FLORA ARAŞTIRMALARI DERNEĞİ

AKDENİZ ÜNİVERSİTESİ 1982

TÜBİTAK

ICMAP

XIII OPTIMA MEETING

March 22-26 2010, ANTALYA/TÜRKİYE

BOOK OF ABSTRACTS

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BOOK OF ABSTRACTS

Edited by Tuna Ekim

Abstracts:

a) Oral Lectures:

b) Posters:

*Sorted by **Name** of **First Author**

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OPTIMA 2010
March 22-26, 2010 / ANTALYA
SCIENTIFIC PROGRAMME

March 22, 2010 Monday

09:00 – 10:30	Registration	Optima International Board & Executive Council Meetings **-A 10-**
10:30 – 11:30	Opening Ceremony and Award Ceremony HALL A-2	
11:30 – 11:45	**Coffee Break**	
11:45 – 12:30	Plenary Lecture by Nurhan ATASOY : Ottoman Horticulture and Western Worlds HALL A-2	
13:00 – 14:00	**Lunch**	

HALL A-2

Botany In Turkey
Chair Person: Adil GÜNER - Musa DOĞAN

14:00 – 14:30	**DOĞAN, M.** Introduction Issues and Trends in the Phytotaxonomic Research in Turkey
14:30 – 15:00	**GÜNER, A.,** Towards The National Botanic Garden of Turkey
15:00 – 15:30	**Coffee Break**
15:30 – 16:00	**CABİ, E.** Systematical Studies and Generic Delimitation on the Genus *Elymus* L. (*Poaceae*) in Turkey
16:00 – 16:30	**CELEP, F.** Revision of the Genus *Salvia* L. (Labiatae) In Turkey
16:30 – 17:00	**DOĞAN, H. M.** Recent Innovations Brought by Geographic Information Systems and Remote Sensing in Vegetation and Flora Studies in Turkey
17:00 – 17:15	**General Discussions**
	Slide Presentations
17:15 – 17:30	***" Turkey's Peerless Flowers"*** by Fatih ORBAY (Nature Photographer)
17:30 – 17:55	***"Silent Scream of the Wild Life in Anatolia"*** by Ali BİLGİNER (Med. Doctor - Nature Photographer)
18:00 – 19:00	**Welcome Cocktail (A FOYER)**
19:00 – 21:00	Dinner

March 23, 2010 Tuesday

	HALL A-5		**HALL A-6**
	History of Mediterranean Botanical Exploration **Chair Person: Ernst VITEK** **co-chair.: Fatih COŞKUN**		**Rare and Threateded plants and habitats** **Chair Person: Jose Maria IRIONDO** **co-chair.: Nezaket ADIGÜZEL**
09:00 – 09:30	**VITEK, E.** Introduction	**09:00 – 09:15**	**IRIONDO J. M.** "Introduction: Rarity and threats in Mediterranean plants and habitats"
09:30 – 10:00	**SALES, F.** Botanical collections in the Mediterranean	**09:15 – 09:45**	**MORENO. J. C.**: "Achievements and challenges of the Countdown 2010 and beyond initiative in the Mediterranean Region"
10:00 – 10:30	**Coffee Break**	**09:45 – 10:15**	**THANOS, C.**"Study cases on conservation of endangered plants and habitats" in Greece"
10:30 – 12:30	**GREUTER, W. & SALES, F.** Mediterranean Herbaria ROUND TABLE	10:15 – 11:00	**Coffee Break**
		11:00 – 11:30	**ESCUDERO, A.**"Conservation of Mediterranean gypsum steppes: understanding community structure at hierarchized spatial and
		11:30 – 12:00	**UĞURLU, E.& Gavilan, R. G.** "Rare oak forests in Turkey: characterisation and threat assessment"
		12:00 – 12:30	**General Discussions**
13:00 – 14:00	**Lunch**		
	HALL A-5		**HALL A-6**
	Geophytes **Chair Person: Georgia KAMARI & Neriman ÖZHATAY**		**Archaeological and xenophytic fossil flora** **Chair Person: Uzi PLITMANN & Mordechai KISLEV** **co-chair.: Hayri DUMAN**
14:00 – 14:30	**KAMARI, G.** & **ÖZHATAY,N.** Introduction	**14:00 – 14:15**	**PLITMANN, U. or KISLEV, M.** Introduction to Symposium
14:30 – 15:00	**FOREST, F. & al.** : Geophytes and the mediterranean-south african biogeographical connection: a particular emphasis on ***Asparagaceae*** and ***Colchicaceae***.	**14:15 – 14:45**	**LIPPI, M.M.** Ancient floras, vegetational reconstruction and man-plant relationships: case studies from archaeological sites
15:00 – 15:30	**TURLAND, N.** : Geophytic weeds in the traditional agriculture of Crete	**14:45 – 15:15**	**LIFSHITZ, N.** Dendroarcheology Of Shipwrecks In Isreal
15:30 – 16:00	**FRIDLENDER, A.** Genome size assessments of some Mediterranean geophytes	15:15 – 15:45	**Coffee Break**
16:00 – 16:30	**Coffee Break**	**15:45 – 16:15**	**MELAMED, Y.** Locally Extinct Plants Found At The 780,000 Years Old "Gesher Benot Ya'aqov", Israel
16:30 – 17:00	**PUSTAHIJA, F. & al.:** Genome organization of some Mediterranean geophytes – facultative serpentinophytes	**16:15 – 16:45**	**KISLEV, M.** The Secret of good life at the Moyat Awad-A Station on the Incense Road
17:00 – 17:30	**PERUZZI, L.** : Chromosome diversity and evolution in *Gagea* Salisb. (*Liliaceae*)	**16:45 – 17:15**	**General discussion**
17:30 – 18:00	**MARQUES, I. & al.:** Consequences of natural hybridization in geophytes: disentangling the origin of orphan hybrid populations in *Narcissus*.	**17:15 – 18:30**	**Poster Session** **HALL A-1**

18:00 – 18:30	**General discussion**		
18:30 – 19:00	**Poster Session HALL A-1**		
19:00 – 21:00	**Dinner**		
March 24, 2010 Wednesday			
	CONGRESS EXCURSION TO GEMBOS PASTURE		
09:00	Departure		
	Lunch		
18:00	Arrival		
20:00 – 23:00	**Congress Dinner HALL A-2/A-3**		
March 25, 2010 Thursday			
	HALL A-5		
	Integrating molecular and "traditional" taxonomy Chair Person: Tod STUESSY co-chair.: Ahmet DURAN		
09:00 – 09:15	**STUESSY, T.** Introduction to symposium		
09:15 – 09:45	**EHRENDORFER, F.** Lessons on integration from a half-century of change in plant systematics: *Carlina* and other examples.		
09:45 – 10:15	**LACK, W.** Why is there a worldwide decline in monographic plant systematics, and what can we do about it?		
10:15 – 11:00	**Coffee Break**		
11:00 – 11:30	**MARHOLD, K.** Have cytology and morphometrics already been absorbed into traditional systematics?		
11:30 – 12:00	**OBERPRIELER, C.** Ariadne's double-helical thread – the role of DNA in modern floristic and monographic research.		
12:00 – 12:30	**STUESSY, T.** Is there really a conflict between traditional and molecular systematics?		
12:30 – 13:00	**Discussion**		
13:00 – 14:00	**Lunch**		
	HALL A-5	**HALL A-6**	
	Effects of Global change on Mediterranean Plant life Chair Person: Fernando VALLADARES co-chair.: Murat EKİCİ	**Mediterranean Leguminosae Chair Person: Yuri ROSKOV & Olja VASIC co-chair.: Tekin BABAÇ**	
14:00 -14:15	**VALLADARES, F.** General overview of global change in Mediterranean ecosystems	**ROSKOV, Y.** Introduction	
14:15 – 14:45	**CABELLO, J.** Ecosystem functioning in the dry Iberian Southeast: baseline conditions and temporal trends during a positive NAO period	**ESSOKNE, R. S. & JURY, S.** Field and Laboratory-based approaches to a revision of *Adenocarpus*.	
14:45 – 15:15	**KIGEL, J. & al.** Productivity-diversity relationships in Mediterranean herbaceous vegetation: testing effects of precipitation scenarios along a climatic gradient	**PINA, F. & VALDÉS, B.:** Proposals for a Rearrangement of *Lotus* sect. *Lotus* (*leguminosae*) Based on its Variability in the w Mediterranean Area	
15:15 – 15:45	**LINARES, J. C.& al.** Global Change effects on relict Western-Mediterranean mountain forests	**BRULLO, S., GIUSSO del GALDO, G. & MUSARELLA, C.:** Taxonomic revision of the *Astragalus angustifolius* Lam. group (*Leguminosae*).	
15:45 – 16:15	**Coffee break**		
16:15 – 16:45	**CARREIRA, J. A. & al.** "Management Adaptation Options to Climate Change in Relict Mediterranean Mountain Conifer Forests: a conceptual model and practice linking Ecophysiology and Landscape Ecology."	**CRISTOFOLINI, G., GALLONI, M., PODDA, L., & VIVARELLI, D.:** Pollination ecology provides some new insight into evolution and systematics of Mediterranean legumes.	
16:45 – 17:15	**LLORET, F. & al. :** "Climatic suitability of tree species from the Iberian Peninsula under climate change scenarios"	**MAXTED, N., SHEPARD, J., AMRI, A., STREET, K., SHEHADEH, A., PIGGIN, J. & KONOPKA, J.:** Temperate Forage and Pulse Legume Genetic Gap Analysis.	
17:15 – 17:45	**NAGY L.: "**Climate change impacts in Mediterranean high mountains"	**BISBY, F. & ROSKOV, Y.:** ILDIS legumes in the Catalogue of Life, Encyclopedia of Life, GBIF Biodiversity Portal and other major biodiversity resources on line.	
17:45 – 18:15	**Discussion**		
18:15 – 19:00	**Poster Session HALL A-1**		
19:00 – 21:00	**Dinner + BBQ Party (Botanic GARDEN)**		
March 26, 2010 Friday			
	HALL A-5	**HALL A-6**	
	Botany In Turkey II Chair Person: K. Hüsnü Can BAŞER	**Plant Differantiation on heavy-metal soils Chair Person : Federico SELVI co-chair: Mecit VURAL**	
09:00 – 09:15	**BAŞER. K.H.C.** Introduction	**09:00 - 09:20**	**SELVI,F.** Introduction
09:15 – 09:45	**ERTUĞ, F.** " Ethnobotany in Anatolia: Current Challenges and Issues"	**09:20 – 10:00**	**BAKER,A.** Metallophytes: a unique biological resource for mine site remediation, ecological restoration and phytomining
09:45 – 10:15	**TARIKAHYA, B.** "Taxonomy of *Symphytum* (Boraginaceae) with Special Emphasis on Turkish Species"	**10:00 - 10:30**	**ADIGÜZEL, N., REEVES R. D.** Important Serpentine Areas of Turkey and Distribution Patterns of Serpentine Endemics and Nickel Accumulators -
10:15 – 10:45	**YAPRAK, A. E.** "Taxonomic revision of *Salicornia* L. Section ***Dolichostachyae*** A. J. Scott"	**10:30 – 11:00**	**CECCHI, L.** Evolutionary lineages of Ni-hyperaccumulation and systematics in Europaean *Alysseae* (**Brassicaceae**)
10:45 – 11:15	**Coffee Break**	11:00 – 11:30	**Coffee Break**
11:15 – 11:45	**BAKIŞ, Y.** Optimization of Morphological Data in Numerical Taxonomy Studies.	**11:30 – 12:00**	**CRESPI, A.L.** Morphological and trace metal accumulation analysis of *Antirrhinum ophioliticum (Plantaginaceae)*, a new taxon of the ultramafic rocks of NW Iberian Peninsula -

11:45 – 12:15	**AKAN, H.** "The Botanical Tourism in Turkey"	**12:00 – 12:30**	**MENGONI,A.** Metallophytes, hyperaccumulators and their bacteria: the view from an ecological genetics perspective
12:15 – 12:45	**General Discussions**	**12:30 – 13:00**	**General Discussions**
13:00 – 14:00	**Lunch**		
	HALL A-5		**HALL A-6**
	The role of irano-turanian elements in the evolution of Mediterranean Flora **Chair Person: Frederic MÉDAIL** **co-chair.: Atabay DÜZENLİ**		**Socio-economic and ecological effects of plant introductions in the Mediterranean** **Chair Person: Vernon HEYWOOD** **co-chair.: Füsun ERTUĞ**
14:00 -14:30	**MÉDAIL, F.** Biogeographical links between the Irano-Turanian and the mediterranean floras.		**HEYWOOD, V.** Socio-Economic and Ecological Effects of Plant Introductions In The Mediterranean: An Overview
14:30 – 15:00	**PONEL, P.** Comparing post-glacial vegetation dynamics of deciduous oak woodlands in the Irano-Turanian and Mediterranean regions.		**BRUNEL S.** Socio-Economic And Ecological Effects Of Plant Introductions In The Mediterranean. Plant Invasions In The Mediterranean
15:00 – 15:30	**VALLÈS J. &al.** Molecular phylogenetic and cytogenetic insights to genera with Mediterranean and Irano-turanian taxa. Case studies in the *Asteraceae* .		**BERMEJO, Es. H.** Impacts of the introduction of ornamental plant species on urban and peri-urban landscapes
15:30 – 16:00	**Coffee Break**		
16:00 – 16:30	**FREITAG H. & KADEREIT, G.** *Chenopodiaceae* in the Mediterranean and their evolutionary relationships with the Irano-Turanian region.		**Discussion**
16:30 – 17:00	**PAROLLY, G.** Phytogeographical relationships between Irano-Turanian and Mediterranean floras in rocky habitats of E. Mediterranean		
17:00 - 17:30	**Discussion**		
17:30	**GENERAL MEETING OF OPTIMA AND CLOSING CEREMONY** **HALL A-5**		
20:00 – 22:00	**Dinner**		
March 27, 2010 Saturday / Post Congress Tour I			
07:30	ÇIĞLIKARA - NATURAL CONSERVATION AREA (ELMALI)		
c. 20:00	Arrival		
March 28, 2010 Sunday / Post Congress Tour II			
09:00	KÖPRÜLÜ KANYON NATIONAL PARK (MANAVGAT)		
c. 18:00	Arrival		

ORAL PRESENTATIONS

METALLOPHYTES: A UNIQUE BIOLOGICAL RESOURCE FOR MINE SITE REMEDIATION, ECOLOGICAL RESTORATION AND PHYTOMINING

A. J . M. BAKER
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Metallophytes – plants that have evolved on metal-enriched soils – have key 'values' that must drive research on their unique properties, and ultimately their conservation. The ability of metallophytes to tolerate extreme metal concentrations commends them as the optimal choice for ecological restoration of mineral wastes and metal-contaminated sites. Metallophytes have also spawned several novel phytotechnologies, including phytoextraction and phytomining. Action towards conserving the global metallophyte resource base is imperative because many species are under threat of extinction from mining activities. This has been identified as a priority in the Mining, Minerals and Sustainable Development (MMSD) Project of the Global Mining Initiative in 2002, but positive responses from the minerals industry have been slow. The last decade has however seen an ever-increasing interest in metal-tolerant and metal-accumulating plants both from an academic standpoint and their use in restoration and phytostabilization. Few studies have highlighted the need to conserve these species. This paper identifies future research needs for the conservation and utilization of the global metallophyte biodiversity with some specific examples from mediterranean Europe.

Keywords: metallophytes, phytotechnologies, phytoextraction, phytomining, phytostabilization, ecological restoration.

TOWARDS THE NATIONAL BOTANIC GARDEN OF TURKEY

Adil GÜNER[1], Vehbi ESER[2]

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History and the current situation of botanic gardens in Turkey is summarized with special reference to some active botanic gardens. The Ministry of Agriculture and Rural Affairs has decided to establish a National Botanic Garden in response to the need and demand expressed mainly by scientists and specialists from the Ministry. The short history of the developments about the National Botanic Garden is given. The results of the mission statement workshop held by the Ministry are mentioned as the expected future of the National Botanic Garden.

Keywords: National Botanic Garden, Turkey.

