by adding that ´Complexity does not increase through differentiation but also through (re)combination, reticulation, and exchange´. Especially hybridisation and homoploid and polyploid hybrid speciation are very common phenomena in the tribe that support the importance of reticulations in plant evolution and the growth of biodiversity. The present contribution will summarise studies of the last years dealing with reticulate evolution in *Anthemis*, *Leptinella*, *Leucanthemopsis*, and *Leucanthemum*. It will also present novel methodological approaches towards hybrid detection, species tree reconstruction in hybridising species complexes, and species network reconstruction in polyploid genera. Methodological progress in species delimitation based on next-generation-sequencing (NGS) will be exemplified in the heavily hybridising, diploid genus *Rhodanthemum* from NW Africa and the polyploid complex of the S European genus *Leucanthemum*

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Discovery and introduction of *Cardamine occulta* (*Brassicaceae*) into Europe

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Schulz in 1903, in his monograph of *Cardamine* (*Brassicaceae*), treated *C. flexuosa* in a wide sense with a number of subspecies, varieties and forms. Out of the infraspecific taxa recognised by him, only *C. scutata* Thunb., *C. fallax* (O.E. Schulz) Nakai and *C. pennsylvanica* Willd. are now generally recognised as separate species. The remaining part of *C. flexuosa* had until recently been treated as a single species without recognising any infraspecific taxa. In 2006, however, Lihová et al. showed that Eastern Asian weedy populations assigned to *C. flexuosa* represent a separate cytotype and genetic lineage. Recently, the name *C. occulta* Hornem. was determined for these Asian populations. While an octoploid level was ascertained for *C. occulta*, the tetraploid level was confirmed for *C. flexuosa*, as well as for their close relatives from Asia, *C. scutata* and the recently described *C. kokaiensis* Yahara & al. The relative monoploid genome sizes were found to be strikingly different between these species. Variation in genome size agrees with different polyploid origins suggested based on genomic *in situ* hybridisation and comparative chromosome painting. These data indicate an autopolyploid origin of *C. kokaiensis* from a parental genome related to *C. parviflora* L. By contrast, an allopolyploid origin has been shown for the other species: *C. scutata* most likely originated via crossing of *C. amara* L. with *C. parviflora*, and *C. flexuosa* from *C. amara* and *C. hirsuta* L. Interestingly, *C. occulta* most probably originated through allopolyploid hybridisation of *C. scutata* and *C. kokaiensis*. While *C. occulta* is widespread in Asia and has been recorded in other continents for a long time, in Europe it was discovered only recently: in 1977 it was collected at Vercelli (Italy) and in 1993 in the province of Alicante (Spain). Nevertheless, currently it is present throughout most of the European countries, its spreading being supported mostly by horticulture.

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The Bryophyte flora of the Sicilian archaeological areas

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The results of surveys conducted in the last two decades on the bryophytes of some Sicilian archaeological areas located in the provinces of Palermo, Catania, Enna, Syracuse, and Trapani are analyzed. The taxonomic, ecological and chorological characters of the floras are compared and the similarity among their species composition is evaluated. Furthermore, the taxa of major phytogeographic interest, whose protection measures have to comply with the conservation requirements of the sites, are highlighted, as well as the most frequent and covering species, of which both the role of biodeteriogens of the ruins and the protective role in the biological soil crusts are emphasized.

From Flora Europaea and Med-Checklist to Euro+Med PlantBase: the never-ending task for a happy Sisyphos

ECKHARD VON RAAB-STRAUBE, WITH EDITORS AND AUTHORS OF THE EURO+MED PLANTBASE

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As of 1st of February 2018, 18 years after the project has begun, the Euro+Med PlantBase (E+M) has finally reached full coverage of vascular plant taxa. E+M now provides free access to a complete checklist of the European and the Mediterranean Flora, including also the Macaronesian Islands and the Caucasus. E+M is the most comprehensive taxonomic information system on plant biodiversity of the region, designed as a dynamic, permanently updated and critically evaluated on-line checklist. However, due to the limited number of active contributors, data quality is still heterogeneous. The bulk of the data originates from the merge of Flora Europaea, Med-Checklist, the Flora of Macaronesia plus ongoing additions from more than one hundred recent standard floras, checklists, taxonomic monographs and floristic publications. Still, ca. 15 % of the taxa had to be taken from external sources, namely from the World Checklist of Selected Plant Families, Kew, and from the International Legume Database and Information Service (ILDIS) for the *Fabaceae*. Work is currently in progress to replace those external data with original, amended and updated E+M data. E+M now contains 224 families with 2409 genera and a total of 44437 taxa (32760 species and 11677 subspecies), including those genera with very large numbers of apomictic microspecies. The database provides 47620 accepted names and 94310 synonyms with standardized nomenclatural citations, misapplied names, orthographic variants, 147804 common names in 53 different languages, 375810 source-referenced distribution records for 46644 taxa, and literature-based distribution maps. Suprageneric classification has been updated and now largely follows the APG IV system. The forthcoming migration of the database to the Common Data Model will allow for easier editing, immediate on-line publication of additions and corrections, easier connection with other data resources, and direct publications of selected datasets for defined regions or taxonomic groups.

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Moroccan Red Data Book: a basic tool for plant conservation

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It is widely accepted that the Moroccan flora and vegetation are amongst the richest and most diverse in the circum Mediterranean countries. Moreover, the flora is characterized by its rate of endemism. However, Morocco's ecosystems, like the ones of the other southern and eastern Mediterranean countries, have been, for decades, undergoing very harsh anthropo-zoogenic pressure. Threats of regression or even extinction of plant (and animal) species are real and serious. Researchers and decision makers are all asked to work hard for the conservation of the national biodiversity. In order to achieve this goal with full knowledge, an inventory of the situation seemed essential. This is how emerged the idea of a Red data book.

Nowadays, the "Red data Book of the vascular flora of Morocco" project is well advanced. To date, six fascicules out of a total of ten have been published, and diffused via the website of the Association Tela-Botanica

The Red data Book deals with all the existing or doubtful plant species in Morocco both in natural or naturalized status (s. l.). They are classified according to the IUCN Red List Categories (World Union for Nature), slightly amended. For Category VU (Vulnerable) EN (Endangered) and CR (Critically Endangered) species, the following information is provided: Biological type; World distribution; Distribution in Morocco.