CONSERVATION OF MEDITERRANEAN GYPSUM STEPPES: UNDERSTANDING COMMUNITY STRUCTURE AT HIERARCHIZED SPATIAL AND TIME SCALES

Adrian ESCUDERO

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In order to mitigate the impact of global change drivers on specialized soil systems such as those occurring on semiarid gypsum outcrops, it is very critical to know how they vary in time and space. Recently we have experimentally showed how gypsophytes respond to these changes and more specifically how do different drivers interact on plant performance. However it is prioritary to scale up this knowledge to the community level in order to develop a proper management at the whole system level. With this in mind we have explored how the structure and composition of different community attributes of these systems including biological soil crusts and plant communities varies in space and time. We have studied a detailed chronosequence spanning for almost 100 years with more than sixty sites with different ages from abandonment. In all these sites the complete plant community was surveyed together with their permanent soil seed banks and a complete set of predictors. In parallel we have surveyed the structure and composition of the biological components of these communities at several spatial scales (regional to very local) and related to different surrogates of ecosystem functioning.

Taken all together we found that these steppes are able to rapidly recover from disturbance. Secondary succession on specialized Mediterranean soils does not follow the widely described ‘‘amelioration’’ process in which soil features and composition are closely related over time. In addition we also concluded that restrictive soil conditions control both structure and functioning of mature communities at hierarchized scales, independently of the nature of the community compartment.

Keywords: Biotic interactions, Environmental filtering, Gypsum vegetation, Land abandonment, Succession

TAXONOMIC REVISION OF *SALICORNIA* L. (*CHENOPODIACEAE*) SECT. *DOLICHOSTACHYAE* A.J. SCOTT. IN TURKEY

Ahmet Emre YAPRAK[1], Gül Nilhan TUG[2], Ender YURDAKULOL[3]

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Salicornia Sect. *Dolichostachyae* consists of approximately ten species which are mainly distributes in lower parts of coastal salt marshes in Eurasia. Taxonomy of the section is problematic like the other sections of the genus and very little known about the section from Turkey. Before our study, known species of the section from Turkey are *S. fragilis* Ball & Tutin and *S. dolichostachya* Moss. without certainty. We determined S. fragilis as a doubtfull record and confirmed the presence of *S. dolichostachya* Moss. and recorded *S.emerici* Duval-Jouve as a new species record from Turkey. Finally three species belonging to this section recognised from Turkey, namely: *S. dolichostachya, S.emerici* and *S.freitagii* Yaprak & Yurdakulol. Chromosome number of *S. dolichostachya, S.emerici* are reported first time from Turkey and *S.freitagii* first time for science. We have discussed morphological and ecological characteristics of these species. Since rDNA ETS sequences of these species are identical, Amplified fragment length polymorphisms (AFLP) were utilized to examine systematic relationships in the section.

Keywords: *Chenopodiaceae, Salicornia, Dolichostachyae,* Turkey, AFLPs

GENOME SIZE ASSESSMENTS OF SOME MEDITERRANEAN GEOPHYTES.

Alain FRIDLENDER

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Botanists have been interested in Mediterranean bulbs for a long time. In spite of numerous, and quite complete, studies about some genus (*Tulipa*, *Iris*, *Crocus*, *Narcissus*, *Scilla*, etc.), our knowledge about systematic, distribution, or populations state of conservation remain incomplete.Even recent monographs about some genus are far from solving all the taxonomic and field identification problems. Furthermore, we poorly know the threats concerning those species (horticultural collects, urbanization, agricultural changes, etc.). Chromosomal studies, and more recently DNA studies, improved our knowledge in bulbous species. For a few years, genome size investigations also allowed us to consider the geophytes with a new approach. 2C DNA values open new perspectives in the study of geophytes diversity (field inventories, identification, conservation, etc). The recent studies on *Colchicum, Narcissus, Arum* show the interest of flow cytometry.

Keywords: Mediterranean, bulbous geophytes, DNA amount, flow cytometry.

METALLOPHYTES, HYPERACCUMULATORS AND THEIR BACTERIA: THE VIEW FROM AN ECOLOGICAL GENETICS PERSPECTIVE

Alessio MENGONI

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In the past years there has been an increasing interest in the application of ecological genetic methodologies to the flora from heavy-metal rich soils, due to their peculiarity as a model for evolution and adaptation. Facultative and obligate metallophytes have evolved in different taxonomic groups to take advantage from living in such toxic soils. Within them, special interest has been dedicated by our research group to *Silene paradoxa*, *Onosma echoides* and to the nickel-hyperaccumulator *Alyssum bertolonii*. We performed molecular population genetics studies on such species and on their associated microflora, discovering an unexpected high genetic diversity and the molecular evidences of a "facilitated adaptation" which allowed to rapidly colonize heavy-metal rich soils evolving the physiological adaptation needed to cope with such harsh environment. I'll review and discuss the main findings of the works done pointing out to some unanswered questions which could benefit from the application of ecological genetics methodologies, especially in the analysis of the relationships between metal hyperaccumulators and their associated bacteria.

Keywords: Serpentinophytes, microevolution, hyperaccumulation, plant-associated bacteria.

TAXONOMY OF *SYMPHYTUM* (*BORAGINACEAE*) WITH SPECIAL EMPHASIS ON TURKISH SPECIES

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With this research, *Symphytum* species growing in Turkey were revised by using morphological characters, nuclear ribosomal ITS and chloroplast trn$L_{(UAA)}$ sequences. Beside all Turkish *Symphytum* species, phylogenetic analysis involved 10 *Symphytum* species growing outside of Turkey and 25 species from related genera, to increase the credibility of the analysis. Results indicate monophyly, a single origin of taxonomically doubtful genus, *Procopiania* Guşuleac and *Symphytum*. Phenetic analysis was performed by numerical methods and 4 groups that comprise Turkish species were determined. The speciation and evolutionary relationships were discussed. Species were listed with the help of morphological affinities and phylogenetical relations. *S. sylvaticum* subsp. *sepulcrale* var. *sepulcrale* and *S. sylvaticum* subsp. *sepulcrale* var. *hordokopii* and *S. asperum* var. *armeniacum* subspecies were suggested as synonymy.

Keywords: *Symphytum*, *Boraginaceae*, revision, molecular phlogeny

ARIADNE´S DOUBLE-HELICAL THREAD – THE ROLE OF DNA IN MODERN FLORISTIC AND MONOGRAPHIC RESEARCH

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Of the three main fields of systematics, i.e., taxonomy, phylogenetics, and evolutionary biology, especially the latter two have gained an extraordinary push in the last two decades through the incorporation of DNA-based sources of information (sequence data, fingerprint methods). In analogy to the science of physics (with the exception of a flagrant imbalance concerning the financial support between these two fields of basic research), these new methods equipped us both (a) with ´phylogentic telescopes´ that allow us to look back in time by reconstructing the evolutionary history of a organism group and to infer its temporal, spatial, and ecological differentiation (macroevolution), and (b) with ´population genetic particle colliders´ that allow us to answer the question which forces keep the world (the biological entities of species) together in its interior and what processes lead to the differentiation of populations, drive the speciation pump, and eventually influence the change of biodiversity (microevolution). In contrast to the mentioned three main fields of systematics that have been (and still are) methodologically ripening throughout the centuries (taxonomy) and decades (phylogentics, evolutionary biology), the intersections among these three fields provide considerable and hitherto poorly addressed problems that form obstacles in our way towards the genuine focus of systematics, being the compilation of a comprehensive catalogue of life-forms accompanying mankind on ´spaceship earth´ and the understanding and appreciation of mechanisms responsible for this diversity. Integration of taxonomy and phylogenetics (intersection A) is hampered by unsolved discussions concerning the incorporation of phylogenetic results into the classification and nomenclature of entities above the species level, intersection B (phylogenetics and population genetics) demonstrates that most of our phylogenetic reconstructions are rather gene trees than species trees, and intersection C (evolutionary biology and taxonomy) is the home of the impenetrable labyrinth of species concepts and definitions. Despite those DNA-based methodological obstacles that may have gained considerable attention by some systematists and (by others) were considered to detract too much funds and working power from basic taxonomical research, we should explore in more detail the chances that could arise from the inclusion of molecular information into floristic and monographic research. A main focus of the present paper will be on the changes and limitations of ´DNA barcoding´ in taxonomy and the possibilities of molecular methods to explain morphological, phytochemical, and ecological diversity in plants.

Keywords: evolutionary biology, DNA barcoding, taxonomy, phylogenetics, phyogenomics, species.

STUDY CASES ON CONSERVATION OF ENDANGERED PLANTS AND HABITATS IN GREECE

Costas A. THANOS

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The Greek flora is among the richest in Europe and the Mediterranean Basin; it comprises a total of about 6500 taxa (with a high level of endemism, ca 17%), distributed over 13 discreet floristic regions and numerous (ca 115) diverse habitat types. A recent overview of the conservation status of Greek endemics indicates that at least 40% of them are threatened or near threatened while, similarly, many habitat types are challenged by considerable anthropogenic and climatic risks. On the other hand, during the past decade, a significant number of projects have increasingly addressed several conservation issues (ecological research, field inventorying, monitoring, management and environmental awareness), mainly through the implementation of the European Habitat and Species Directive (92/43/EEC) and the Global (and European) Conservation Strategy initiatives. Case studies will be presented referring to:

(a) the LIFE+ Project 'JUNICOAST - Actions for the conservation of coastal dunes with *Juniperus* spp. in Crete and the South Aegean (Greece)' that is currently implementing conservation actions on the priority habitat '2250* - Coastal dunes with *Juniperus* spp.' in several locations of southern Crete. Particular emphasis is placed on determining the *Juniperus macrocarpa* population size, composition and structure (sex ratio, reproduction and regeneration, growth, age distribution).

(b) the LIFE Project 'CRETAPLANT - A Pilot Network of Plant Micro-Reserves in Western Crete' which led to the establishment of 7 high-biodiversity, small-scale nature reserves, each characterized by 6 plant species of European Community priority: *Androcymbium rechingeri*, *Anthemis glaberrima*, *Bupleurum kakiskalae*, *Cephalanthera cucullata*, *Hypericum aciferum*, *Nepeta sphaciotica* and priority habitat type 9370, *Palm groves of *Phoenix*.

(c) the European Projects ENSCONET and SEMCLIMED and relevant activities of two important, recently established, Greek Seed Banks on the *ex situ* conservation of numerous, threatened plants.

Keywords: endemic plants, threatened plants and habitats, in situ conservation, monitoring, seed banking

RARE OAK FORESTS IN TURKEY: CHARACTERISATION AND THREAT ASSESSMENT

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Eighteen species of native oaks grow in Turkey. As a group, these oaks are adapted to a wide variety of habitats, from wet riparian zones to dry rocky hillsides, forming extended forest. The land area is 780,576 km^2. Total forest area is 211,000 km^2 , of which 30 % belongs to oak forest.(nearly 65 000 km^2). Oak forest covers a great part (8,3 %) of the Anatolian plateau, from west to east and north to south, in an altitudinal range from 20 m to 2200 m, growing from thermo-Mediterranean to Oro - Mediterranean bioclimatic belt . Some species are widely distributed, while others have a much more limited range, like *Quercus petraea* subsp. *pinnatiloba*, *Quercus aucheri* or *Quercus vulcanica*. They are endemic from Turkey and they need conservation priorities, not only the species themselves, but also the forest they form, representing the potential vegetation of such territories. Most vegetation studies on these forests have been made from a phytosociological perspective (Adıgüzel,Vural 1995, Akman et al. 1978, Akman, İlarslan 1983, Behçet, 1994, Bekat, Seçmen 1984, Duman 1985, 1995, Ekim, Akman 1991……..Vural et al. Yarcı, 2002, Yurdakulol et al. 1998), but present knowledge on these types of vegetation is sparse and in many cases not very accurate, so we are developing a project to address some of the main aspects of the Oak communities in Turkey, that could serve for a better understanding of the Turkish landscape and to give the basis for a better way to conserve them:

1) We have compiled a database of all Oak vegetation relevés in Turkey. Data has been obtained from publish and unpublished data, but also forest are being sampled during the spring of 2008 and 2009.

2) To get a classification of all vegetation types, we have carried out different multivariate analyses that show the floristic separation of them and the general biogeographical pattern distribution.

3) A part of the information extracted from the multivariate analyses can also be explained by climatic features, so we pretend to get the climatic envelopes that best define any of these vegetation types.

Keywords: Vegetation, *Quercus*, Multivariate Analyses, Turkey

SYSTEMATICAL STUDIES AND GENERIC DELIMITATION ON THE GENUS *ELYMUS* L. (*POACEAE*) IN TURKEY.

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An updated synopsis of *Elymus* s.l. (Gramineae) in Turkey is presented on the basis of revisional study conducted by the authors on the tribe Triticeae in Turkey between 2006-2009. Since Linnaeus (1753) described the genus *Elymus* L. with original six taxa, (*E. arenarius*, *E. sibiricus*, *E. canadensis*, *E. virginicus*, *E. caput-medusae* and *E. sitanion*), lots of transfers have been occurred between *Elymus* and other closely related genera or *vice versa*. The last comprehensive taxonomic treatment of Elymus in Turkey was made by Melderis (1985) who recognized 19 species in the Flora of Turkey and the East Aegean Islands volume 9 without giving any infrageneric grouping. In our revisional study, the genus is treated in its narrow sense including the genera *Elytrigia* Desv. and *Roegneria* K. Koch. However, *Pseudoroegneria* (Nevski) A. Löve and *Thinopyrum* A. Löve are morphologically clearly distinct groups and should be recognized as different genera from the *Elymus* s.l. on the basis of genomic concepts and morphological characters. As the arguments for recognizing the *Roegneria* and *Elytrigia* are not sufficiently persuasive, therefore we evaluated them in the genus *Elymus*.

Keywords: *Elymus*, generic delimitation, Turkey, *Pseudoroegneria*, *Thinopyrum*

GENOME ORGANIZATION OF SOME MEDITERRANEAN GEOPHYTES - FACULTATIVE SERPENTINOPHYTES

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In this work we report the changes of the genome organization in some serpentine populations for three lilies species (*Lilium albanicum*, *L. bosniacum* and *L. martagon*) and Poet's daffodil (*Narcissus poeticus* L.), in comparison with other populations growing in optimal conditions in the region of Dinaric Alps. The karyotype and chromosomal organization were analyzed by fluorochrome banding (chromomycin A_3 and DAPI) and double Fluorescence *In Situ* Hybridization (FISH) using 18S-5.8-26S and 5S rDNA probes. It was observed that populations from stressful and not optimal environment conditions such as atypical serpentine substrate possessed B chromosomes bearing rDNA genes. It was confirmed that in all atypical populations the presence of one or two CMA positive bands on B chromosomes corresponded to 18S, or sometimes to 5S rDNA loci (*Lilium bosniacum*). These supplementary 18S loci at B chromosomes are probably active, since the increased number of nucleoli was observed.

This study supports the hypothesis that superior plants surviving in atypical natural habitats frequently generate B chromosomes which can present some adaptive advantages. Furthermore, it provides opportunity for complex investigations of possible role of B chromosomes.

Keywords: *Narcissus*, *Lilium*, B chromosomes, heterochromatin pattern, rDNA organization

BOTANICAL COLLECTIONS IN THE MEDITERRANEAN

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The roots of plant taxonomy are very much connected with the Mediterranean. As a result, this area of c. 2.090.000 km^2 houses 229 herbaria registered in Index Herbariorum and a declared total of c. 28.000.000 specimens involving 21 countries. The size of the collections varies substantially but the majority fall under the "magic" number of 74.000 specimens, the number suggested to be adequately curated by 1 full-time staff. Some of these Mediterranean herbaria house material of particular (Mediterranean) collector(s) and are historical in nature; at the other end of the spectrum, others have expanded their scope, even to the faraway ex-colonies and are very active.

A project on the historical collection of Moritz Willkomm "*Herbarium mediterraneum pyrenaicum et canariense*" housed at COI, involving databasing, imaging, restoration and typification, prompted us to the exercise of extrapolating from this study case to the vast collections in the Mediterranean in financial terms and timescales. The exercise is meant to be thought provoking. Some data refer specially to the situation in Turkey. Suggestions are made on the way forward in the light of modern herbaria requirements and the global initiatives.