The Red data book stands also for an updated national floristic inventory, with an updated nomenclature and taxonomy.

The Carob tree: biogeography, ecology and cultural history of a neglected Mediterranean tree

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The Mediterranean thermophilous woodlands were very early impacted by human activities, and are still highly threatened by the destruction and the alteration of their habitats. For forage and fruit trees, the recurring exchanges between natural populations and cultivated agroecosystems constituted a pivotal aspect in the process of Mediterranean fruit tree domestication. Nowadays determining the native status of Mediterranean fruit tree populations represents a major but difficult task for phylogeography because early human influences began just after post glacial migrations. Here we applied geographical genetic methods to tackle this issue for a neglected thermophilous tree, the Carob tree (*Ceratonia siliqua* L., *Fabaceae*) aiming at providing the first genetic diversity report across its entire distribution range. Carob tree is widely exploited for food and forage since Antiquity and currently for industrial, agricultural and soil restoration purposes. The origin of carob tree populations throughout the Mediterranean basin is supposed to be dependent of an historical process of dissemination by humans since its domestication in the Middle-East around 6,000-4,000 BC. However, previous palaeobotanical and vegetation studies stated that the carob is a widespread component of thermophilous forest vegetation and opened a debate about the native or feral status of its populations. The patterns of genetic diversity were compared for populations growing in natural, semi-natural or cultivated habitats. We examined the relative contribution to genetic differentiation of geographical distance, current and past environments and the role of human dissemination routes. Genetic diversity and differentiation analyses revealed unexpected geographical patterns calling for a new appraisal of the domestication pattern of the carob tree in the Mediterranean basin. This research was investigated in the framework of the DYNAMIC (*Deciphering sYmbiotic Networks in cArob-based MedIterranean agro-eCosystems*) French ANR-project.

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Diversity and conservation of subfam. *Carduoideae* (*Asteraceae*) in Bulgaria

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Depth floristic and taxonomic studies on Bulgarian flora began in the late XIX century. As a result several editions of Floras have been published. In 1963 a long-term project to develop a critical Flora of Bulgaria was started, which is still in place. Up to now, 11 volumes have been published and the last 12 volumes are currently being developed by a team of scientists under the framework of the project 'Flora of the Republic of Bulgaria, vol. 12: Biological Diversity in *Asteraceae* subfam. *Carduoideae* and *Cichorioideae*' (ДН-01/7/16.12.2016), financed by the Bulgarian National Fund for Scientific Research. All species included in vol. 12 of the Flora of the Republic of Bulgaria are illustrated by professional artists. The main part of the volume is devoted to the diversity of subfam. *Carduoideae*. This sub-family includes 20 genera and 145 species that represent annuals, biennials and herbaceous perennials, distributed throughout the country from the sea shore to the highest mountain peaks. More than 25% of the species are of conservation significance being Bulgarian or Balkan endemics. The percentage of endangered species is not small. The richest genus is *Centaurea*, with 75 species and 12 subspecies. It is also the richest in species with conservation status: 10 species are Bulgarian endemics; other are Balkan endemics (18 species); 18 species are of conservation significance and are included in the Bulgarian Biodiversity Act. The state of the populations of some of these is quite worrying and action plans have been developed for its improvement. There have been detected 21 medicinal and aromatic species from subfam. *Carduoideae* which are subject to collection by the local people and are included in the National Law on Medicinal Plants.

Relationship between the cypsela of *Echinacea* and its endophyte symbionts

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Cypselas are fruits derived from an inferior ovary, forming a further layer (perianth) outside the fruit pericarp. We investigated the three most frequently cultivated *Echinacea* species (*Asteraceae*) to observe the presence and localization of endophytic microorganisms. Bacteria were observed exclusively within cells of the cotyledons parenchyma. The bacteria were enclosed in membrane structure similarly to the situation observed in other endocellular bacteria such as mycobacteria.

Moreover, the presence of fungi was recorded in the perianth, that is the most external component of the cypsela. This modified residual of the flower is woody and porous in the cypsela and hosts numerous hyphae, that are able to cross the walls between one cell to the other. This presence was never recorded before. The presence of fungi in the cypsela is apparently arrested at the level of the pericarp, containing phytomelanin.

A last microorganisms component is that represented by bacteria strictly adhering to the external side of the perianth.

In conclusion, the observation of the cypselas of three different species of *Echinacea* showed that three different components of microorganisms are carried by the fruit during dispersal. One endocellular bacterial component in the cotyledon; another more generic component adhering to the external side of the perianth, and a fungal component contained inside the porous layer of the perianth, whose remarkable structure may be considered as an adaptation for fungal transport. The endophytic bacteria are reported as possible producers of substances of pharmaceutical interest, while the fungi in the perianth may be important to block the entrance of pathogenic fungi by production of alkaloids. The presence of endophytic bacteria was observed also in the shoot, leaves and roots of the adult plant and we may suggest that these endosymbiont bacteria are carried also at the seed stage.

The cypsela can therefore be described as a unit of dispersal composed by more symbionts.

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Progenitors of cultivated plants in the Iberian Peninsula

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In the Mediterranean area agriculture began in the Neolithic with the introduction into cultivation in the Middle East of a group of cereals, legumes and other crops, which cultivation expanded latter to Europe and the rest of the Mediterranean at a speed not higher than one km per year. None of these crops reached the Iberian Peninsula before the Bronze Era, and during the Paleolithic, Mesolithic and Neolithic, primitive inhabitants survived by hunting, fishing and by gathering fruits, seeds, leaves, roots, etc. of a high number of native plants, of which Evergreen Oak (*Quercus ilex* subsp. *ballota* (Desf.) Samp.) played a basic role, but also Hazel (*Corylus avellana* L.), Stone Pine (*Pinus pinea* L.), Wild Olive (*Olea europaea* var. *sylvestris* (Mill.) Lehr.), White Beam (*Sorbus aria* (L.) Crantz), Rowan (*S. aucuparia* L.), Wiode Service Tree (*S. torminalis* (L.) Crantz), etc, whose use has never been abandoned. Some new crops are being obtained in the Iberian Peninsula by domestication from their native progenitors. Indications are given on the introduction into cultivation of Borage (*Borago officinalis* L.), Golden Thistle (Spanish Oyste Plant; *Scolymus hispanicus* L.) and Bladder Campion (*Silene vulgaris* (Moench) Garke).