Keywords: botanical collections infrastrucutre; Mediterranean; databasing; Willkomm herbarium; Turkish herbaria cost assessment

GEOPHYTES AND THE MEDITERRANEAN-SOUTH AFRICAN BIOGEOGRAPHICAL CONNECTION: A PARTICULAR EMPHASIS ON *ASPARAGACEAE* AND *COLCHICACEAE*

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The winter-rainfall zone of southern Africa and the Mediterranean Basin are two of the five regions of the world with Mediterranean-type climates. Both regions present high plant species diversity combined with a high level of endemism, which qualifies them as two of the Earth's 34 biodiversity hotspots. Geophytes represent a large part of this diversity in both regions, much more than many other vegetation types of the world, but with little overlap in genus diversity (i.e. genera found in one region are rarely found in the other, with a few exceptions). We present an overview of the genera of geophytes found in both regions and we discuss the biogeographical patterns observed in these groups in light of the available phylogenetic information. We focus particularly on subfamily Scilloideae (former family Hyacinthaceae) of family Asparagaceae, which includes genera *Ornithogalum*, *Albuca*, *Drimia* and *Dipcadi*, and family Colchicaceae, which includes genus *Colchicum* (=*Androcymbium*). These two families also have representatives outside the Mediterranean ecosystems (e.g. tropical Africa, Madagascar, and India). New molecular phylogenetic evidence for these two groups, combined to state-of-the-art ancestral area reconstruction methods and molecular dating, will allow us to examine the biogeographical patterns of these groups.

Keywords: Biogeography, Cape, *Scilloideae*, *Colchicaceae*, phylogenetics.

REVISION OF THE GENUS *SALVIA* L. (*LABIATAE*) IN TURKEY

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Salvia L., the largest genus of Labiatae, represents an enormous cosmopolitan assemblage of nearly 1000 species mainly distributed in Central and South America (500 spp.), Central Asia/ Mediterranean (250 spp.) and Eastern Asia (90 spp.). The last comprehensive taxonomic treatment of *Salvia* in Turkey was made by Hedge, who recognized 87 species in the country. Since then, nine species have been added to the genus in Tukey as new species or new records. As well as, two synonyms are evaluated as valid species. The number of species known from Turkey is now reached to 97, demonstrating that Turkey is a major centre of diversity for the genus in Asia. Since 2005, as a part of a revision of the genus *Salvia* L. in Turkey, the authors have carried out extensive field studies and collected a large number of specimens to carry out a taxonomic revision of *Salvia* and solve existing taxonomic problems in Turkey, to determine distribution and the threat categories of the taxa,to construct a new infrageneric grouping, to determine ecological and phytogeographical properties of the taxa, to carry out some morphological, anatomical and palynological assesements for taxonomic reason and to understand the evolution of taxa. The objectives of this study are to give an outline of taxonomy, ecology, anatomy and micromorphology of the genus.

Keywords: *Salvia*, revision, morphology, micromorphology, Turkey.

CLIMATIC SUITABILITY OF TREE SPECIES FROM THE IBERIAN PENINSULA UNDER CLIMATE CHANGE SCENARIOS

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Assessing the potential future of current forest stands is key to designing conservation strategies and understanding potential future impacts to ecosystem service supplies. This is particularly true in the Mediterranean basin, where important future climatic changes are expected. We have characterized the climatic suitability of more than fifty tree species of the Iberian Peninsula from current information of the distribution of these species. Then we have mapped the areas with future climatic suitability for each species under scenarios of climatic change. We used Generalized Linear Models to model topo-climatic species suitability, based on presence/absence plots from the Third Spanish National Inventory (SNI). To ensure robustness, only uncorrelated topo-climatic variables were chosen and 250 subsets of presence/absence were used for each species. Area Under the ROC Curve (AUC) was used to assess the accuracy of the models, showing good performance of the models. Climate change impact on the distribution was addressed projecting the models to the A1FI and A2 scenarios derived from the HadCM3 simulation, developed at the Hadley Centre-UK. We downscaled these values by adding the predicted mean increase or decline of temperature and precipitation (2050-2080) to the Digital Climatic Atlas of the Iberian Peninsula.

In addition to the performance of each individual species, pattern of co-occurrence of some pair of species such as *Abies alba* and *Fagus sylvatica* were also investigated. The results showed an overall decrease of the topo-climatic suitability of both species, allowing identify areas potentially playing a crucial role as a climatic refugee (Pyrenees mountain range). Accordingly, current mixed forests of these species will not undergo significant changes because of its current restricted distribution in the Pyrenees.

Finally we have also compared the modeling approach of climatic suitability (niche-based models) to the results of the process-based terrestrial biogeochemical model GOTILWA+ that has been developed in the Mediterranean region to explore how forests are influenced by water stress, tree stand structure, management techniques, soil properties, and climate (including CO_2) change. We projected the future of current stands of three forest species (*Pinus sylvestris*, *Pinus halepensis*, *Quercus ilex*) with contrasting distributions, using regionalized climate for continental Spain. Results highlight variability in model ability to estimate current distributions, and the inherent large uncertainty involved in making projections into the future. Despite increased drought stress, CO_2 fertilization through projected increased atmospheric CO_2 concentrations is shown to increase forest productivity in the mechanistic process based model that of the non- CO_2 fertilisation scenario by the period 2050-2080. This highlights the importance of introducing aspects of plant biogeochemistry into current niche-based models for a realistic projection of future species distributions.

Keywords: climate change, Iberian Peninsula, niche-based model, *Pinus sylvestris*, *Pinus halepensis*, process-based biogeochemical, model species distribution, *Quercus ilex* tree.

PROPOSALS FOR A REARRANGEMENT OF *LOTUS* SECT. *LOTUS* (*LEGUMINOSAE*) BASED ON ITS VARIABILITY IN THE W MEDITERRANEAN AREA

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Lotus has a cosmopolitan distribution with W Mediterranean and the Macaronesian Islands as one of its main diversity centers. Around 200 species recognized for this genus are classified into 14 sections (including sections *Bonjeanea*, *Dorycnium*, *Tetragonolobus* and *Benedictella*, usually considered as separate genera). The highest morphological variability occurs in sect. *Lotus*, which consequently includes the higher number of taxa in comparison with the rest of the sections. Within sect. *Lotus* two groups without formal taxonomic category have been recognized traditionally: *L. corniculatus* and *L. angustissimus* complexes, clearly separated by a series of morphological and biological characters. Morphological and molecular studies, latter based on AFLPs currently developed by the authors, have resulted in the description of a new taxon: *L. lourdes-santiagoi* F. J. Pina & Valdés, and in the recognition of *L. glareosus* Boiss. & Reut., a neglected species. Besides, these studies suggest that sect. *Lotus* could be divided into several sections that clearly distinguish by vegetative and floral characters, of which one should be formed by the *L. angustissimus* complex, what it is not only supported by morphological characters but in agreement with recent studies by other authors based on molecular markers (nrITS). The new morphological characters, never used before in the taxonomy of *Lotus*, greatly help to separate the W Mediterranean taxa.

Keywords: *Lotus*, *Leguminosae*, ITS, AFLP, phylogeny.

ILDIS LEGUMES IN THE CATALOGUE OF LIFE, ENCYCLOPEDIA OF LIFE, GBIF BIODIVERSITY PORTAL AND OTHER MAJOR BIODIVERSITY RESOURCES ON LINE

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International Legume Database and Information Service (ILDIS, www.ildis.org) delivered a draft world checklist of *Leguminosae* family in 2005. Latest version of the checklist (ver. 10.01, May 2007) contains information about 19,949 species with 5,118 infraspecific taxa and 28,498 synonyms. Data have been collected and scrutinised by the team of 72 authors in 25 years of the project. ILDIS lists 1,500 native and cultivated legume species in the Mediterranean region. The top ten richest genera are: *Astragalus* (215 species), *Trifolium* (122), *Genista* (93), *Vicia* (79), *Lotus* (76), *Ononis* (62), *Lathyrus* (60), *Medicago* (60), *Cytisus* (50) and *Onobrychis* (45). Tribes *Trifolieae*, *Vicieae* and *Loteae* have the main core of their species diversity in the region. (Analysis is made as a part of EC 4D4Life project). ILDIS has contributed to the Catalogue of Life (CoL, www.catalogueoflife.org) since 2000. Our legume checklist appears in ten web and CD editions of the CoL Annual Checklist. ILDIS supplies a full taxonomic checklist with references, common names and distribution data to the CoL. Through the Catalogue of Life ILDIS taxonomic checklist feeds the Global Biodiversity Information Facility Data Portal (GBIF, www.gbif.org) with species concepts, accepted names, synonymy, common names and names of taxonomic experts. GBIF specimen data and maps are linked to ILDIS taxonomy in the portal. Since the start of the Encyclopedia of Life in February 2008 (EoL, www.eol.org) ILDIS checklist is used as a taxonomic backbone for aggregation of rich descriptive data including texts, images, maps, nucleotide sequences (NCBI) and digitised bibliographic resources (BHL). Taxonomies in IUCN, NCBI, EBI, ECBOL, LifeWatch and many other global and national Internet portals thus use ILDIS resource directly or through the Catalogue of Life for their internal consultancies.

Keywords: *Leguminosae*, legumes, checklist, database, portal.

BIOGEOGRAPHICAL LINKS BETWEEN THE IRANO-TURANIAN AND THE MEDITERRANEAN FLORAS: AN INTRODUCTION

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The main environmental characteristics of the Irano-Turanian region are continentality, inducing extreme changes in temperatures and highly contrasted seasons, and low precipitations. This region constitutes an outstanding centre of plant diversity and speciation for the whole Holarctis. It is floristically well differentiated from the adjacent regions by an important contingent of xerophytes, specialy in *Astragalus, Acantholimon, Cousinia*, and within the Chenopodiaceae. By examining the phytochoria of *ca.* 500 plant species of the deserts and subdeserts of Iran, Léonard (1989) defined indeed an Irano-Turanian regional centre of endemism. Nevertheless, since the seminal work of Eig (1931) who clearly defined this region, the biogeographical relationships between the floras of the Mediterranean and the Irano-Turanian regions were differently interpreted by phytogeographers. Some authors include some of its parts (eg. central Turkey) within the Mediterranean region, while others placed the Mauritanian steppes Province of North Africa within the Irano-Turanian region.

Several examples of intraspecific and intrageneric East-West plant disjunctions have been also noticed for a long time, notably between steppic areas of central and eastern Spain and those of eastern Mediterranean or central Asia. Diverse hypothesis have been put forward to explain these biogeographical patterns, and the presence of steppe plant populations in the western Mediterranean: (i) these western populations are interpreted as relict populations of a formely ancient (pre-Pleistocene) and wider distribution range, now restricted to some favourable "steppic refugia"; (ii) they derive from eastern lineages that migrated in a stepping-stone manner across land masses and potential land-bridges, notably during the driest episodes of the Messinian salinity crisis (5.5-5.3 Ma); (iii) these extant populations are the result of some - more or less recent - colonization events through long distance dispersal; (iv) they are the testimony of early introductions by man in relation to the westward diffusion of agriculture during the Neolithisation of Mediterranean Europe, between 8500 and 7200 cal BP. Owing to significant progresses in plant phylogeny and phylogeographical history, a better understanding of these disjunctions is now possible, and this presentation examine several insights from some recent studies.

Keywords: Biogeography, Irano-Turanian region, plant disjunction, phylogeography, steppe plants.

LESSONS ON INTEGRATION FROM A HALF-CENTURY OF CHANGE IN PLANT SYSTEMATICS: *CARLINA* AND OTHER EXAMPLES

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Since the middle of the last century the author has witnessed and was actively involved in the development of systematic and evolutionary botany from a solid "traditional" basis to what it is today. This is briefly reviewed with references to karyo- and biosystematic work on *Galium*, *Asperula* and *Knautia*, extensions into the chemosystematics of Asteraceae-Anthemideae and Rutaceae, conflicts with purely phenetic approaches in basal Angiosperm families (Winteraceae, Annonaceae, Dilleniaceae) and finally the break-through with the help of DNA-analytical methods in Rubiaceae-Rubieae, Dipsacaceae, *Achillea* and *Carlina*. It is obvious, that the integration of an increasing number of new technologies has placed "traditional" plant systematics on a much broader multidisciplinary and scientifically better supported basis. That certain problems and uncertainties remain in spite of these developments is illustrated by comparing an earlier monograph on *Carlina* (1990,1994) with recent DNA-supported research data. The genus *Carlina* (Asteraceae, Cardueae) is quite variable in growth form (from treelets to annuals) and includes ca. 28 species centred in the Mediterranean area and the Canary Islands, but with considerable extensions into temperate Eurasia. It is most closely related to *Chamaeleon* (with 3 Mediterranean species). Nuclear and plastid DNA sequences support the majority of the earlier conclusions on relationships and historical differentiation based on morphological, anatomical, karyological, phytochemical, ecological and chorological data. Nevertheless, there are obvious improvements and new phylogenetic aspects, but also new problems: Extinctions among basal clades apparently result in the choice of outgroups less suitable for the reconstruction of phylogenetic relationships and charcter change. Furthermore, accelerated genetic divergence in apomorphic and relatively young annual taxa may result in the artefact of their quite basal placement in the phylogenetic trees.

Keywords: plant systematics, historical developments, multidisciplinarity, interpretation problems of DNA-data, *Carlina*.

ETHNOBOTANY IN ANATOLIA: CURRENT CHALLENGES AND ISSUES

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Each culture has used the natural plants within their surroundings, cultivated some of the basic ones, and traded some others to fulfill their various requirements. These plants have been used not solely as food, medicine, shelter, clothing, fuel, and fodder but also as crafts, objects and beliefs that each society generates according to their cultural backgrounds. The plants they gather, the crops they choose to cultivate, and their distinct ways to prepare and use them represents an important part of their cultural identity. Studying these interactions require different approaches, and each approach shows part of the reality. Multi disciplinary approaches may shed more light to this multi- faceted relatrionship between plants and people. Anatolia forms a bridge between Europe and Southwest Asia, and has served as a migration route for various groups. Many genera and sections have their centre of diversity in Anatolia. Species endemism is high due to climatic and topographic diversity, and the limited extent of Pleistocene glaciations. But also the human factor has probably made a fundamental impact on this diversity. The "Neolithic Revolution" been accomplished by early hunter-gatherers in Anatolia about 12000 years ago. The information related to the use of the endemic and common plants available in Turkey, makes up an important part of the country's cultural heritage. There was no systematic study covering all potential useful plants found in one specific rural area of Turkey until the 1990s, most of the field work that had been conducted in Anatolia was related to medicinal plants. This means that we have had no idea about how many useful plants were available within a selected rural area, and what is the "plant kit" of a village within their surrounding landscape. In addition, wild plant usage as food, fodder, fuel, and various different uses such as in handicrafts and in symbolic applications were neglected. Although the number of studies increased in the last 15 years, the main challenge is recording this long-established heritage before it get disappeared, due to rapid modernization, migration to towns and changing social relations.

Keywords: Ethnobotany, Turkey, Anatolia, cultural heritage.

PHYTOGEOGRAPHICAL RELATIONSHIPS BETWEEN IRANO-TURANIAN AND MEDITERRANEAN FLORAS IN ROCKY HABITATS OF THE E MEDITERRANEAN

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The present contribution reviews the role of the Irano-Turanian element in the composition of the lithophytic high mountain vegetation of the wider Taurus range (Tauric System) under a community-based focus. The flora of the area is predominantly Mesogean. Due to the scrappy and heterogeneous set of data available, the study is largely a gap analysis, comprising the evaluation of (1) chorotype spectra of selected scree, rock, meltwater and wind-swept cushion communities; (2) over-all chorotype spectra of mountain massifs and (3) the distribution patterns and, whenever possible, the evolution of selected Irano-Anatolian or Irano-Anatolian-E Mediterranean genera such *Heldreichia*, which are associated more closely with lithophytic upland habitats. Compared to the expected clear E–W trends (decreasing proportions of Irano-Turanian geo-elements and geno-elements westwards), the altitudinal and ecological trends are more complex due to the occurrence of two ecologically differentiated groups: The prevailing xerophytic Irano-Anatolian element is opposed by a smaller group of hygro- to mesomorphic species with often wide Irano-Turanian ranges and Central Asian links, which are confined to damp places. In floro-genetic terms, both groups have also developed a number of local endemics. Irano-Turanian endemism (e.g., *Anchonium*, *Dionysia*, *Graellsia*, *Michauxia*, *Vavilovia*) is generally very low within the lithophytic vegetation of the Taurus System at generic level, but gains significance at species level particularly in the east with high proportions of endemics of Irano-Turanian origin (25-45 %) within the chorotype spectra. Such mainly Mesogean genera with many endemic species in Anatolian rocky habitats include, e.g. *Silene*, *Gypsophila*, *Alyssum*, *Aethionema* s.l., *Erysimum*, *Isatis*, *Thlaspi* s.l., *Onosma*, *Nepeta*, *Tanacetum*, *Centaurea* s.l., *Scorzonera* s.l., *Tulipa* and *Allium*. However, in the Western and Central Taurus, the majority of the massifs support lithophytic vegetation, on which the Irano-Turanian elements mainly encroach as differential species from the zonal units on the scree, rock and meltwater communities.

Keywords: Chorology, evolution, genoelement, high mountain vegetation

POLLINATION ECOLOGY PROVIDES SOME NEW INSIGHT INTO EVOLUTION AND SYSTEMATICS OF MEDITERRANEAN LEGUMES

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A great diversity of *Leguminosae–Faboideae* is found in the Mediterranean region, including many endemic and rare taxa. Among tribes having their main diversity centre in the Mediterranean area, let's mention *Loteae*, *Coronilleae*, *Vicieae*, *Cytiseae*, the last being the richest in species. It is well known that tribes and genera have been historically established on morphological grounds, with special regard to floral characters. Recent taxonomic revisions, mainly based upon molecular characters, have challenged the traditional taxonomic treatment, as several genera that used to be regarded as natural ones, turned out to be polyphyletic. The inconsistency between "traditional" (morphological) taxonomy and phylogenetic (molecular) relationships is a major point of concern in pursuing a natural system of classification. The question arises, whether the incongruence between natural groups based on morphological traits and monophyla based on molecular homology is due to experimental flaws or has a biological foundation. Pollinators' ethology, form and size play a relevant role in shaping floral structures, and more so when pollination is specialized. Most Legumes have been reported in the past to be "generalist", i.e. pollinated by several different insect taxa. However, the very concept of generalist vs. specialist species needs to be critically examined: a species pollinated by several insect taxa may be specialized, as far as its fitness is enhanced by only one or few of them, or by a structurally homogeneous insect guild, when other pollinators exert little influence on seed production, or even depress it. In this light, recent evidence has shown that pollination in Mediterranean Legumes may be much more specialized than previously reported. Such "cryptic" specialization may account for homoplasy of floral characteristics, so the species that share important floral features, and hence are regarded as forming "natural" genera, may be the outcome of common pollination strategy rather than represent monophyletic clades.

Keywords: *Faboideae*, homoplasy, phylogeny, pollination specialization, taxonomy.

RECENT INNOVATIONS BROUGHT BY GEOGRAPHIC INFORMATION SYSTEMS AND REMOTE SENSING IN VEGETATION AND FLORA STUDIES IN TURKEY

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In the last two decades, the use of geographic information systems (GIS) and Remote Sensing (RS) increased rapidly due to the great interest of many institutions in Turkey. Parallel to this increase, hardware, software and trained people structures started to develop. This progress enabled the preparation of some countrywide digital databases to be used in spatial analysis and modelling processes. Flora and vegetation studies took the benefit of these improvements, and some applications showed the emerging utility of these tools. In this presentation, we summarized two latest innovations of us that can be used for plant bio-diversity and community composition mapping. In the former, we explained how plant bio-diversity of Nallıhan forest ecosystem were modelled and mapped in GIS by utilizing diversity indices (Shannon Wiener, Simpson, Number of Species), environmental variables (soil, topography, geology and climate), and remotely sensed data (LANDSAT-ETM+). In the latter, we summarized the ways of Normalized Difference Vegetation Index (NDVI) usage to develop plant community composition maps of Tersakan Valley in Amasya by using both GIS and RS.

Keywords: Geographic information systems, remote sensing, plant bio-diversity, community composition, mapping

WHY IS THERE A WORLDWIDE DECLINE IN MONOGRAPHIC PLANT SYSTEMATICS, AND WHAT CAN WE DO ABOUT IT ?

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The worldwide decline in monographic plant systematics is a fact and there are several reasons for it, internal and external, as well as immediate and proximate. Internal reasons include a certain reluctance to embark on long-term projects of major complexity, the requirement of expertise in a broad spectrum of techniques and the necessity to deal with a vast amount of pre-existing data, scattered over hundreds of books and journals published during the last three centuries and in several different languages. Tackling large taxa of world-wide distribution difficult to cut into palatable portions, inborn delays in clarifying nomenclatural problems which make proposals to committees necessary, as well as the uncertainty to calculate the net win of knowledge at the beginning of a monograph make many of us hesitant. External factors acting against monographic botany include the focus of many funding agencies, both national, European or international, on what they call innovative research, as a rule based on the fetish of fashionable methods. Monographic botany therefore often cannot be supported by research grants. This goes with another deplorable development: researchers are more and more ranked not according to their achievements, i. e. the quality of their publications, but according to the quantity of funds they are able to attract for their projects. One further deplorable fact has to be considered: following the Rio conventions decision makers dedicated enormous resources into the study of biological diversity, but the lion's share went to molecular and computational scientists who pretend to solve the problem of biodiversity exploration. All this money did neither increased the number of taxonomists nor the number of taxa described as new to science, nor the number of monographs. Apart from these immediate reasons there are proximate factors behind. Many institutions have given up their established taxonomic expertise, which may be regarded as somewhat suicidal, and have instead developed expansive laboratories regarded as modern and consequently indispensable. And, maybe, reducing chaos, one of the central aims of monographic botany, is no more regarded as sexy these days.

Several changes have to take place in order to improve this malaise, both internal and external, immediate and proximate. Internal steps should include strengthening expertise on taxa, not on methods. We have to further improve the quick and easy access to taxonomic information and specimens, notably type material, clearly bearing in mind however that information is not knowledge. And we have to reorganise our work in house towards integrated team work instead of the monographer working in isolation. External steps will be more difficult to achieve. We have to convince funding agencies that the conventional impact factor (IF) which consistently goes with a low Cited Half Life (CHL) makes absolutely no sense in monographic botany, where the Cited Half Life is persistently infinite. As a consequence we have to develop our own criteria for quality, which hopefully will become largely acceptable both to the community and funding agencies. On the long run and as a proximate goal we have to re-establish taxonomy in the curricula of universities, which has become a very rare species on the verge of extinction in several countries. We also need a more collaborative approach with molecular methods being just

one element among several. And most importantly we have to develop more respect for synthetic work and the integrative approach, taxonomy having been very appropriately called the unending synthesis.

THE BOTANICAL TOURISM IN TURKEY

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Turkey has a rich natural flora due to diversity of ecological factors like geology, soil, temperature, light and precipitation. Turkey has the plant species as much as the European continent. There are also more endemic plants species in Turkey than the Europe posseses. Around 3.500 of 10.000 native species grow nowhere else in the world, in other words they are known as endemic species characterized by a limited area of distribution. Turkey is quite a rich country from the stand point of number of plant species. While species number, present in all along Europe is a total of about 13.000, this figure is about 10.000 in Turkey.

Today, Turkey is at the intersection point of 3 different plant area which is not present in either of the European country. These plant area are Mediterranean Plant Area (includes Mediterranean and Aegean regions), European - Siberia Plant Area (includes Black Sea and Marmara region), Iran - Turan Plant Area (includes Central Anatolia and Easter Anatolia regions.). Much of the coastal and more temperate areas of Turkey are covered in maquis. The higher slopes of the verdant Black Sea region are thick with beech, oak, maple, alder, Scots Pine, and Oriental Spruce, while the narrow coastal strip and lower slopes are used to grow tea, hazelnuts, flax, maize, cherries and plums. All of these plants are suited to a temperate climate with plenty of rain. Steppe is the most common landscape in Turkey today, especially in Iran-Turan plant area. The flora varies from lush forests, steps to typical Aegean and Mediterranean vegetation. With nearly ten thousand species, Turkey is a botanical paradise. Among the many different types of plants, bulbs are of particular interest. Bulbous plants, known in scientific terminology as geophytes, such as snowdrops, tulips, hyacinths, narcissi, lilies, orchids and cyclamen, all of which are among the first wild flowers to be benefited for botanical tourism and decorative purposes. As a source of many native and endemic species, Turkey is a major area for travel tours of botany.

In this study, the potential of botanical tours in Turkey will be presented with some practical examples.

Keywords: Botanical tourism, ecotourism, Flora, Turkey

CHENOPODIACEAE IN THE MEDITERRANEN AND THEIR EVOLUTIONARY RELATIONSHIPS TO THE IRANO-TURANIAN REGION

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The Mediterranean and the Irano-Turanian regions are comparatively rich in Chenopo-diaceae, with c. 280 and 350 spp., respectively. Most of them are ecologically specialized as (1) halophytes – growing on strongly saline or alkaline soils, as, e.g., coastal lagoons and depressions in arid areas, (2) xerophytes – in steppes, semi-deserts and deserts, and (3) ruderals – on disturbed sites. The chenopod floras of both regions are related. They have many species in common, preferably annuals of subf. Chenopodioideae. Others penetrate more or less into the adjoining region, but very many are confined to the one or the other region due to ecological constraints or to limited dispersal abilities. Recent phylogenetic studies carried out in different subfamilies of Chenopodiaceae have shown that the major lineages were present and started to diversify obviously already in the Early Tertiary in an area around or at the northern shores of the former Tethys that reached to C Asia and the Indian Ocean. Their further diversification and regionalization was strongly favored by increasing aridity and continentality in the eastern section associated with the disintegration of the Tethys. Later periods of climatic deterioration, in particular the Messinian salinity crisis of the Upper Miocene and the cool and dry periods of the Pleistocene caused invasions of certain taxa from today's Irano-Turanian region into the Mediterranean, where subsequently, after having been isolated, they underwent separate speciation processes. Plant geographical and molecular evidence of these intricate relations will be presented from different groups, mainly from subf. Salicornioideae and Camphorosmoideae. As fossils are extremely rare, the time of the respective splits can be tentatively estimated by molecular clock analyses only.

Keywords: *Chenopodiaceae*, diversification, molecular clock, Tethys

CONSEQUENCES OF NATURAL HYBRIDIZATION IN GEOPHYTES: DISENTANGLING THE ORIGIN OF ORPHAN HYBRID POPULATIONS IN *NARCISSUS*

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Different factors determine the evolutionary fate of hybridization events. Ploidy changes, spatial dynamics of hybridizing processes (e.g., hybrid zone), degree of internal reproductive barriers, viability of F_1 hybrids, the availability of new or intermediate niches to colonize, the phylogenetic proximity of hybridizing species and the fitness of hybrid lineages are among the most important. In the case of geophyte species, an additional factor is its ability to propagate clonally so that even low fertility hybrids can persist for years. In this work, the complex nature of the Iberian natural hybrid *Narcissus* ×*perezlarae* is clarified. Four organellar and one nuclear sequence markers reveal that it actually consists of two different hybrid taxa, *Narcissus* ×*perezlarae* (*N. cavanillesii* × *N. miniatus)* and *N.* ×*alentejanus* (*N. cavanillesii* × *N. serotinus*), the mother species being predominantly *N. cavanillesii*. This framework is also supported by cytogenetic information, genome size and artificial crosses. Throughout their ranges, dissimilar situations are found across populations from this polytopic hybrid complex: sympatric populations without hybrids, sympatric populations where hybrids occur, and populations where hybrids occur but their parents are lacking ('orphan hybrid populations'). We provide evidence based on ecological niche modeling and molecular evidence supporting that the most likely cause for this pattern is extirpation of *N. cavanillesii* via demographic swamping and competition.

Keywords:Parental extirpation, niche competition, cpDNA, mtDNA, ITS, niche modeling.

IMPACTS OF THE INTRODUCTION OF ORNAMENTAL PLANT SPECIES ON URBAN AND PERI-URBAN LANDSCAPES

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Globalization of biodiversity has had positive and negative consequences both for the biosphere and human interests. The spread of cultivated species, including ornamentals also shows this dual facet. On the one hand and referring strictly to the case of ornamental plants, the increase of biodiversity has an enrichening effect and better adaptation and efficiency is achieved in the construction of urban landscapes. However, the allochtonous ornamental plants frequently generate risks such as: a) becoming invasive; b) affecting human health or safety (species that are allergenic, toxic, or fragile, susceptible to falling branches or whole trees), c) causing damage to buildings, pavements and other urban facilities, d) affecting the identity of the city in terms of its landscape, cultural, historical or ethnological components.

The introduction of the allochthonous species in Mediterranean urban gardening has occurred through a gradual incorporation over the centuries and has come from diverse geographical origins and cultures: Hellenistic, Roman, Byzantine, Islamic, Ottoman, American, South African, Australian, among others. The process has gone through phases, during periods of cultural innovation and intellectual curiosity such as the Renaissance and Enlightenment, and through certain mechanisms such as changes in the gardening public, International Exhibitions, the globalization of the market for ornamental species and the progressive utilitarianism experimented by the urban gardening.

Cultural landscapes and urban environments and historic sites require a special treatment. The authors advocate the application of a certain geographical and historical accuracy in their restoration, even though accepting the evolution of the garden and the presence of archaeophytes. International Charters relating to the conservation and restoration of monuments (Athens 1931, Venice 1964, Florence 1982), provide an integrated vision of styles and periods, but their level of commitment is ambiguous. In this paper we study the spectrum of exotic species in various archaeological sites of southern Spain as Alhambra and Generalife (Granada), Madinat al-Zahara (Cordoba) and the Citadels of Malaga and Almeria, analyzing their impact under the four components mentioned above.

Keywords: Exotic species, urban and cultural landscapes

PRODUCTIVITY-DIVERSITY RELATIONSHIPS IN MEDITERRANEAN HERBACEOUS VEGETATION: TESTING EFFECTS OF PRECIPITATION SCENARIOS ALONG A CLIMATIC GRADIENT

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Ecosystem functioning depends, among other factors, on resources availability and the structure and diversity of the vegetation. In regions with Mediterranean type of climate, water is the main limiting factor driving the functioning of the ecosystem. Effects of predicted climate change scenarios for the Eastern Mediterranean Basin were tested on primary productivity, species richness and diversity of the annual herbaceous vegetation in a long term field experiment using *in situ* rainfall manipulations across a North-South climate gradient of increasing aridity in Israel. Vegetation and soil seed-bank parameters were monitored during eight years, in four sites along a climatic/rainfall gradient: 780, 540, 300 and 90 mm/year, representing Mesic-Mediterranean, Mediterranean, Semiarid and Arid climatic conditions, respectively. Rainfall was reduced or increased in the Mediterranean and Semiarid sites by ca. 30% with rainout-shelters, or additional irrigation in conjunction with rain events.

Productivity of the herbaceous vegetation was linearly related to variation in rainfall across sites and years. An unimodal (hump-shaped) relationship was found between species richness versus precipitation and productivity. Rainfall manipulations did not change this relationship, and did not affect species richness in the different sites. This herbaceous vegetation with high dominance of annual species showed relative stability in composition during eight years of exposure to increased or reduced rainfall treatments. The relatively high plant phenotypic plasticity in response to water availability, large seed production and the resulting large soil seed-banks that characterize this vegetation probably buffer against inter-annual fluctuations in rainfall and drought cycles, conferring stability to the plant community, and making it less vulnerable to climate change.

Keywords: climate change, Mediterranean, biodiversity, productivity, plant community

ECOSYSTEM FUNCTIONING THE DRY IBERIAN SOUTHEAST: BASELINE CONDITIONS AND TEMPORAL TRENDS DURING A POSITIVE NAO PERIOD

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In relation to predicted intensification of aridity conditions competitive capacity of vegetation adapted to drought is expected to increase in the Iberian Southeast. Due to the interactions among orography, litology, vegetation structure, rain patterns and atmospheric circulation models (ACMs), the response of ecosystems would be complex. To understand how Habitats of Community Interest (HCIs) located in this area are responding to these conditions, satellite-derived ecosystem functioning attributes and its trends for the period 2000-2008 were characterized. Based on MODIS images, subrogates of productivity (EVI-I), seasonality (EVI CV) and phenology (EVI MAX and MIN) were retrieved considering sites corresponding to the HCIs 1420, 1510, 1520, 5330, 5220 y 6220. Each site was also characterized for the dominant vegetation structure and litology. Afterwards, Man-Kendall test was used to compute temporal trends in annual and monthly EVI values. Results allowed the establishment of the reference annual curve of ecosystem functioning and EVI trends for each HCI within the studied period. Biotic and abiotic controls imposed by vegetation structure, litology, climate and ACMs, were also analysed in relation to the spatio-temporal responses of each HCI. The study shows the potential of remote sensing tools to monitor HCIs, a need for the European environmental policies.

Keywords: Aridity, ecosystem response, EVI, habitats of comunnitiy interest, monitoring, remote sensing, precipitation use efficiency, temporal trends, vegetation structure.

MOLECULAR PHYLOGENETIC AND CYTOGENETIC INSIGHTS TO GENERA WITH MEDITERRANEAN AND IRANO-TURANIAN TAXA. CASE STUDIES IN THE *ASTERACEAE*

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The Mediterranean and the Irano-Turanian regions are two waste floristic territories, which are close to each other not only from geographical point of view, but regarding plant species and landscapes as well. Its relatively large physical interface and the existence, even in very distant parts, of similar botanical formations (among which steppe and semi-desert communities are particularly relevant) imply coincidences and exchanges between both floristic elements. Many plant genera have a significant presence in both floristic regions.