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La Famille des Ombellifères (*Apiaceae*) dans le massif de l'Ortles-Cevedale (Alpes Centrales)

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La famille des Ombellifères (*Apiaceae*) dans le massif de l'Ortles-Cevedale (Alpes Centrales) est représentée de 27 taxons. Les échantillons ont été recueillis dans les années 1961-1970 (leg. F. Pedrotti, E. Orsomando, C. Cortini Pedrotti) et sont déposés dans l'herbier de l'Université de Camerino (CAME). Pour chaque taxon, les nouvelles suivantes sont rapportées: nomenclature (selon Flora d'Italia par Pignatti, 1982), altitude au-dessus du niveau de la mer, étage de végétation, ordre de végétation (ordre dans lequel on a trouvé les taxons, même s'ils ne sont pas de taxons caractéristiques au sens phytosociologique). Liste des taxons: *Aegopodium podagrari*a, *Angelica sylvestris*, *Anthriscus sylvestris*, *Astrantia major*, *A. minor*, *Athamanta cretensi*s, *Bupleurum stellatum*, *Carum carvi*, Chaerophyllum aureum, C. hirsutum subsp. hirsutum, C. hirsutum subsp. villarsii, Conium maculatum, *Daucus carota*, *Heracleum sphondylium*, *Laserpitium halleri*, *L. latifolium*, *L. krapfii*, *Ligusticum mutellina*, *Orlaya grandiflora*, *Pastinaca sativa*, *Peucedanum oreoselinum*, *P. ostruthium*, *Pimpinella major*, *P. saxifraga*, *Seseli annuum*, *S. varium*, *Trinia glauca*. Ces espèces sont distribuées de l'étage collinéen à l'étage alpin (m 600-3905). La plupart de ces espèces sont typiques des espaces ouverts (combes à neiges, mégaphorbiaies, prairies primaires, prairies secondaires); très peu sont les espèces némorales ou d'ourlet. Les ordres de végétation sont les suivants: ***Salicetalia herbaceae***, combes à neige, étage alpin: *Ligusticum mutellina*; ***Adenostyletalia***, mégaphorbiaies, étage subalpin: *Peucedanum ostruthium*; ***Caricetalia curvulae***, prairies primaires siliceuses, étage alpin: *Laserpitium halleri*, *Bupleurum stellatum*; *Seslerietalia variae*, prairies primaires calcaires, étage alpin: A*thamanta cretensis*, *Trinia glauca*; ***Festucetalia valesiacae***, prairies secondaires xero-thermophiles, étages collinéen et montagnard inférieur: *Orlaya grandiflora*, *Peucedanum oreoselinum*, *Pimpinella saxifraga*, *Seseli annuum*, *Seseli varium*; ***Arrhenatheretalia***, prairies fauchables, étages collinéen et montagnard: *Heracleum sphondylium*, *Pastinaca sativa*, *Pimpinella major*, *Carum carvi*; ***Molinietalia***, prairies humides, étages collinéen et montagnard: *Angelica sylvestris*; ***Prunetalia***, haies, étages collinéen et montagnard: *Aegopodium podagraria*. Ces espèces ne sont pas liées à des associations particulières, mais elles se trouvent dans des milieux différents, comme forêts clairsemées et pâturages: *Chaerophyllum hirsutum* subsp. *villarsii*, *Laserpitium latifolium*, *L. krapfii*, milieux rudéraux: *Conium maculatum*, *Daucus carota*; mégaphorbiaies et formations d'arbustes (*Juniperus nana* et d'autre espèces): *Astrantia major*, *A. minor*; milieux humides et ruisseaux: *Chaerophyllum hirsutum* subsp. *cicutaria*, ourlets: *Aegopodium podagraria*, *Chaerophyllum aureum* et *Anthriscus sylvestris*.

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Gundelia, from one to many species – an ignored diversity

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For long time in scientific botany the genus *Gundelia* was treated with only one polymorphic species: *Gundelia tournefortii* L.

Gundelia tournefortii was described in 1753 by Linnaeus, all later described taxa have been put back into synonymy by later authors. Therefore during the OPTIMA excursion 2002, plants of this genus have been presented to the participants as "*Gundelia tournefortii*". In 2005 two new localities of *Gundelia* have been found in Armenia, and during the *Compositae* Congress in Barcelona colleagues seeing the photos agreed that these cannot be only one species. The searching for good characters to distinguish these species started.

As soon as the important characters had been identified, step by step all published names of whatever rank have been checked, typified and – as far as possible – the type localities visited.

Gundelia has its centre of diversity in Turkey, reaching Afghanistan in the East, Israel in the South and Cyprus in the West. At the moment 14 species are accepted, distinguishable by general habit, colour of flowers, number of flowers in one partial synflorescence, form and size of fruits, indumentum, climatic and ecological requirements.

Currently accepted taxa: Israel, Cyprus, Lebanon, Syria: *Gundelia tournefortii*; Turkey: *G. anatolica*, *G. asperrima*, *G. colemerikensis*, *G. dersim*, *G. glabra*, *G. komagenensis*, *G. mesopotamica*, *G. munzuriensis*, *G. tournefortii* (incl. *G. cilicica*); Armenia: *G. aragatsi*, *G. aragatsi* subsp. *steineri*, *G. armeniaca*; Iran and Iraq: *G. microcephala*, *G. tehranica*, and *G. rosea*.

There are still names needing clarification: *G. tenuifolia*, *G. tournefortii* var. *araneosa*, *G. tournefortii* var. *armata*, and *G. tournefortii* var. *tenuisecta*.

National Herbarium of Georgia at the Institute of Botany, Ilia State University, Georgia

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The National Herbarium of Georgia at the Institute of Botany of Ilia State University, Tbilisi, is one of the oldest (1845) herbaria in the Caucasus. It is included in Index Herbariorum under the code "TBI".