Apart from morphological and ecological considerations, molecular cytogenetic and phylogenetic studies are nowadays useful, even indispensable to correctly assess the systematic relationships among plant taxa and their evolutionary patterns.
The present communication will focus, with the above-mentioned approach, on several genera of the Asteraceae family displaying an important amount of Mediterranean and Irano-Turanian taxa, to establish the relationships between the representatives of both areas.

One outstanding such genus is *Artemisia*. With more than 500 species, its origin is located in the Central Asian part of the Irano-Turanian region, and has a non-negligible occurrence in the Mediterranean region, with some landscape-dominating species in both territories.

,*Echinops*, which comprises more than 100 species distributed in tropical Africa, the Mediterranean basin and other temperate regions of Eurasia, is another good case study, because it encompasses also Mediterranean and Irano-Turanian taxa.

The *Rhaponticum* group, made of ca. 40 species and widely distributed in Eurasia, Africa and Australia, will also be considered for its Mediterranean and Irano-Turanian representatives (basically in the genera *Myopordon*, *Oligochaeta* and *Rhaponticum*).

Different aspects of genome evolution (with cytogenetic data, including genome size assessment) and molecular phylogeny of these genera will be commented, together with morphological and other data, with emphasis on the relationships between their Mediterranean and Irano-Turanian taxa.
Keywords: *Artemisia*, *Echinops*, genome evolution, molecular systematics, *Rhaponticum*.

MANAGEMENT ADAPTATION OPTIONS TO CLIMATE CHANGE IN RELICT MEDITERRANEAN MOUNTAIN CONIFER FORESTS:
a Conceptual Model and Practice linking Ecophysiology and Landscape Ecology.

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Mountain areas around the Mediterranean basin are refuges for relict conifer forests, which represent temperate biome "islands" within the Mediterranean-type climate region that are expected to be particularly vulnerable to climate change. Vulnerability to change is a function of the ecosystem sensitivity and its adaptive capacity. By "adaptive capacity" we mean the ability of a system to adjust to environmental change (including variability and extremes) or to moderate potential damage. We assume mountain conifer forests are intrinsically sensitive to climate warming, since ecosystem sensitivity is mainly determined by species composition and adaptation to local conditions. However, we have observed distinct responses to recent climate variability in *Abies pinsapo* forests at regions with contrasting land-uses at both sides of the western Mediterranean coast. This led us to propose that stand and landscape structural attributes, through their effects on density-dependent factors, modulate the adaptation capacity, and thus the vulnerability, of these forests to climate stress.

Here we present a conceptual model linking tree carbon balance and forest dynamics at the stand and landscape levels in order to discuss how management practices enhancing the structural diversity of mountain conifer forests may foster their adaptive capacity to climate change. Increasing respiratory costs of living tissues as temperature rises, and dependence on stored mobile carbohydrates during protracted drought periods, can severely limit the carbon balances of some Mediterranean forests, and lead to visible symptoms of dieback once this pool has been used up. In the context of impending climate change, soil water availability is also critical. Thus, reducing respiratory costs and trade-offs between the competence for light and water in forests is crucial to survive adverse periods. This can be achieved by pro-active management protocols which increase tree species richness and structural diversity. Results of ongoing field-demonstrations in Spanish pinsapo-fir forests will be presented.

Keywords: *Abies pinsapo*, canopy structure, forest management, adaptive capacity, climate change

INTRODUCTION: RARITY AND THREATS IN MEDITERRANEAN PLANTS AND HABITATS

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Rarity is a vague concept that has traditionally been associated to threat and extinction. In fact, the idea that rare species and habitats are more vulnerable to extinction than common species and habitats forms part of the current paradigm in conservation biology. The main reason to sustain this statement relies on the low number of populations and the low coverage area associated to rare species and habitats, respectively. Following a faulty logic, when we assess the status of a population of a rare species or a fragment of a rare habitat we tend to perceive them as intrinsically more vulnerable than a similar population of a common species or a similar fragment of a common habitat, respectively. However, this is not necessarily the case and, many times, the situation tends to be the opposite. The main threats that act upon species and habitats are of anthropogenic origin and rare species and habitats often tend to occupy sites that that are stable from the standpoint of plant succession and impact of human activities. At the same time, many common species and habitats are under strong pressure of agriculture, transportation infrastructures and urban developments, and, consequently, are experiencing severe decline in the number of populations or coverage area. The environmental heterogeneity that characterizes the Mediterranean Region provides fertile ground for the presence of a great number of rare narrow endemic species and habitats. Similarly, the great human pressure that has historically been exerted in this region up to the present day adds further elements for the generation of "new rare" species or habitats. The combination of both processes opens a huge range of situations that constitute a challenge for the implementation of succesful systematic strategies for the conservation of plant species and habitats in the Mediterranean Region.

Keywords: Rarity, threats, Mediterranean, endemic, conservation paradigm.

GLOBAL CHANGE EFFECTS ON RELICT WESTERN-MEDITERRANEAN MOUNTAIN FORESTS

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Long-term basal area increment (BAI) in *Abies pinsapo* from south Spain and north Morocco, *Cedrus atlantica* from Middle Atlas in Morocco, *Pinus nigra* from south-east Spain, and *Abies alba* from north Spain, were studied to investigate growth trend in relic Western-Mediterranean mountain forests. We want to elucidate the way land-use history and density-dependent factors modulate the responses of radial growth to climatic stresses for several drought-sensitive conifer. First, we verified that land-use history and density-dependent factors predicts mean BAI for the studied species; i.e. it modulates the degree to which the average climate-driven potential for growth is expressed. Then, we verified that the long-term pattern of temperature predicts the long-term pattern of BAI, estimated as the main trend over the XX century. We applied Dynamic Factor Analysis (DFA) to regional data of temperature in order to test the hypothesis Western-Mediterranean Basin has experienced similar temperature increase. DFA was also applied to mean BAI to quantify common growth trends among the studied trees species. The mean BAI was mainly determined by site mean precipitation, land-use history and density-dependent factors, whereas growth trends obtained by DFA were similar among species. Common trends of growth decline were strongly related to long-term, late-winter to summer temperatures, while the residuals were related to total annual precipitation, although with decreasing significance as mean site precipitation increased. Our results support the contention that global warming is related to widespread growth decline and death recently observed in relic Mediterranean mountain forest. Long-term climatic drought stress was the main driving factor of growth decline in the studies species. Moreover, trees from drier sites, growing at higher stand density, were predisposed to decline given an additional short-term stress, such as a severe drought.

Keywords: adaptive capacity, basal-area increment, climatic change, drought, Dynamic Factor Analysis, global warming, linear mixed models, vulnerability

ACHIEVEMENTS AND CHALLENGES OF THE `COUNTDOWN 2010 AND BEYOND´ INITIATIVE IN THE MEDITERRANEAN REGION

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'Countdown 2010 and beyond' has been the initiative of the Convention on Biological Diversity to significantly curb the loss of biodiversity by such date. Amongst others, its objectives include promoting the sustainable use of biodiversity, studying its biggest threats, maintaining the integrity of ecosystems, ensuring the supply of goods and services provided by biodiversity, and protecting their traditional knowledge.

Although parts of these points has been redefined and/or delayed until 2020, the proximity of the completion date for this campaign allows us to examine critically the progress on plant conservation and the success on the achievement of other targets. It is well worth making such a revision in the Mediterranean Region, particularly in light of the additional EU commitment to halt biodiversity loss by 2010 through its Action Plan for Biodiversity.

In my talk I will pay particular attention to the first goal of such Plan –'Safeguarding the most important species and habitats'– in Mediterranean countries. Among them, Spain provides a timely case study because there have been two comprehensive assessments of conservation status of the Spanish vascular flora in the past decade (Red Lists in 2000 and 2008), and points to an unflattering conclusion of the initiative.

Keywords: Mediterranean, Biodiversity, Red List, Policy, Vascular plants.

HAVE CYTOLOGY AND MORPHOMETRICS ALREADY BEEN ABSORBED INTO TRADITIONAL SYSTEMATICS?

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Polyploidisation is undoubtedly a frequent mode of speciation in plants and recent data indicate that most angiosperm lineages have undergone one or more episodes of genome duplication during their evolutionary history. Therefore, at least basic knowledge about chromosome numbers and/or ploidy levels of studied taxa is crucial for systematic studies of any group of plant species. Acquiring such data is facilitated by the recent expansion of flow cytometry applications that enable screening a large number of samples. These methods, however, often reveal also differences in DNA content among close relatives of the same ploidy level, and can identify hybrids among them. Detailed studies of cytotype distribution go hand in hand with deeper insights into morphological variation provided by the methods of multivariate morphometrics. This approach, as opposite to the cladistic one, is particularly useful for taxa recognition, rather than for reconstructing phylogenetic relationships. It is most efficient in cases where differences among taxa are based on quantitative characters with values overlapping among related taxa. Application of morphometric methods introduced much broader population sampling into taxonomic studies, as well as screening of numerous morphological characters. Various approaches can be taken in morphometric studies. While the analysis of population samples characterised by mean values of characters may reveal certain trends, the analyses of individual plants enable to go into considerable detail. Hypotheses can be generated using clustering and/or ordination methods, such as PCA, PCoA, and MDS, while a wide spectrum of discriminant analyses can be used for hypothesis testing. A special case is represented bygeometrical morphometrics dealing with the comparison of the shape rather than the size of organisms or individual organs. Indeed, morphometric studies have shown in many cases that identification keys and descriptions based on limited material might be seriously biased, which underlines the need for thorough sampling in systematic studies.

Keywords: cytology, flow cytometry, morphometrics, sampling strategies

EVOLUTIONARY LINEAGES OF NI-HYPERACCUMULATION AND SYSTEMATICS IN EUROPAEAN *ALYSSEAE* (*BRASSICACEAE*)

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Ni-hyperaccumulation is a rare form of physiological specialization shared by a small number of angiosperms growing on ultramafic soils. The remarkable proportion of hyperaccumulators in the family Brassicaceae offer a broad range of opportunities to investigate the expression, regulation and evolution of the genetic traits underlying such a specialization. However, the evolutionary patterns of metal accumulation in Brassicaceae are still incompletely known. We used non coding nrITS sequences and a phylogenetic approach to assess relationships among Ni-hyperaccumulators in tribe Alysseae at the genus, species, and below-species level, in order to test monophyly vs. polyphyly of this trait within such an important group.

Molecular data show that the ability for Ni-hyperaccumulation in Alysseae has a double origin, appeared in the clades of *Bornmuellera-Leptoplax* and *Alyssum* sect**.** *Odontarrhena*. Lack of affinity between *Leptoplax emarginata* and *Peltaria*, a member of Thlaspideae into which *L. emarginata* is placed by some authors, implies that Ni-accumulation did not originate in Thlaspideae, unlike commonly believed. In *Bornmuellera-Leptoplax* this ability represents an early synapomorphy appeared from an ancestor shared with the calcicolous, sister clade of Mediterranean *Ptilotrichum.* In *A.* sect**.** *Odontarrhena* it has multiple origins even within the three Europaean clades retrieved by DNA sequences. Lack of geographic cohesion suggests that accumulation ability has been lost or gained over the different serpentine areas of south Europe through independent events of adaptation and selection associated with changes in the expression of functional genes. Genetic continuity and phenotypic plasticity within and between populations of the *A. murale* s.l. complex call for a reduction of the number of Ni-hyperaccumulator taxa to be formally recognized.

Keywords: *Alysseae*, *Alyssum* sect. *Odontarrhena*, *Bornmuellera*, *Brassicaceae*, *Leptoplax*, molecular phylogeny, Ni-hyperaccumulation

CHROMOSOME DIVERSITY AND EVOLUTION IN *GAGEA* SALISB. (*LILIACEAE*)

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There is abundant literature on the diversity of chromosome numbers found in *Gagea*, but there has been no attempt to analyse these data within a robust phylogenetic framework. Recently, however, this changed with the proposal for a new circumscription of *Gagea* infrageneric taxa, comprising 13 sections and an improved understanding of the evolutionary relationships between them. Thus there is now the opportunity to examine patterns and trends in chromosome evolution across the genus as a whole. Based on literature survey, karyo-morphometric features for 9 sections and 44 species (for a total of 60 accessions) were obtained. Included in the data set were basic chromosome number, ploidy level, chromosome total haploid length (THL) and 13 different measures of karyotype asymmetry. In addition, genome size proxy estimates for all species studied were inferred from THLs using a regression model previously calibrated for Liliaceae. Trends in karyotype evolution were analysed by superimposing the karyological data onto a phylogenetic framework for *Gagea*. Combining the large amount of data enabled mean karyotypes to be produced, highlighting differences in karyotype structure between sections. Further differences were noted when various parameters for analysing karyotype asymmetry were assessed. Overall, the analyses of karyotype features within a well-supported phylogenetic framework enabled the most likely patterns of chromosome evolution within *Gagea* to be reconstructed, also highlighting differences with other genera of Liliaceae subfam. Lilioideae.

Keywords: *Gagea*, *Liliaceae*, karyotype evolution, karyotype asymmetry, polyploidy

ANCIENT FLORAS, VEGETATIONAL RECONSTRUCTION AND MAN-PLANT RELATIONSHIPS: CASE STUDIES FROM ARCHAEOLOGICAL SITES

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Archaeobotany provides information on the ancient floras, the vegetation which surrounded the archaeological sites, and the interaction between human populations and plants.

Humans are able to successfully settle in a large variety of habitats and to find solutions for their food supply using different strategies. Over time, they acquired specific techniques and evolved subsistence strategies which differently impacted the territory, becoming an important agent in shaping landscapes. Archeobotany includes many different fields of research which concern macro-or micro-remains. Crossing results furnishes not merely a sum of information but it multiplies the meaning of single information, allowing detailed and unambiguous interpretation of the results. This is the case of the wood and palynological analyses in the Garden of "Casti Amanti" in Pompeii, Italy, which allowed reconstructing the geometrical asset of the flowerbeds. The precise position of *Juniperus* and *Rosa* in the garden was detected.

Archaeobotanical investigations provide information about plant gathering, diffusion and cultivation. Humans voluntarily introduced plants in the territory where they lived, but many weeds were also involuntarily introduced. Regarding the plants which were voluntarily introduced, ancient documents must be taken in consideration. On the contrary, involuntarily introduced plants can only be recorded in sediments. In Pompeii, the finding of *Citrus* pollen grains reopens the discussion about the introduction of *Citrus* lemon in the Mediterranean area.

The same research may also offer information about wood technology, seasons of gathering or feeding, geographic origin of materials. For example, the content of a resin found in an Egyptian coffin from Saqqara allowed establishing the geographic origin of this material used in the burial rites.

The ancient natural vegetation is generally studied out of archaeological contexts, because in the human settlements it has been strongly affected by human activity. However, in same cases, archaeological sites have the peculiarity of amplifying the record of past events. This is the case of the catastrophic floods which occurred in Pisa, Italy, during the Roman time.

Keywords: Archaeobotany, plant remains, human-plant interaction

MORPHOLOGICAL AND TRACE METAL ACCUMULATION ANALYSIS OF *ANTIRRHINUM OPHIOLITICUM* (*PLANTAGINACEAE*), A NEW TAXON OF THE ULTRAMAFIC ROCKS OF NW IBERIAN PENINSULA

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Morphometric evidences within and among species of *Antirrhinum* section *Streptosepalum* are presented in this work. The results obtained allow further development of hypothesis concerning species boundaries. Six populations were sampled for *A. braun-blanquetii* (119 plants), two populations for *Antirrhinum meonanthum* (represented by 49 plants), and four populations for *Antirrhinum* inhabiting in ultramafic rocks in NE of Portugal (*A. ophioliticum*, 107 plants). The states of 10 exomorphological characters (variables) were recorded and coded, on living plants. Multivariate statistical analyses -cluster analysis (UPGMA, unweighted pair-group method using arithmetic averages, and City-block (Manhattan) distances), principal components analysis based on a correlation matrix (PCA) and canonical discriminant analysis (CDA)- suggest that *Antirrhinum* occurring in the serpentine outcrops of the province of Trás-os-Montes, North-East Portugal, is a species distinct from *A. braun-blanquetii* and *A. meonanthum*. Analyses of major and trace elements in leaves dry matter are also carried out. Ecological differences are also apparent. *Antirrhinum ophioliticum* Amich, Bernardos & García-Barriuso (Plantaginaceae), is described and illustrated. Notes on its distribution, ecology, karyology, and taxonomic relationship are presented, as well as some details of seeds were investigated using a scanning electron microscope (SEM). A key of diagnostic differences between *A. ophioliticum* and the closely related taxa *A. braun-blanquetii* and *A. meonanthum* is provided.

Keywords: *Anthirrinum ophioliticum*, morphometric, karyology, taxonomy.

THE SECRET OF GOOD LIFE AT MOYAT AWAD – A WAY STATION ON THE INCENSE ROAD

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More than a thousand fruit remains were found at Moyat Awad (Moa), mostly date and olive, but also peach, pomegranate, almond and a few others. Most loci are dated to the Nabatean period (1st C BCE–1st C CE), and the rest to the Roman period (106–220 CE). The site with its springs is located in the center of the Arava Valley, the most arid region within the territory of ancient Nabataea, which is generally unsuitable for agriculture (aside from the growing of date palms).

,The Incense Road from south Arabia via Petra to the Mediterranean coast crossed the Arava Valley; and Moyat Awad, which was a flourishing way station with installations and commodities of a standard far superior to its local resources. Agricultural trials had clearly shown that it was possible to establish flourishing agriculture in the Negev during the Roman period. Another possible factor responsible for the wealth of incense and spice traders was the profit they made from the weight increase of their goods when taken from an arid region to one with a relatively high humidity. Consequently, the adage, "money that comes easily, disappears easily," seems to apply to caravan merchants, who spent part of their significant commercial gains in caravan stations such as Moyat Awad on their journey back to Arabia.

Keywords: Luxury food, incense road, Nabatea, Roman period

CLIMATE CHANGE IMPACTS IN MEDITERRANEAN HIGH MOUNTAINS

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The objective of this study is to provide a review of our knowledge of high mountain (alpine or cryo-oromediterranean) plant and vegetation diversity in the Mediterranean basin and consider how these may change in the future as a result of global change drivers, such as climate and land use change, and atmospheric pollution.

Simple climate envelope models, using modelled future climates developed for different scenarios that may apply to greenhouse gas emission/impact mitigation, suggest dramatic reduction in today's alpine (cryo-oromediterranean) climate zone. It is not certain however if one may deduce a corresponding proportional reduction in alpine plant species diversity. As with cryo-oromediterranean vegetation, changes are likely to manifest differently in different habitats (e.g. zonal vs. azonal). Flora and vegetation changes are discussed in view of trait variation, adaptation and dispersal. Potential negative changes, such as species extinctions are evaluated in terms of their relationship to evolutionary time elapsed since their development. Finally, early results on species altitude range extension from a current ongoing long-term surveillance programme are evaluated.

Climate change impacts may be offset or exacerbated by land use or other global change drivers, such as nitrogen deposition. Pastoralism is perceived to control encroachment by woody vegetation thereby maintaining an open landscape where alpine plants are able to grow. On the other hand, grazing animals are vectors of dispersal for native, naturalised and, to a lesser extent, exotic species. Species altitude ranges and dispersal mode are examined and probabilities of range extension are considered.

Finally, evidence, plausibility and probabilities of change are synthesised.

Keywords: adaptation, alpine, cryo-oromediterranean, global change, land use.

IMPORTANT SERPENTINE AREAS OF TURKEY AND DISTRIBUTION PATTERNS OF SERPENTINE ENDEMICS AND NICKEL ACCUMULATORS

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Ultramafic rocks and derived soils (serpentines) are widespread in Turkey, making this one of the most significant countries in the world for serpentine soils and their associated floras. In northwestern Turkey considerable serpentine areas occur in Kütahya, Balıkesir and Bursa provinces, with smaller areas in Çanakkale province. In the Mediterranean region, serpentines extend from Muğla to Hatay provinces, and are scattered northeastwards from Kahramanmaraş to Erzincan provinces. Other notable smaller outcrops occur in Ankara province. Serpentine areas are rich places for plant diversity and local endemism. Many endemics in Turkey are restricted to serpentine soils; some of these are known from only one or two provinces, such as *Alyssum crenulatum* Boiss., *A. dubertretii* Gomb., *Bornmuellera kiyakii* Aytaç & Aksoy and *Centaurea aladaghensis* Wagenitz. The nickel-accumulating serpentine species in Turkey belong to the genera *Alyssum* L., *Bornmuellera* Hausskn., *Pseudosempervivum* (Boiss.) Grossh. (formerly in *Cochlearia* L.), *Thlaspi* L. s.l. and *Centaurea* L. The present authors have explored 55 serpentine sites; 60 Ni-accumulating and more than 40 serpentine-endemic species have been reported from Turkish serpentines. Ni accumulators and serpentine endemics are evaluated here according to their geographic distributions, altitudes, threat categories and Ni concentrations, and are presented in their grid squares and provinces.

Keywords: Endemism, hyperaccumulation, nickel, serpentine, Turkey

GEOPHYTIC WEEDS IN THE TRADITIONAL AGRICULTURE OF CRETE

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Changes in land use during the 20th century, including the adoption of modern farming methods, have rendered traditionally cultivated cereal fields a rare and still declining habitat in many parts of the Euro-Mediterranean area. The South Aegean island of Crete (Kriti) is chosen to illustrate the rich assemblage of non-invasive Mediterranean weeds – including numerous geophytes – that occur in such habitats. Several of these taxa are ecologically specialized, and can be regarded as 'obligate weeds of traditional agriculture', in contrast to the less specialized (facultative) weeds, which can tolerate a wider variety of cultivation methods and can rapidly colonize newly cultivated land. The obligate weeds are among the most threatened plants in the Euro-Mediterranean area. Using them as indicators, 'hot spots' of diversity where traditional agriculture is still practised can be reliably identified. One locality, the Katharo plain in eastern Crete, is probably the richest on the island. It is recommended that it be made the focus of practical conservation efforts as a matter of urgency.

Keywords: conservation, Crete, geophytes, traditional agriculture, weed

TEMPERATE FORAGE AND PULSE LEGUME GENETIC GAP ANALYSIS

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Wild legume species and genetic diversity of the Mediterranean Basin provide an invaluable source of traits for the improvement of cultivated temperate forage and pulse legume crops. The presentation illustrates how the existing geo-referenced passport data associated with *Cicer*, *Lathyrus*, *Lens*, *Medicago*, *Pisum*, *Trifolium* and *Vicia* species can be used to identify gaps in current conservation and also to develop a more systematic conservation strategy for the genera individually, but also as well as a whole. Taxonomic, ecological, geographic and conservation information for the seven genera were collated from ICARDA, EURISCO, GRIN and SINGER datasets together with herbarium specimen passport data, then synthesised and analysed. The combined database contained 32,489 unique geo-referenced observations collected between 1884 and 2008. Patterns of specific distribution, based on the germplasm accession and herbarium specimen data, was combined with predicted distributions based on climatic models and compared to that element of diversity actively conserved in a conservation gap analysis using GIS tools. The *ex situ* conservation status of each taxon was assessed and used to provide a priority ranking for future collection priorities in the Mediterranean Basin. Patterns of species richness are presented for each genus and combined to identify the hotspots of complementary temperate forage and pulse legume species were genetic reserves should be established to maximise legume diversity conservation within the Mediterranean Basin. Specifically, target IUCN recognised protected areas are identified and these are identified as potential sites to establish genetic reserves. However, the premier temperate forage and pulse legume hotspots, on the Syrian/Lebanese border is not coincident with any existing internationally recognised protected areas and here there is a need to establish a novel protected area.

Keywords: legume, wild relatives, genetic resources, conservation, protected area.

DENDROARCHAEOLOGY OF SHIPWRECKS IN ISRAEL

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Comprehensive dendroarchaeological studies carried out on nine shipwrecks along the Mediterranean coast of Israel enable to identify the various wood species used in ancient shipbuilding in the Eastern Mediterranean, to detect the repairs and locate the possible construction sites of the ships.

Tantura Lagoon shipwrecks: The earliest ship, the Ma'agan Mikhael, presents the Classical Period, dated to the 4th century BC. About 80% of the hull timbers were made of *Pinus brutia* (Calabrian pine) and the remaining components of the hull were made of tree species that grow native in west – northwestern Turkey.

Three ships present the Medieval Period: Dor 200/1 dated to the 5th -6th centuries AD, Tantura E dated to the 7th-9th centuries AD and Tantura F dated to the beginning of the 8th century AD. The wood species used for building the hull of Dor 2001/1, i.e. *Pinus brutia*, *Cupressus sempervirens* (Cypress) and *Fagus orientalis* (Oriental beech) are native to west – northwestern Turkey, except for *Tamarix (X5)* (Tamarisk) and *Ziziphus spina Christi* (Christ thorn; Jujube) which are native to Israel and were used as repairs on the ship made upon its arrival to Dor. Tantura E was built mainly of *Pinus brutia* and *Cupressus sempervirens*, whereas *Tamarix (X5)* which is native to Israel was used as repairs on the ship upon its arrival to Dor. Two wood species used in constructing the hull of Tantura F, i.e. *Pinus brutia* and *Tamarix smyrnensis*, grow together native in two regions in Turkey: around Izmir and in Antalya, suggesting that most likely it was built on the west or south coast of Turkey.

Three ships, Dor 2002/2, DW2 and Dor C dated to the 17th-19th centuries AD present the Post Medieval Period (Ottoman). The hull of those ships was mainly constructed of *Pinus brutia* which constituted 80%-85% of the examined timbers. The assemblage of wood species used in constructing the hull of those three ships grow native in west – northwest Turkey, suggesting that they were probably built in this region. .

Akko shipwrecks: Akko 1 and Akko 2, dated to the 18th-19th centuries AD, present the Post Medieval Period (Ottoman). Akko 1 was mainly built of *Quercus petaea* constituting about half of the timbers, *Quercus cerris* and *Pinus brutia*. Akko 2 was built only of *Pinus brutia*. The native habitats of the tree species used in constructing the hull of those two ships suggest they were probably built in west – northwest Turkey.

Keywords: dendroarchaeology, shipwrecks, tree species, Israel

COMPARING POST-GLACIAL VEGETATION DYNAMICS OF DECIDUOUS OAK WOODLANDS IN THE IRANO-TURANIAN AND MEDITERRANEAN REGIONS

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Mediterranean and Irano-Turanian xerophytic deciduous oak woodlands display very different postglacial histories. Whereas the Mediterranean oak woodlands suddenly expand at the beginning of the Holocene, the expansion of the major Irano-Turanian oak woodland in the Zagros–Anti-Taurus Mountains delay until the Middle Holocene at about 6500 cal yr BP. The current hypotheses explain this delay as a consequence of a regional aridity during the early Holocene, slow migration rates of forest trees, and/or a long history of land-use and agro-pastoralism in this region. Here, we support a hypothesis that suggests different precipitation seasonalities during the early Holocene compared to the late Holocene. The dominant oak species of the Zagros–Anti-Taurus Mts *Quercus brantii* Lindl. is strongly dependent on spring precipitation for regeneration and is sensitive to long dry season. Detailed analysis of modern atmospheric circulation pattern in SW Asia during the late spring suggests that the Indian Summer Monsoon (ISM) intensification can modify the amount of late spring and/or early summer rainfall in western/northwestern Iran and eastern Anatolia which could in turn have controlled the development of the Zagros–Anti-Taurus deciduous oak woodlands. During the early Holocene, the northwestward shift of Inter-Tropical Convergence Zone (ITCZ) could have displaced the subtropical anticyclonic belt or associated high pressure ridges to the northwest. The latter could, in turn, have prevented the southeastward penetration of low pressure systems originating from the North Atlantic and Black Sea regions. Such atmospheric configuration could have reduced or eliminated the spring precipitation which would have hindered the expansion of oak woodlands. This scenario highlights the complexity of biome response to climate system interactions in transitional climatic and biogeographical regions.

Keywords: Irano-Turanian, Mediterranean, deciduous oak woodland, vegetation dynamics, post-glacial, Indian Summer Monsoon

FIELD AND LABORATORY-BASED APPROCHES TO A REVISION OF *ADENOCARPUS*

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The genus *Adenocarpus* contains approximately 23 species and is centered in the western Mediterranean with a few outlying species in tropical Africa and south-central SE Europe. Many different treatments have been published since the last complete revision over 40 years ago by Gibbs (1967). The most radical new treatment was for *Flora iberica* (Castroviejo, 1999), where new species are described and subspecies raised in rank. Although rich in *Adenocarpus* taxa, Ouyahya's account in *Flora Pratique du Maroc* has followed that of *Med Checklist*. In order to produce a comprehensive modern revision, we have undertaken morphological and phytochemical studies together with a molecular investigation to create a phylogeny using the independent data sets from: morphology, phytochemistry and the nucleotide sequences of non-coding DNA (ITS) and the chloroplast (*trn*L-F). The basic variation in the genus has been examined, and the distribution of the variants noted. This work was supported by fieldwork in both Morocco and Spain. A phytochemical analysis of the leaf flavonoids of the genus was carried out using two-dimensional paper chromatography and high-performance liquid chromatography. The Flavone mono-C-glycosides appear to be the most common flavone glycoside class but restricted to the Moroccan endemic species. In contrast, flavonol O-glycosides and 5-Hydroxy-isoflavone O-glycosides exist only in the endemic species of tropical Africa and south-central SE Europe. The taxonomic and evolutionary implications of the flavone C-glycosides, and the phenolic compounds data are discussed in relation to the results from the molecular studies.

Keywords: *Leguminosae*; *Adenocarpus*; Morphology; Phytochemistry; Phylogeny; taxonomy.

TAXONOMIC REVISION OF THE *ASTRAGALUS ANGUSTIFOLIUS* LAM. GROUP (*LEGUMINOSAE*)

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Within the genus *Astragalus*, *A. angustifolius* Lam. represents a rather critical and still not deeply investigated species. This plant is a typical orophyte, showing a thorny cushion-like habit and chiefly occurring in the eastern Mediterranean territories (Balkans, Aegean Islands, Anatolia, and Lebanon). On the basis of field and herbarium investigations, as well as literature, *A. angustifolius* can be considered a species complex, including many taxa well differentiated from the morphological and chorological viewpoint previously considered distinct species, subspecies or varieties of the species at issue (*A. retusus* Willd., *A erinaceous* C. Presl., *A. pungens* Willd., *A. echinoides* L'Hér., *A. olympicus* Pall., *A. angustifolius* subsp. *longidens* Hub.-Mor. & V. A. Matthews, *A. angustifolius* var. *violaceous* Boiss., *A. angustifolius* var. *peduncularis* Boiss., *A. angustifolius* var. *glabrescens* Boiss., etc.). The present study aims at clarifying the taxonomy, nomenclature, and typification of the several taxa hitherto referred to *A. angustifolius*, taking advantage both from herbarium and living material collected in the whole distribution range of this really interesting group. Several allied species, showing close relationships with *A. angustifolius*, are also examined. They are *A. sirinicus* Ten., *A. tymphresteus* Boiss. & Spruner, *A. taygeteus* Perss. & Strid, *A. hermoneus* Boiss., *A. gennarii* Brullo & Bacchetta, etc. A phylogenetic tree based on morphological data is provided too.

Keywords: *Astragalus angustifolius*, taxonomy, nomenclature, phylogenetic

SOCIO-ECONOMIC AND ECOLOGICAL EFFECTS OF PLANT INTRODUCTIONS IN THE MEDITERRANEAN. Plant invasions in the Mediterranean

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Invasive alien plants are recognized worldwide as detrimental to agriculture (e.g. causing crop loss or additional treatment costs), to the environment (e.g. by out competing native species) or tourism, and as a result to the economy in general. The Mediterranean Basin is particularly vulnerable to plant invasions as its climatic conditions potentially allow the establishment of sub-tropical and tropical species. In the context of climate change, new plants currently limited by cold winters may establish and spread, aquatic habitats being particularly at risk.

Examples include *Eichhornia crassipes* (the water Hyacinth) which can totally cover freshwater surfaces and out compete native species. *Solanum elaeagnifolium*, currently invading the Mediterranean, is a weed of many crops (potato, tomato, cereals, and orchards).