The Herbarium contains collections of nomenclature types, the Caucasian, Middle Asian, Iranian-Turkish, European, Paleotropical, Grossheim's collections as well as collections of plants of Tbilisi environments, introduced plants (at Batumi, Sokhumi, Tbilisi Botanical Gardens), and the duplicate fund.

The total number of the herbarium specimens exceeds one million, while the number of nomenclatural types exceeds 1000. An important direction in the work of the Herbarium in 2014-2018 has been a survey of the monocot specimens stored at the Herbarium and their arrangement in compliance with modern taxonomy and nomenclature on the basis of electronic databases and relevant monographies. Other important directions include creation of a virtual herbarium of target collections, establishment of a Georgian-English database, herbarium specimen barcoding and promotion of their use at the international level. An exchange program for duplicate material with various leading world centers will become active, promoting, in its turn, replenishment of the herbarium fund.

Poster presentations / Demonstrations

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From the experience of "PLANT" and "PYRGY" EU Projects onwards: interdisciplinary link of medicinal plant science with history and art

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The iconography of medicinal and aromatic plant in art masterpieces can be an interesting contribution to the ethnobotanical knowledge related to the historic period when the artefact was produced. Along herbarium specimens, sometimes misrepresenting the morphological characters, the images inside artistic expressions not meant for scientific purposes, and often related to complex symbolic meanings, are of interest also from the botanical and the pharmaceutical point of view. Within the work of the EU project "Plants in European Masterpieces (PLANT)" we considered 100 species of ethnobotanical interest into 25 paintings and frescoes of XVI century in the Genoese museums or in other museums but having Genoa as a subject. Part of the dissemination activities of the EU project "Strategia d'impresa in settori di nicchia per l'economia agroindustriale del Mediterraneo (PYRGI)"were devoted to the comparative study of a Genoese collection of pharmacy jars, pharmacy recipes of pharmacopoeias used in the past in Liguria, and aromatic and medicinal plants of the Ligurian area. For both projects a relational database ad hoc developed, having specific tables for all the three main sections of study (art, botany and pharmaceutical and ethnobotanical knowledge), was produced. These databases were the backbones of the PLANT desktop application and of the web site for PYRGI respectively. The hyperlink trees allow the user to navigate among reconstructions of ancient recipes, the botanical information and the related masterpiece. The ongoing research is focused on other paintings of the Genoese collections of the Musei di Strada Nuova. The painting *I santi Sebastiano, Giovanni Battista e Francesco*; *Madonna con il Bambino e Angeli* (1502-1503) by Filippino Lippi, is of particular relevance, with 43 entities; 36 of which are herbaceous species. 18 taxa are clearly identifiable, belonging to Pteridophtyes (2 taxa) and Angiosperm Dicotyledons (16 taxa).

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Cladonia subturgida a very little known Mediterranean lichen

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Cladonia subturgida Samp. is a species that for a long time was known only from a single locality in Beira Alta (NW Portugal). After a morphological, chemical and molecular study of similar species it was concluded that *C. subturgida* is a morphologically and chemically polymorphic species that should include *C. iberica* Burgaz & Ahti, but is not related with *C. corsicana* (Rondon & Vězda) Pino-Bodas, Burgaz & M. P. Martín (*C. turgida* var. *corsicana* Rondon & Vězda), and its distribution was enlarged to SW of the Iberian Peninsula.

As result from new collections, this species is much more frequent in other countries of the Mediterranean Region. It has been found in South France, Sardinia (Italy) and Greece (continental areas and Crete).

This species has a persistent primary thallus with long squamules (6-16 × 5-4 mm), upper surface light green to olivaceous and lower surface white to greyish colour. Podetia are not very often encountered, not scyphose, branched, 5.5-15 × 1-2.3 mm, corticated and with open axils. Apothecia are common, dark brown. Pycnidia are very common, on the squamules surface, pedunculated, black. The chemistry is variable with six different chemotypes,but atranorin and protolichesterinic acid are the most frequent substances.

It grows on bare soils or earth bank, preferably acidic or subneutrophilous. The dominant vegetation is *Cistus* shrubs, heathlands, Pinus or oak formations. The altitude ranges from 25 to 1225 m.

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Ecological role and exploitation of *Posidonia oceanica* in the Mediterranean area

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The paleoendemic seagrass *Posidonia oceanica* (L.) Delile (*Posidoniaceae*) represents a key species of the most important and productive ecosystem in subtidal habitats of the Mediterranean Sea. This species is the most common seagrass in Sicily where it forms dense and extensive beds, which are characterized by high coverage and primary production values, along the Western coasts. According to phenological processes, the beaching of *P. oceanica* residues (*banquette*) represents a great environmental, economic, social and, hygienic problem, conflicting with a number of activities (tourism, bathing establishments, etc.). Even though seagrasses play a fundamental ecological role in limiting coastal erosion and promoting the origin of the coastal dunes, the presence of *P. oceanica* residues along the coasts can negatively decrease the tourism value of beaches. As a result, according to national and regional laws and guidelines, local authorities are required to remove banquette and to accumulate it in landfills. In this work, the ancient exploitation and current uses of *P. oceanica* residues are reported according to literature and field data.

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Plant landscape and phytodiversity in the ancient town of Erice (NW Sicily)

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The The town of Erice, in the province of Trapani, is an environmental unicum in the context of the ancient settlements of western Sicily. Its history, substrates, and particular climate, generated by its geo-orographic position, make it a particular hot spot of natural and cultural biodiversity. Located on the top of Mount San Giuliano, in addition to natural habitats with their specific florulas, the town shows small gardens and among the few inhabitants there is a widespread green culture. A tourist destination by its various architectural and landscape historical peculiarities, Erice presents a residential center made up by small stone buildings, with small courtyards or "bagli" often used to house pergolas, decorative or fruit plants placed in pots or in the ground. Protected from the wind - thanks to the special microclimatic conditions that occur at the top of the relief exposed to moist sea breeze- they find the optimal environment to grow and preserve.