Although the problems caused by invasive alien plants are widely neglected, particularly in the Mediterranean, tools and methods are being developed to prevent their entry and spread. When a new potential invasive plant is identified and recorded in European and Mediterranean countries, it may be subject to prioritization and risk assessment. These processes aim to identify the threat a species may represent, and to evaluate preventive actions, including eradication and prohibition of sale. Mediterranean botanists could play a major role in identifying and reporting further newcomers. Emerging invasive alien plants have already been highlighted: *Baccharis halimifolia*, *Gymnocoronis spilanthoides*, *Pennisetum setaceum*, *Pistia stratiotes*, *Stipa trichotoma*, *S. neesiana* and *S. tenuissima*, *Verbesina encelioides*, etc. Furthermore, as about 80% of invasive alien plants are estimated to be voluntarily introduced for ornamental purposes, a “Code of conduct on horticulture and invasive alien plants” has been developed. This Code of conduct shall be implemented either at the national or local scales to tackle the problem and raise awareness among the horticultural sector and the public.

Keywords: Invasive alien plants, impacts, climate change, risk analysis

IS THERE REALLY A CONFLICT BETWEEN TRADITIONAL AND MOLECULAR SYSTEMATICS?

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Sequencing of the DNA molecule has had numerous impacts on human society, and this influence continues to widen. Unlocking the hereditary information contained within genes as well as understanding roles of intergenic regions offers potentials for revealing the basis of the human condition, amelioration or elimination of disease, regulation of controlled substances, and many other uses. Within biology, unraveling the genomes of selected organisms has resulted in new insights on numerous aspects of cell biology, including developmental patterns, and also evolutionary relationships. It is this last aspect that has come powerfully into systematic biology. For the first time, we now have a quantitative yardstick that enables us to measure genetic similarity (or difference) between any two organisms, no matter at what level of the taxonomic hierarchy. This approach has unleashed thousands of sequencing projects that utilize selected genes or intergenic regions from the nucleus and/or organelles, often in combination, in consort with tree-building algorithms that provide more precise views of relationships. Due to these exciting potentials, many of the new jobs in plant systematics have now been oriented toward persons with DNA expertise. This has threatened the training of fundamental aspects of our field, especially monography, for the next generation of workers. This lack has substantial implications because the monograph is where new hypotheses of relationships are proposed that can be subsequently tested by DNA data. Without more of the former, eventually there will be none of the latter. Monography and DNA investigations, therefore, must go hand-in-hand for a more robust approach to estimating evolutionary relationships. Furthermore, for the study of many biological questions, such as evolution of characters, origin of adaptations, and co-evolutionary patterns, knowledge of the whole organism will require personal field and herbarium expertise that can be enhanced, rather than substituted, by DNA information.

Keywords: evolution, DNA data, monography, phylogenetics.

SOCIO-ECONOMIC AND ECOLOGICAL EFFECTS OF PLANT INTRODUCTIONS IN THE MEDITERRANEAN: AN OVERVIEW

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Over the past two millennia the Mediterranean region has been the recipient of many waves of plant introductions, some of which have produced major effects on the landscapes and lives of the peoples who inhabit its shores. The impacts of the introductions made by the Romans and the Moors are compared with those of the 'Columbian exchange' which led to a systematic and massive transfer and diffusion of plants, animals and diseases between the old and new worlds. The effects of the various introductions on both agricultural and urban landscapes are discussed as are the impacts on human diet and nutrition which had important demographic consequences and both deleterious effects on human health as well as providing plant-based medicines to cure some diseases such as malaria. Some of these effects are still being played out today. The social and economic consequences, although initially, scarcely perceptible, were quite profound in the subsequent centuries after the initial introductions. The landscapes and the economy of the region have also been affected in more recent times by changes in the way that the introduced crops are cultivated, such as intensification including irrigation and cultivation of fruit, salad crops and flowers in greenhouses or under plastic, crop substitutions such as sunflower (*Helianthus*) for olive, increased reforestation and plantation forests, often with exotic species such as *Eucalyptus*. Urban landscapes have been transformed as a consequence of the widespread introduction of ornamental subtropical species that are now almost their defining features. Finally, invasive alien species are an increasing threat to landscapes in several Mediterranean countries and likely to become more widespread in the face of climate change.

Keywords: plant introductions, landscapes, invasive alien species

OPTIMIZATION OF MORPHOLOGICAL DATA IN NUMERICAL TAXONOMY STUDIES

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Numerical Taxonomy or Phenetics aims to create a taxonomy using numeric algorithms. Morphological analysis are carried out by measuring dozens of variables in Numerical Taxonomy. The workload to perform measurements is proportional to number of characters. However, some part of the data may be irrelevant or sometimes meaningless. In this study, we introduce a newly developed method based on Feature Selection method of Genetic Algorithms to optimize the data by eliminating meaningless or repeated part of it. Method uses morphological data as input and for a given Numeric Taxonomy method, optimize the data to a subset of characters.

Keywords: Phylogenetics, Numerical Taxonomy, Optimization, Morphology.

LOCALLY EXTINCT PLANTS FOUND AT THE 780,000 YEARS OLD GESHER BENOT YA'AQOV, ISRAEL

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Seed and fruit remains of 130 taxa were identified at the Gesher Benot Ya'aqov archaeological site. These remains were found together with many Acheulian stone tools, rich assemblage of fossil animal bones, as well as pollen, wood and bark. The site is located south of the Hula Valley in the Dead Sea Rift, a segment of the African Great Rift System. It stretches along 3.5 km of the bed and both banks of the River Jordan. Excavations revealed a series of waterlogged tectonically tilted layers that were deposited in the paleo-Lake Hula and on its shores. The wealth of archaeological finds deposited on the shores of this lake represent the environment and behavior of hominins that occupied this landscape. The fieldwork exposed deposits that document a series of paleoclimatic fluctuations extending over 100,000 years and dated to the Lower and Middle Pleistocene, some 800-700 kyr.

The seeds and fruit remains include fifteen locally-extinct-taxa, i.e. taxa that do not grow today in the Hula Valley or in other region included in flora Palaestina. These taxa are wet-habitat plants, namely *Aldrovanda vesiculosa*, *Azolla filiculoides*, *Hippuris vulgaris*, *Euryale ferox*, *Montia minor*, *Najas foveolata*, *Nymphoides peltata*, *Potamogeton coloratus*/*polygonifolius*, *P. distinctus*, *Ranunculus arvensis* var. *inermis*, *Salvinia natans*, *Sagittaria sagittifolia*, *Trapa natans*, as well as *Stratiotes intermedius* and *Tectochara* cf. *merianii* that had become extinct. Their significance for the hominins that occupied the ancient Hula Valley is discussed. It is interesting that most of these regional extinct species have a wide distribution with a lacuna in the Middle East.

Keywords: Gesher Benot Ya'aqov, Hula valley, Local extinction, Pleistocene, water-plants.

POSTERS

POLLEN MORPHOLOGY OF TURKEY'S ENDEMIC *HELICHRYSUM* MILL. (*ASTERACEAE*) TAXA

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In this study pollen morphology of 12 endemic taxa were studied with light-microscope and scanning electron microscopes. Palynological definitions for each taxa were made. Pollens are radial symmetrical. The shapes of the pollens are oblate-spheroidal, suboblate and prolate-spheroidal. The ornamentation of pollens is echinate. The results and evaluations of the study indicated that *Helichrysum* taxa and pollen morphology were similar.

Keywords: *Helichrysum*, *Asteraceae*, Pollen, SEM, LM.

COMPARATIVE ANATOMY AND TRICHOME MORPHOLOGY OF SOME *SALVIA* L. (*LAMIACEAE*) TAXA AND THEIR SYSTEMATIC SIGNIFICANCE

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In this study, anatomy (stem, blade and petiole) and trichome morphology of *S. adenocaulon* P.H.Davis, *S. dicroantha* Stapf, *Salvia napifolia* Jacq., *S. nemorosa* L. and *S. verticillata* L. ssp. *amasiaca* (Freyn & Bornm.) Bornm. growing in Turkey are examined in order to clarify their similarities and differences by using light microscopy (LM) and scanning electron microscopy (SEM). The results obtained from the anatomical studies revealed a clear distinction among the investigated taxa. Two main trichome types on the blade, calyx, corolla, inflorescence axis, and stem of the taxa were observed: glandular and non-glandular trichomes, according to the absence or presence of a secretory head on the trichome. The glandular trichomes were identified into two types: subsessile and capitate. The capitate glandular trichomes and the non-glandular trichomes were further divided into several kinds. Distribution and density of the identified trichome types were also provided.

Keywords: Anatomy, *Lamiaceae*, *Salvia*, SEM, Trichome morphology

PHENETIC ANALYSIS OF THE *CRATAEGUS* L. (*ROSACEAE*) TAXA

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The study is based on the *Crataegus* species collected from the field in Turkey and Iran or deposited at various herbaria. For this purpose, among all of the selected characters, 75 of morphological characters are found useful and they have been studied for 35 taxa as operational unit (OTU). The data is analyzed with the NTSYSpc package program for understanding the similarities among OTU's. According to obtained phenogram, the taxa belong to the complexes *Crataegus azarolus*, *C. monogyna,* and *C. orientalis* are distinct from the other taxa. Beside this, the results obtained from numerical taxonomic and classical study are not in congruence at least subgeneric level. Furthermore, some of the taxa in species and subspecific level do not support to the classical taxonomic result. The basic problem for taxonomy of the genus seems to be hybridization and intermediate forms related to ecological conditions.

Keywords: *Crataegus*, *Rosaceae*, taxonomy, Turkey

FLORAL MORPHOLOGY AND TAXONOMIC SIGNIFICANCE OF THE *NIGELLA* L. (*RANUNCULACEAE*) TAXA

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Nigella, which is divided into three genera based on floral morphology by some authors, are very diverse in shape. Sepals are petaloid and showy; petals are specialized and bearing nectary; stamens are primitive in respect of number and anthers shape; fruit is a capsule of united or semi-united carpels. Leafy bracts in a few species of the genus enclose flowers. The parts of the flowers have been examined and studied in respect of morphometric approaches. The data which have been composed of 27 floral characters have been analyzed with the NTSYSpc package program. These characters have been also evaluated from taxonomic and evolutionary point of view. The study in the floral characters shows that variation of them is extremely high in comparison with other morphological characters and essential for taxonomy of the genus. This study supports to segregation of *Nigella* into three separate genera.

Keywords: Floral morphology, cluster analysis, *Nigella*, taxonomy.

CLASSIFICATION AND ORDINATION OF TAURUS CEDAR FORESTS IN THE SOUTHERN ANATOLIA

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Cedrus libani forests have been under anthropogenic pressure from humankind for thousands of years. The almost inaccessible topography of the Taurus Mountain Chain (Southern Anatolia) has prevented cedar in this region from being extirpated, in contrast to its other areas of distribution in Syria and Lebanon. The study is a comprehensive investigation of *C. libani* forests on the Taurus Mountain Chain. A data set containing all available relevés from *C. libani* forest vegetation from the Taurus Mountain Chain was constituted and analyzed with classification and ordination techniques that are widely used in vegetation ecology studies in the world and especially in Europe. Numerical analyses of relevés confirmed the individuality of associations, as well as the division of *C. libani* forests into two ecologically and floristically different groups/alliances (*Abieti-Cedrion* and *Lonicero-Cedrion*). *Abieti-Cedrion* is distributed in the middle and eastern Taurus whereas *Lonicero-Cedrion* appears in the western Taurus. The main gradients of *C. libani* forests were indicated by their distribution and floristic composition being strongly affected by the geographical factors from west to east and also from south to north. Topographical factors are also decisive on their distribution. *C. libani* forests are mainly part of the Mediterranean phytogeographical region and Mediterranean floral elements therefore prevail, but with a decrease in the influence of the Mediterranean climate, under more continental conditions, the proportion of Iran-Turanian and Euro-Siberian floral elements increase, especially towards the east and north, as well at higher altitudes and on steeper sites.

Keywords: *Cedrus libani*, ecology, forest, numerical analysis, phytogeography

SOME RARE ENDEMICS OF BELBAŞI&MAHA PLATEAUS (ANTALYA - GAZİPAŞA) FROM SOUTH ANATOLIA

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This research comprises Belbaşı&Maha Plateaus and their environs that takes place in Gazipaşa district of Antalya. The research area is in the border of Sugözü and Şahinler villages. It is located in a valley that is extending south–north direction between Cula&Karasay mountains with Akçalı mountain and terminated with Gevne valley that feeds the Göksu River. It is stated in C4 square, according to the P.H. Davis's grid system for Turkey. And it is situated in the Central Taurus Mountains as geographical and located at Sub-Mediterrranean area which shows the transition properties of Mediterranean and Irano-Turanian fitogeographic regions as fitogeographical.

This study is a part of "Flora of Belbaşı & Maha Plateaus (Antalya-Gazipaşa)" project (I.U. T-3668, 2008-2010). 1270 plant specimens were collected from the research area in different vegetation periods from 2007 to 2009. Up to now, 430 samples have been idendified. As a result of identification of the collected plant specimens, 238 taxa belonging to 116 genera and 62 families have been determined. Forty-eight of these taxa are endemic. The plant specimens, which are collected from the area have been kept in the ISTO (Istanbul University Faculty of Forestry Herbarium).

In this study, distribution of endemic taxa have been investigated and the statuses have been evaluated according to the IUCN threat criteria. As a result of this study, many of endemics are rare. *Arnebia purpurea* S. Erik & H. Sümbül, *Cephalaria gazipashensis* H. Sümbül, and *Onopordum bracteatum* var. *arachnoideum* S. Erik & H. Sümbül are known only from Belbaşı and Maha Plateaus and Gevne valley.

In this investigation, which is also supported by the literature researching, has been intended to emphasize the importance of the region and the plants that should be protected.

Keywords: Rare endemic, IUCN,Gazipaşa, Belbaşı&Maha Plateaus, Turkey

GENOME SIZE AND PLOIDY LEVELS SUPPORT MORPHOLOGICAL VARIATION IN SYMPATRIC POPULATIONS OF *Sorbus aria* AND *S. austriaca*

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The genus *Sorbus* L. (rowans) represents one of the taxonomically most challenging woody genera in European flora. Diversification within the genus is strongly affected by past and current hybridization, polyploidization and apomixis. *Sorbus aria* and *S. austriaca* represent sexual diploid and tetraploid species respectively, which often occur in sympatric areas. These species were examined for variation of leaf morphology and genome size both in pure and mixed populations of the two rowans. Genome size analysis by flow cytometry gave *S. aria* with mean value 2C=1.38 pg ± 0.032 and *S. austriaca* with 2C=2.74 pg ± 0.045 which corresponds to di- and tetraploid levels. Moreover, in sympatric areas a high portion (27%) of triploid individuals with intermediate genome size (2.02 pg ± 0.031) was found. Diploids had the highest monoploid Cx-value (0.69 pg), tetraploids intermediate (0.68 pg) while the triploids possessed the smallest (0.67 pg). Analysis of morphological variation using Canonical Discriminant Analysis clearly showed three distinct groups of individuals corresponding to their different ploidy levels. The first two canonical functions of leaf morphometric variables explained all observed variation (F1= 71.3% and F2= 28.7%), confirming that discrimination was absolute and highly significant. The possible origin of triploid individuals in sympatric areas of the *S. aria* and *S. austriaca* complex are disscussed.

Keywords: *Sorbus*; sympatry; genome size; ploidy variation; Cx-value

GENETIC VARIATION AND PHYLOGEOGRAPHY IN THE BARBARY THUJA (*TETRACLINIS ARTICULATA* (VAHL) MASTERS)

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We investigated patterns of genetic variation within and among *Tetraclinis articulata* (Vahl) Masters populations in the western Mediterranean Basin. We genotyped 214 individuals using Amplified Fragment Length Polymorphisms (AFLP) from natural populations throughout the whole distribution range of this species (Algeria, Malta, Morocco and Spain). The two AFLP primer combinations used generated 700 unambiguously scorable DNA fragments. Different analyses such as the Principal Coordinate Analysis (PCoA), the AMOVA, the Neighbor-Joining (NJ), and the Bayesian clustering revealed a poor structure among the populations analyzed. Our results document a low effect of the Strait of Gibraltar on *Tetraclinis articulata* differentiation as populations from S Iberian Peninsula were, genetically, very close to those from N Morocco (Rif Mountains). This is interpreted in the context of postglacial history of the region. Also, the human impact of this species has been discussed.

Keywords: AFLP, *Tetraclinis articulata*, W Mediterranean,

PLANTS AND CULTURE IN EUROMEDITERRANEAN AREA: ARCHAEOBOTANY AND THE PaCEM NETWORK

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As a follow-up to an EU PaCE project [(1)], and under the same key-words '*Plants and Culture*', we wish extend our archaeobotanical network into Mediterranean countries. The main aim of this PaCEM network is to establish joint and coordinated associations with archaeological sites belonging to major ancient civilizations.