The Giardino del Balio, Villa Pepoli and the remains of the park around the town, as well as the Castello di Venere and the various rocky relieves within the town, the old walls of protection of the city, are ideal habitats for many native and cultivated species. Among the former we remember the endemic and very rare *Centaurea erycina*, *Silene nefelites*, and *Brassica villosa* subsp. *drepanensis* Other endemic species find the best habitat in emerging cliffs and in architectural artefacts; they are *Silene fruticosa*, *Dianthus rupicola* subsp. *rupicola*, *Seseli bocconei*, etc. In the same contexts other chasmophytes are also frequent among which *Athamantha sicula* emerges. On the margin of Villa Pepoli, awesome trees of *Prunus mahaleb* subsp. *mahaleb* testify to the ancient settlement of native tree species - rare on the island - then locally cultivated. In the Giardino del Balio, in addition to the ancient borders of *Buxus sempervirens*, luxuriant specimens of *B. balearica* remarks the sub-oceanic character of the climate at the top of Mt. San Giuliano. The presence of a rich contingent of pteridophytes and bryophytes also depends on such climate, including the rare epiphytic moss *Cryphaea heteromalla*, common right on the branches of the two *Buxus* species.

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Botany and Art: acanthus in the Corinthian capital

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As it is known from the history of art, in classical architecture, the capital of the Corinthian order is inspired by acanthus leaves. Acanthus is a generic name, which means that the reference can concern several species of *Acanthus* L. as it is. There are, in fact, two certain species, *Acanthus mollis* and *A. spinosus*, which are two vicariant congeners; the first one is distributed in the western and central Mediterranean (Corsica, Spain, Portugal, France, Italy, Yugoslavia, Sardinia, and Sicily), in the Azores and Balearic Islands; the second one is present in part of the eastern Mediterranean (Albania, Bulgaria, Crete, SE Italy, Greece and Yugoslavia). In this geographical context, *A. balcanicus* of the Balkan Peninsula is also present, from SW Romania to N.W. Yugoslavia (Albania, Bulgaria, Greece, Yugoslavia, Romania and, dubiously Turkey).

The acanthus of the original Corinthian style was *A. spinosus*. More common in Magna Graecia, *A. mollis* has soft foliage with rounded lobes. We have no positive elements leading us to consider *A. balcanicus* too.The capitals of the monuments of Magna Graecia are different from those of the mother country, rather inspired to *A. spinosus* present in the flora of Eastern Europe.

The acanthus leaves did not merely inspire Greek architecture: they were also adopted by the Christians, in the Gallo-Roman capitals and in the sepulchral monuments to symbolize the resurrection.

Why was the acanthus in particular chosen? Was it just for the peculiar leaf morphology or for the plant symbolism in classical antiquity? PIn this regard, the acanthus symbolizes both resurrection and regeneration; in addition, as a perennial herbaceous plant - cyclically subject to dry in the summer season and come back to vegetate since the next winter starting a new cycle - it is ideally suited for being interpreted in art and architecture. Therefore, the biological form (hemicriptophyte) of the two Acanthus species is the basis of its symbolism and its stylistic success. It is also possible that the third species of this genus present in the European flora may have had the same role as the other two congeners, and this represents a working hypothesis to which the authors are dedicated.

The BRAIN website: cooperative network on archaeobotany

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BRAIN - Botanical Record of Archaeobotany Italian Network has been developed after the cooperation of 15 archaeobotanist teams working on Italian archaeological sites. The first cooperation, introduced at the MedPalyno2015 Congress in Rome, produced a joint paper on the role of Botany in improving the knowledge of cultural - archaeological and natural - heritage.

Following the idea that archaeobotany is a key tool 'for the understanding of the bio-cultural diversity', the web site hosts the inventory of the archaeological researches including pollen, palynomorphs, seeds/fruits, wood, charcoals and other plant remains analyses, fruitfully used to deepen the history of past vegetation, land cover, land-uses and palaeoethnobotany. Italy is among the richest countries of archaeobotanical studies in the world, and actually BRAIN includes >650 sites, among which 110 in Emilia Romagna, 74 in Apulia, 67 in Lombardy, 64 in Latium, and 39 in Tuscany. The studies have been mainly carried out on Roman (192 sites), Neolithic (119), Medieval (119), and Bronze age contexts (117). Recently, three new sections were added: Off-sites, Spot records, and Extra-Italy. The website, programmed by Matteo di Lena and Federico Camerini, consists of 6 pages, two of which are especially dedicated to the database including Sites and References. Site position and density are immediately visible in a map while three graphs show updated statistics on the number of sites per area, or cultural period, or type of plant remain. References may be sorted in alphabetical order, or author names.

BRAIN network is an useful instrument for both single or joint researches. The website is also a good way to publicize the impressive work done in the field of archaeobotany in the Italian on-sites (archaeological) or near-sites (human-related environmental sites) and makes the archaeobotanical data available for archaeological researches and studies on conservation and biodiversity on a long-term perspective.

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Contributions to the study of the historical gardens of Sicily. The garden of Villa Filangeri in S. Flavia (Palermo)

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The botanical study of Sicilian historical gardens dates back to 1980 and developed continuously until 2000, when it almost came to a halt. The enquiries made during that period of major activity focused on the major, representative gardens of the city of Palermo. They were followed by enquiries on the gardens in other urban centres of Sicily, among which, in the area of Palermo, those in Bagheria are of note, a city renowned for its big historical villas owned by a some of Sicily's wealthy aristocracy. The slow-down of such studies, especially those on private gardens, was caused by problems to obtain access. However the inventorying continues, as is witnessed by the recent publication of a study devoted to Villa Natoli in Palermo. The present contribution, presenting the species inventory of one garden and mapping the distribution pattern of its greenery, bears witness on of this renewed interest. It concerns the garden of Villa Filangeri in the territory of Santa Flavia, an urban centre adjacent to the city of Bagheria.

The villa and its park initially belonged to the princes Filangeri and eventually came to the counts Lanza of Mazzarino. They date back to the second half of the 18th century. Subsequent to World War II they were gifted to the town of Santa Flavia.

The park, in part kept as a garden, has a surface area of about one hectare. It is situated in the plain of Bagheria-S. Flavia, once covered by dense lemon orchards. Its species inventory is fairly remarkable. It includes many species frequently found in the gardens of Palermo (city and province). alermoand in the ones of the same province. Like other gardens of the same period, it suffered some impoverishment, but it also hosts new acquisitions to enrich the original stock. Succulent plant families predominate, *Agavaceae*, *Aloaceae*, *Cactaceae*, *Euphorbiaceae* and *Apocynaceae* in particular. In terms of genus and species numbers, palms and legumes are best represented. Elements of note are some big trees of *Araucaria* (*Araucariaceae*) and some species rarely found in Sicilian gardens: *Rhus lancea* (*Anacardiaceae*), *Justicia adhatoda* and *Thunbergia coccinea* (*Acanthaceae*), *Colocasia esculenta* (*Araceae*) and *Wigandia caracasana* (*Hydrophyllaceae*).

Why did *Acanthus mollis*, native of West Mediterranean, become a so relevant artistic and symbolic element arising from ancient Greece?

PIETRO MINISSALE

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In classical antiquity many plant species were a source of inspiration in art and architecture. An emblematic case is *Acanthus mollis* L., a West Mediterranean species, although many Mediterranean countries Floras are in contradiction with respect to its native distribution. Two subspecies are known: *Acanthus mollis* subsp. *mollis* distributed in Italy, France and Croatia, and *A. mollis* subsp. *platyphyllus* Murb. growing in Morocco, Algeria and Tunisia. In other Mediterranean countries it should be an introduced taxon, such as in Greece and Turkey where the native species is *A. spinosus* L. Although the maximum spread of the *Acanthus* leaf in architecture occurred in Roman times, the Corinthian capital was born in Greece, portraying *A. mollis*. Among the earliest examples we remember the Doric Temple of Apollo Epicurius at Bassae in Peloponnese, built in 450-425 BC. probably by Ictino, the Tholos at Epidaurus (360-330 BC.), characterized by Doric columns in the exterior, while the inner colonnade consists of 14 Corinthian columns. The leaf carved in the stone is unequivocally that one of *A. mollis*. The invention of the Corinthian capital is attributed, without certain proof, both to Callimaco and Ictino, which operated in Athens and in the Peloponnese. As this species was not present as native in Greece at that time, it was seen and designed taking inspiration from some place in Sicily or Magna Graecia or from cultivated plants originating in those areas. The first examples of this capital fall into areas of Doric ethnicity. A city founded by this ethnic group that had intense cultural exchanges with the mother country was Syracuse, where *A. mollis* is widespread. But further information need to be found in order to understand the genesis of this architectural element, which is an evidence of cultural influences implemented in the motherland starting from the colonies become autonomous.

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Plant landscape and phytodiversity in the archeological area of Segesta (NW Sicily)

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In the system of Sicilian archaeological parks, the area of Segesta - an ancient city of western Sicily referring to the Carthaginian eparchy, - represents, together with Selinunte, Erice and Mothia, another integrated hotspot of biodiversity and archeaology. The current plant landscape is strongly influenced by a millenary anthropic transformation. There are no residual expressions of the original plant covering that, with reference to the environmental potential of the area, can be traced back to the evergreen Mediterranean forest dominated by *Quercus ilex*, presently only sporadically occurring in the area of the ruins, together with other species related to associations and upper syntaxa referable to the class *Quercetea ilicis* (*Olea europaea* subsp. *sylvestris*, *Ceratonia siliqua*, *Pyrus spinosa* s.l., *Rhamnus alaternus*, *Chamaerops humilis*, *Crataegus laevigata*, *Ruscus aculeatus*, *Asparagus albus*, *A. acutifolius*, etc.). Sporadic is the presence of *Celtis australis* and *Ficus carica*.

The whole area of Segesta is included in the potential belt of both maquis and Mediterranean evergreen forest, formations once present but progressively replaced with classical Mediterranean tree crops (olive, almond, carob and vines). The abandonment of these crops allowed the advent of grasslands, sometimes with trees, until the introduction of new plants scattered to further mark the anthropization of the area. Quite widespread in the hill next to the theatre is the garrigue with *Chamaerops humilis* and *Ampelodesnmos mauritanicus*, here diversified by the presence of *Plumbago europaea* which, due to its high degree of coverage, sociability and frequency, is a good unpublished plant association. The whole area is rich in aromatic (*Phoeniculm vulgare*, *Origanum vulgare*, *Mentha pulegium* and *M. rotundifolia*, *Salvia sclarea*) and medicinal species (*Atractylis gummifera*, *Hypericum perforatum*, *H. perfoliatum*, *Sylibium marianum*, *Urginea maritima*).

Elements of landscape importance in spring-summer are *Asphodelus ramosus*, some spiny *Asteraceae*, such as *Cynara cardunculus* subsp. *cardunculus* and *Onopordum illyricum*, and other *Apiaceae*, as *Magydaris tomentosa*, *Thapsia garganica* and the most frequent and expressive *Ferula communis*.

There are several exotic plants introduced in the last century (*Eucalyptus* sp. pl., *Cupressus* sp. pl., *Pinus* sp. pl.), or naturalized since longer time (*Agave americana*, *Opuntia ficus-indica*, *Myoporum serratum*). The presence of the invasive *Ailanthus altissima*, widespread even in the most sensitive areas, has negative repercussions on the stability of the already precarious monuments and on the landscape in general, away from the stereotypical images of Segesta.

Some iconographic documents, dating back to the illustrations of the travellers of the *Grand Tour*, give a representation of the vegetation covering this area before its transformations. It would be advisable inspiring to this period the actions of landscape restoration to be undertaken in this area.

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The plant landscape of the Sicilian archaeological areas through the iconographic documentation of travellers and naturalists

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The landscape is commonly defined as the set of physical and historical-anthropological characters expressed by a territory. Our re-elaboration defines the landscape as the set of perceivable characters of a territory expressed in relation to the stratification of the occurred natural and cultural processes. The *Grand Tour* reports are one of the most effective means to fix at least one stage of evolution from the Sicilian landscape, before its further transformation. These reports provide often a stereotypical image of the landscape of the Island, in particular as regards the major archaeological areas subjected to particular attention by the cultured travellers.

The authors summarize the characters of the plant landscape of the main Sicilian archaeological areas, through the analysis of both the rich documentation handed down by travellers, in particular of the *Grand Tour*, and the descriptions of some naturalists who visited the region, between the second half of the 18th and the whole 19th century portraying and /or describing the most expressive places of its classicism.

In the landscape of these areas, the ruins are almost always framed by men in transit or in front of the archaeological remains or in the surrounding area dedicated to the livestock care, with sparse trees and bushes, sometimes constituted by exotic elements very incisive for the travellers,in majority European from across the Alps; being unknown in the travellers'countriesthey represented very attractive subjects. In fact, *Opuntia ficus-indica*, *Agave americana* and the historicized *Phoenix dactylifera* are frequent. Among the indigenous elements we can recognize *Olea europaea*, *Ceratonia siliqua*, *Ficus carica* and other species of leafy trees, partly survived and still present on the margins of the ancient temples and theatres. Among these there would be *Celtis australis*, *Fraxinus ornus*, *Quercus ilex*, *Ulmus canescens*. In the archaeological landscapes of the time, pines and cypresses are missing: these trees were already introduced and widespread in Italy in Roman times but they appeared around the Sicilian archaeological areas starting from the late nineteenth century.

The subject of this demonstration is presented by relating some photographic images of the places – obviously later - beginning with the Alinari Archive (end of the 800s beginning of the 20th century), with reproductions of iconographic documents by J.P.L.L. Houel (1782-87), P. Brydone (1806), R. Saint-Non (1785), J.W. Goethe (1787) and other travellers (J.F. D'Ostervald, 1822-24; D.-D. Farjasse, 1835; C. A. Schneegans, 1890 and G. Vuillier, 1893). In this path of great utility was the reading of the travel diaries of some naturalists, in particular C.S. Rafinesque Schmaltz (1810) and K. Presl (1817).

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Plant landscape of the archaeological site of Selinunte and its restoration: tribute to scholars and professionals who worked on it

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Plant cover of the Selinunte archaeological site has been receiving special attention by various landscape ecologists, mainly with regard to its restoration. Since the Eighties, the then Superintendent to the western Sicily Monuments, professor **Vincenzo Tusa**, was concerned with the landscape restoration of Selinunte area, and the stabilization of the nearby mobile dunes potentially affecting the ruins excavation in this site, which would rapidly become the widest archaeological park of Magna Graecia thanks to its 270 hectares. Tusa began his work by involving one of the most renowned landscape architects at that time, professor **Pietro Porcinai**, Florentine by birth and leader of a School that left substantial cultural heritage and expertise in Italy. He appreciated multidisciplinary and collaborative approaches, including different specializations such as botany. The then director of the Botanical Garden of Palermo, professor **Andrea Di Martino**, also known for his studies on the flora and vegetation of some circum-Sicilian islands (Pantelleria and Egadi), was requested to cooperate to the project plan, which also involved the first author of this contribution. The vegetation of the area was analyzed and fisionomically typified. Main directives were provided to reconstitute the Mediterranean shrubland, partly covering the ruins, in the degraded or bare areas next to the accesses and the Acropolis. A list of appropriate native plants useful for the intervention was also provided. The results of these plantings, carried out under the direction of the knight **Ettore Paternò del Toscano**, who was an open-minded agronomist and expert of Sicilian gardens, are still visible in the Park to the unaware visitors and to those people, specialists included, who approach them. Hence, this represents a valid example of multidisciplinary methodology for reconstituting and rearranging the natural landscape features in a sensitive area; a good model to be repeated in other archaeological sites, as well as in the remaining degraded areas of the Selinunte archaeological Park.

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Evolution of the forest landscape in the Punic Eparchy area (West Sicily): the importance of cork oak in natural residual vegetation for the purposes in the restoration of the forest landscape

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The natural forest vegetation in the territory of the western provinces of Sicily (Palermo, Trapani and Agrigento) has almost completely disappeared. This area coincides with the ancient administrative territorial unit that precedes the division into three "valleys" of the most inhabited island of the Mediterranean: it is the Val di Mazara, remembered by archaeologists as "Punic Eparchy". As a seat of important Greek cities (Himera, Solunto, Entella, Agrigento, Gela, Eraclea Minoa, Segesta, Selinunte, Erice, Lilibeo, Mozia, etc.), it was a Punic domain before being abandoned. Due to the lack of a marked relief and the benefit of climate, agriculture was practiced for three millennia. In the last centuries – first in extensive and then intensive way – this form of agriculture was progressively occupying all practicable spaces and the cultivation of woody plants replaced the natural vegetation - the scrub and the Mediterranean evergreen forest - thus determining a landscape with a strong agricultural imprint, devoid of forest formations; from almond groves, olive groves and vineyards of classic cultivations it has been passed to modern, more rational woody plants which mainly make up the two extreme provinces, the most important wine and olive cultivation area of Sicily. The study of the remains of the natural vegetation that have been re-ignored – almost always small surviving plant communities in the less suitable spaces for traditional agricultural activities – presently allows us to reconstruct the potential vegetation of the area, partly referring to phytocoenosis of the *Oleo-Ceratonion* (*Pistacia-Rhamnetalia alaterni*) and *Erico-Quercion ilicis* (*Quercetalia ilicis*). In this scenery the cork oak (*Quercus suber*) plays an important role, considering its presence as isolated plants or rather open stands, mainly in the westernmost provinces of the Island. These elements of the local natural heritage can be assessed as important relics of the destroyed climacic vegetation of the extensive area stretching from the northern Tyrrhenian coast to the southern one, in contact with the African sea.

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Contribution to the vascular flora of the Archaeological Park of Selinunte and Cave of Cusa (south-western Sicily, Italy): preliminary results

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The Archaeological Park of Selinunte and Cave of Cusa is one of the largest and most extraordinary archaeological sites in the Mediterranean area. It is included in the SIC (Sites of Community Interest) ITA010011 named "Dunal system Capo Granitola, Porto Palo and Foce del Belice".

The site is located in the southwestern coast of Sicily and it stretches over three hills that from East to West are: Marinella or Eastern Hill, Manuzza and Gaggera Hills.

This park, with almost 270 hectares of extension, houses elements of flora and vegetation of great natural value, but to date, a floristic inventory of the whole area is still missing.

In 2018, the project "Census of the vascular plants of the Archaeological Park of Selinunte and Cave of Cusa" started, with the aim of improving the botanical knowledge of this area.

Many field surveyes were carried out in order to cover the most different habitat types present in the investigated area and to record as comprehensively as possible distribution, diversity and variability of the local flora.

Herbarium specimens have been collected and stored in the *Herbarium Mediterraneum Panormitanum* (PAL). Plant identification has been done with the help of the Flora of Italy and Flora Europaea, while nomenclature follows the updated checklists of the vascular flora native and alien to Italy.

To date, about 450 specific and infraspecific taxa have been recorded and collected. The most represented families are: *Asteraceae*, *Poaceae* and *Fabaceae*. The biological and chorological spectra are respectively dominated by therophytes and by the Mediterranean element. The most important taxa of great naturalistic value are:

1- *Cynara cardunculus* subsp. *zingaroensis*, endemic to W-Sicily, was found in the Eastern Hill. This is the first record for southern Sicily.
2- *Limonium selinuntinum*, endemic to SW-Sicily. The species grows only on the sea cliffs that occur in the Archaeological Park of Selinunte. The whole population is estimated to be fewer than 200 individuals. Its habitat is seriously threatened due to strong anthropogenic pressure.
3- *Retama raetam* subsp. *gussonei*, endemic to Sicily and Calabria (Southern Italy). This taxon grows on more or less consolidated dunes that occur near the Gaggera Hill.

Other taxa of particular biogegraphic interest are: *Ajuga iva* subsp. *pseudoiva*, *Echium sabulicola* subsp. *sabulicola*, *Lomelosia rutifolia*, *Ononis diffusa* and *Pancratium maritimum*.

Alongside these floristic findings of great value, field research has also highlighted critical issues, such as the presence, and sometimes large spread, of some invasive alien species which threaten not only local biodiversity but also the monuments themselves, such as: *Ailanthus altissima*, *Carpobrotus edulis*, *Eucalyptus camaldulensis* subsp. *camaldulensis*, *Phoenix canariensis*, *Pinus pinea*, and *Vachellia karroo*.

The "Sicilian Plant Germplasm Repository" of the University of Palermo: 25 years of activity in biological conservation

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The "**S**icilian **P**lant **G**ermplasm **R**epository" was created in 1993 from the Department of Botanical Sciences of the University of Palermo (SGCR/PA) – today section of Botany and Plant Ecology of the Department "STEBICEF" - with the aim to preserve the genetic diversity of endemic or endangered native plants, species of economical relevance and wild progenitors of plant cultivars. The collections are mostly constituted by seeds, and were recently expanded with tissues and DNA accessions.

The specific tasks of SPGR/PA include the short- and long-term *ex situ* conservation and exchange of seeds, the recovery of the phytogenetic heritage, the reintroduction of threatened or endangered species into the wild, as well as basic research on reproductive biology and conservation strategies.

Furthermore, SPGR/PA contains monitoring collections routinely used for seed quality tests upon and during long-term storage, as well as the safety "black boxes" of seed accessions from other Seed Banks. The core collection, one of the most extensive and representative ones, contains over 480 taxa specific and infraspecific of the Sicilian vascular flora. Within this collection, there are represented 38% of the existing endemic taxa and 32% of the critically endangered ones. More specifically, more than 75% of the taxa listed among "The Top 50 Mediterranean Island Plants" are preserved in the SPGR/PA bank, with over 102 individual accessions. Additionally, the individual entries of the tissue and DNA collections are used for scientific exchange and to promote globally researches in the field of genetic characterization, systematic biology and phylogenetics. Moreover, reference samples, documenting and supporting published scientific researches related to taxonomy of critical species and inherent molecular characterization, are deposited and preserved in separate collections.

Recently, the management of Palermo Botanical Garden and Herbarium Mediterraneum – which has historically and traditionally led the scientific education and research in the field of botany - has been transferred to a newly created athenaeum museum system "SiMuA, Centro Servizi Sistema Museale", whose main aim is to rationalize and advertise university-related museums of all disciplines, and promoting their fruition to a wider audience. Within this context, the fate and scientific mission of SPGR/PA has become uncertain, and a concrete risk of losing both the biological assets and the invaluable scientific expertise and know-how built over the past 20 years has come to light.

From ethnobotany to experimental research: the therapeutic properties of Sicilian hellebore

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In Sicily, the genus *Helleborus* (*Ranuculaceae*) is only represented by *H. bocconei* subsp. *siculus* (= *H. bocconei* subsp. *intermedius*). In some mountain areas of the Island, the rhizomes of this plant, harvested in a particular month of the year (May) and dried, are used in traditional veterinary practice for treating pneumonia in domestic animals, cattle and horses in particular. The same usage – with rhizomes of other *Helleborus* species or subspecies – is reported from various other areas of Mediterranean Europe. Phytochemical tests have permitted the isolation and characterization of new biologically active molecules. The extracts of rhizomes and aerial parts of the plant were shown antibacterial properties. Some compounds, isolated from the methanolic extract of the rhizomes, were shown to be cytotoxic. In addition, morpho-anatomical studies have revealed the presence of different endophytic and commensal fungi in all organs of the plant, which could be isolated and cultured. One of the isolates has been identified as the endophytic fungus *Botrytis bissoidea*, which is also widely present in the soil. Further fungal isolates include *Chaetomium strumarium*, strain *RR1*, an endophytic ascomycete the identity of which was confirmed by molecular analyses. When cultured, it developed plentifully; the filtered broth from these cultures was used in antibiotic property assays. The tests were positive; the detailed results are forthcoming. They support our initial hypothesis, that the therapeutic effect the hellebore's rhizomes extract is due to metabolites produced by an endophytic fungus. It remains to be seen whether the plant itself, devoid of the microfungus, produces the same therapeutically effective metabolites that are present in the extracts of plants from the wild or from outdoor cultivation. The study of the Sicilian hellebore, beyond its biological interest, has potential for its relevance for therapeutic applications both in veterinary and human medicine.

Environmental cartography: methodological and practical references

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The aim of this contribution is to make a reflection upon the methodological question of environmental mapping, aiming to reach a systematization proposal. It is assumed that the considerations made regarding the environment are not only directed to nature itself, but also to society. This elaboration begins through the study of the area of interest focusing on its thematic ramifications via analysis maps. After that, a synthesis approach is made which would confirm analysis characterized by groups of features or variables – the Types of environment – also present in relevant literature on types of landscapes, which would be traced over the synthesis map.

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