Archaeobotany is useful both to know how a population exploits the environment, and to understand the evolution of cultural landscape [(2,3)] through the use of plants, which is at the core of understanding modern human impact and sustainability. These issues also include conditions of life and diet, the exploitation of domestic and wild plants, the relationship between environmental modifications and cultural patterns as a result of human settlements. Social responses to climate change are the result of both human perception of nature and adaptation to its changing environment.[(4)]

All known techniques for the archaeological recovery of plants and analyses should be applied consistently to all samples. Distinguishing signs of anthropic action, influence and impact by means of not-intentional or intentional plant management can be achieved not only by approaching the problem within a multidisciplinary framework, but also by parallel studies carried out both on pollen and macroremains. It is only through this integrated approach that a more complete picture of the past landscape can be achieved. The first step of the activity of this developing project will be the creation of the *website* of the PaCEM Mediterranean net.

Keywords: plants, archaeobotany, cultural heritage, Mediterranean basin

ECOPHYSIOLOGY OF GERMINATION IN SICILIAN POPULATION OF *FERULA COMMUNIS* (*UMBELLIFERAE*).

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Ferula communis L. is an umbelliferous plant widespread in the Mediterranean basin and particularly abundant in Sicily and Sardinia islands (Italy). In this species, two chemotypes have been distinguished: one is poisonous and responsible of hemorrhagic syndrome of livestock, known as ferulosis, while the other one (non- poisonous) has anticancer activity due to the presence of daucane esters. In Sicily the dry stem of this plant has commercial applications in special manufactured products.

The object of the research was to investigate the germination ecophysiology of nine Sicilian populations of *F. communis*, in order to establish the correct germplasm conservation of the chemotypes economically interesting.

In this preliminary study we report data of seeds collected in July 2009 from Monte Pellegrino population. The effects of water (control), three GA_3 concentrations (10^{-3}, 10^{-6} and 10^{-9} M) and four temperatures (5°, 15°, 20° and 25°C) were investigated. Besides, seeds were also incubated on MS medium with vitamins, 30 gl^{-1} sucrose supplemented with three GA_3 concentrations (2.8, 5.6 and 11.2 µM) at the same temperatures reported above. Seeds were incubated in the dark and monitored for 120 days. Germination percentage (%G) and mean time germination (MTG) were recorded.

The best germination rate assessed was 30% in water at 5°C (69 days of MTG), followed by 10% in water at 15°C (39 days of MTG). Very low germination rate (4.7% and 90 days of MTG) occurred on MS hormone-free medium and on MS with 2.8 and 5.6 µM GA_3 at 15°C. No germination was observed at higher temperatures. The results show that low temperatures determine germination while GA_3 do not have any inductive effect on germination, in accord with data obtained in Sardinian populations by Sanna and co-workers. Further investigations needs to be carried out to improve the germination protocol of this species.

Keywords: chemotype, *Ferula communis*, germination, germplasm conservation.

THE DETERMINATION OF EROSION INTENSITY OF SOIL WHERE THE PLANT ASSOCIATIONS DISTRIBUTED ON SOME MOUNTAINS IN THE TRANSITION ZONES BETWEEN MIDDLE BLACK SEA AND MIDDLE ANATOLIA REGIONS

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In this study, the erosion levels of some mountains situated between Middle Black Sea and Middle Anatolia regions are determined related to the data in the analysis tables of plant associations. Erosion and loss of soil related to the erosion is an important environmental problem neglected by the today's people. The most important factors for the erosion are inclination, climate, vegetation and the structure of the soil. The climate and soil factors can be neglected while determining the intensity of erosion as they don't show important changes under normal conditions relating to the time. In such a state, vegetation and inclination determine the intensity of erosion. When examining the vegetation, the differences caused by the life length of the plant and the root structures should be taken into consideration. The plant taxa with weak and shallow root structures cannot be expected to prevent erosion. For this reason, "therophytes" and "geophytes" are not considered in determining the intensity of erosion. On the other hand, "phanerophytes", "chamaephytes" and "hemicryptophytes" can slow the intensity of erosion with their strong root structures. Thus, there is an adverse relation between the coverage percentage of the taxa of these life-forms and the intensity of erosion. However, there is a direct relation between the inclination and erosion intensity. 9 plant associations on the Inegöl Mountain, 8 on the Eğerli Mountain, 7 on the Karaömer Mountain and 8 on the Sakarat Mountain are determined by the researchers. Examining the data in the analysis tables of this associations, it is seen that the erosion levels in the distribution areas of the plant associations are 1A: stationary very slight erosion, 1B: sensitive very slight erosion, 2A: stationary slight erosion, 2B: sensitive slight erosion, 3A: stationary mean erosion, 3B: sensitive mean erosion.

Keywords: Eğerli Mountain, Inegöl Mountain, Karaömer Mountain, Sakarat Mountain, Erosion intensity.

SOME RARE ENDEMIC WOODY PLANT TAXA OF TURKEY: THE TREES

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Turkey is one of the wealthest floristic regions in the world. In l960's, it is assumed that the number of the species is between 3.000-5.000. Recent researches showed that there are 9.342 species and 34 % of them (3.130) are endemic. As the origin of many plants, Anatolia is very rich and interesting in terms of endemic plant taxa.

There are about 24 Gymnospermae and more than 870 woody Angiospermae species in Turkey. Forest vegetation covers 24.8 % of the whole country, which is about 21.188.746 million hectars. In terms of tree species, our country's forests consist of 54.4 % Gymnospermae, 45.6 % Angiospermae species.

Among the herbaria in Turkey a especially ISTO is the richest, the most important and the most trustworthy resource in terms of woody plants. ISTO has wealthy collections of species such as *Pinus* L., *Juniperus* L., *Betula* L., *Quercus* L., *Acer* L., *Tilia* L., *Fraxinus* L., *Ulmus* L., *Celtis* L., *Salix* L., *Rhamnus* L., *Crataegus* L., *Pyrus* L., *Sorbus* L., *Amygdalus* L., *Cerasus* Duhamel, *Rosa* L., *Rubus* L., *Pistacia* L., *Euonymus* L. *etc.* ISTO has 5 Gymnospermae, 24 Angiospermae of these woody taxa's type.

This study is performed to reveal rare endemics of some woody taxa (trees). It is prepared by using specimens at ISTO that have limited distribution area, are distributed locally and rare endemic trees species in Turkey. Plants that have a small distribution area and weak population are accepted as rare endemic. The photographs of rare endemic taxa's specimens at ISTO are taken, their characteristics are explained briefly. In addition the maps of distribution areas are used. As a result of studies, there are 58 endemic woody (tree) taxa and 44 of them are rare in the flora of Turkey.

Keywords : Rare endemic, woody taxa, Turkey, ISTO

CHAMAESPARTIUM ADANS. (*LEGUMINOSAE*) A NEW GENUS RECORD FOR THE FLORA OF TURKEY

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Chamaespartium sagittale (L.) P.E. Gibbs (*Leguminosae*) is a new genus record for the flora of Turkey with specimens collected from Yuvacık Dam in Kocaeli province of north west of Turkey. All of the authors collected some interesting plants during floristic studies in the Yuvacık Dam area (Kocaeli), during the spring and summer of 2005. *Chamaespartium sagittale* was identified by the authors, during a working at ISTO and DUOF herbaria in between 2005 and 2009. These specimens were compared with material in the herbaria of ULM (Herbarium Universitaet Ulm, Germany) and BRNU (Herbarium Universitasis Masarykiana Brno, Czech Republic). *Chamaespartium sagittale* usually grows in maquis habitats in the Mediterranean floral region. It is a Mediterranean species with a wide distribution ranging from southern Europe throughout south west Asia. It is recorded that the species is distributed at 1050-1600 (2360) m in shrubby and oak woodlands in south and central Europe. In Turkey, it grows at c. 850 m and in maquis and stony habitats and is distributed in Kocaeli province of Western Black Sea Region. It is clearly understand to floristic links in between north west Turkey and southern Europe with distribution of *Chamaespartium sagittale.* The number of genera of *Leguminosae* in the Flora of Turkey is increased to 70 with the addition of *Chamaespartium*. Its IUCN red list category is EN (Endangered) because of its natural habitat has under threatened of animal grazing and road construction.

Keywords: Flora of Turkey, *Leguminosae*, new genus, *Chamaespartium sagittale*

TURKEY PLANT BANK

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Botanical data in the development and creation of nature protection policy is one of the most important elements. Herbarium, museum and botanical gardens gives possibility plant visually to see and obtain information if they reach the ground. However plant banks provide both view the same thing on the screen in a very short time and able to gain relative-inquiring each other informations about the plant or plants in intended area. Obtained this information contributes primarily to scientific research, to prepare of the EIA report, to create a resource base and current to environmental regulation and protection work, and to eliminate curiosity of them interested in plants. This Plant Bank is built for the first time with all of these reasons by us. BOTANIC 2010 data base was created with the aim of actuating Plant Bank's and constituting and updating plant taxa existed as native and foreign plants in our country, and botanical features of these taxa. Pioneer of this data base was the plant of Eastern Mediterranean region which has the transition zone and the most plant diversity contains a large part of the Anatolian diagonal. This region includes up to 50% richness when it compares with plant diversity of Turkey. "Plant Bank" will be completed representing in also other regions in result of the continuation of data entry. These days, it came half-way point in the completion of The Plant Bank of Turkey.

BOTANIC 2010 Data Base includes 65 features for each taxon. These are: endemism, threatened categories, CITES-conservation status, monumental-medicinal-food-poisonous-alien-aromatic plants, habitat, locality, systematic features, social-sintaxonomic-ecological value, the distribution maps according to GPS coordinates, place and photos, etc. This is the first database that can be done relative-inquiring each other among all of these features of taxon/taxa. Turkey Plant Bank’s trial version web addresses are www.turkiyeflorasi.com, www.turkiyeflorasi.net, www.turkiyeflorasi.org.

Keywords: Plant Bank, BOTANIC 2010, Data Base, Eastern Mediterranean Region, Turkiye florasi.

THE ANATOLIAN DIAGONAL – A HOTSPOT FOR NATURAL HYBRIDISATION FOR the GENUS *ARISTOLOCHIA*?

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Aristolochia is a species rich genus characterized by its unique flowers and well known to botanists from the tropics. Although, *Aristolochia* has a limited diversity and distribution in the more temperate areas of the northern hemisphere, the Mediterranean - Near East region can be regarded as a diversity hotspot with 27 species in Turkey of which 15 of them are endemic to Anatolia.

During field studies for the *Aristolochia* revision in Turkey, we found additional evidence for the existence of the Anatolian Diagonal. Detailed distribution maps of *Aristolochia maurorum* L. and *A. bottae* Jaub & Spach are in accordance with the hypothetical demarcation line of Anatolia which is suggested to be a distributional floristic break, running from NE Anatolia to the Anti-Taurus.

Field studies along the mid-Anatolian Diagonal lead to the discovery of intermediate morphotypes between *A. maurorum* and *A. bottae* (*A. maurorum* × *bottae*). In the same area both parents were also found. This discovery shaped the hypothesis of the existence of potential hybrids between both species as a result from incomplete geographic isolation along the Anatolian Diagonal.

Natural hybridisation, which was first noted by Davis & Khan between *Aristolochia paecilantha* and *A. maurorum* at the southern tip of the Anatolian Diagonal, has been addressed using molecular phylogenetic methods. Detected hybrids of *A. maurorum* and *A. bottae* on the mid of Anatolian Diagonal indicated the natural hybridisation involving three species along the line. Although morphology shows proofs for clarifying the hybridisation fact within these sympatric species, it raised additional questions about intra-specific relations and incomplete geographic/genetic barriers between the Near-East *Aristolochia* species.

Keywords: Natural hybridisation, *Aristolochia*, Biogeography, Taxonomy, Mediterranean, Anatolia.

SEED CHARACTERISTICS AND TESTA TEXTURES OF SECTION *PRATENSIS* FROM *LATHYRUS* L. (*FABACEAE*) IN TURKEY

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The seed morphologies and testa properties of 5 taxa (*L. pratensis* L., *L. layardii* J., *L. laxiflorus* (Desf.) O. Kuntze subsp. *laxiflorus*, *L. laxiflorus* subsp. *angustifolius* (Post ex Dinsm.) Davis, *L. czeczottianus* Bässler belonging to the Pratensis section of the genus *Lathyrus* that can widely be found in Turkey have been analyzed. The morphological properties to be measured included seed size, general shape, surface shape, color and hilum length. The testa patterns (papillae length, papillae density, ribbed and waxy layer) were examined using scanning electron microscope (SEM). In addition, some photographs included in this study were taken using both stereo-microscope and scanning electron microscope (SEM).

Keywords: *Lathyrus*, Section *Pratensis*, seed morphology, testa texture, Turkey

SOME MEDICINAL PLANTS USED IN MARMARİS (MUĞLA) DISTRICT

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This study is a part of the master thesis "An Ethnobotanical Study in Marmaris District (Muğla) ". Marmaris is located in South-West Anatolia. This study have been carried out from December 2008 to February 2010. Questionnaires were filled with the local people's knowledge and plant samples were collected with informants. Each collected material has been deposited as a herbarium specimen in ISTE (The Herbarium of the Faculty of Pharmacy of İstanbul University). Forty traditional medicinal plants from Marmaris (Muğla) district in Turkey have been reported. Among them 31 species are wild and 9 species are cultivated plants. In this poster presentation will be demonstrated medicinal plants which are mostly used for cold, flu, cough as *Matricaria chamomilla, Mentha pulegium, Salvia fruticosa, Sideritis leptoclada, Rosmarinus officinalis, Lavandula stoechas, Anthemis chia* used for stomachache, ulcer as *Cistus creticus, Cistus salviifolius, Momordica charantia, Hypericum empetrifolium, Junglans regia, Origanum onites, Phlomis lycia, Satureja thymbra, Laurus nobilis, Malva sylvestris* and used for kidney stones as *Vitex agnus-castus, Paliurus spina-christi*.

Keywords: Ethnobotany, Marmaris, Medicinal plants, Muğla, Turkey

NEW CHROMOSOME NUMBERS IN GENUS *SERRATULA* L. (*ASTERACEAE*) FROM TURKEY

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The genus *Serratula* L. belongs to Asteraceae family and has 17 taxa in Turkey. In this study, somatic chromosome numbers were determined in four species of *Serratula* which grows up naturally from Turkey. These taxa are *Serratula kotschyi* Boiss., *S. quinquefolia* M.Bieb. ex Willd., *S. erucifolia* (L.) Boriss. and *S. hakkiarica* P.H.Davis according to their floristic order. All species contained somatic chromosome numbers of 2n = 30. The basic chromosome number of the genus was x = 15. The research has made contribution to the cytotaxonomic revision of the genus *Serratula* in Turkey. Somatic chromosome counts were made using Bs200Pro Image Analysis System.

Keywords: Compositae, Chromosome number, *Serratula*, Turkey.

NOTES ON THE DISTRIBUTIONS, ECOLOGY AND THREAT CATEGORIES OF CLOSELY RELATED TWO ENDEMIC SPECIES OF *ERYSIMUM*

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Genus *Erysimum* is represented by 70 taxa in Flora of Turkey. 43 of them are endemic to Turkey. According to Flora of Turkey and recent papers *Erysimum echinellum* Hand.-Mazz. and *Erysimum dincii* Yıld. are two poorly known endemic species. During the excursion in 2005-2009, the authors were collected lost of specimens belonging to the species. *E. echinellum* Hand.–Mazz. was firstly described from Hazarbaba mountain (Elazığ, Turkey) by Handel-Mazzetti in 1913. After this date, it was recollected from different localities (from Adana, Sivas, Kayseri, Karaman, Nevşehir, Kahramanmaraş provinces) by the authors. So, its distribution area has been expanded. The threat category of the species was assessed according to IUCN criteria and the new threat category proposed for this species. *E. dincii* Yıld. was recently described from Karaman province by Şinasi Yıldırımlı in 2008. It was recollected from different localities (from Ankara, Nevşehir, Kayseri provinces). The threat category of the species was assessed according to IUCN criteria and the new threat category proposed for this species. Morphological descriptions, new localities, distribution maps and photographs of the species are given. Phytogeographic elements for these two species are suggested.

Keywords: *Erysimum*, ecology, threat categories, endemic, Turkey

PLANTS OF CR CATEGORY DISTRIBUTED IN ALANYA

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The research areas which are Akdağ and Cebireis Mountains (Alanya-Antalya) take place in rich of endemics Toros Mountain range. Among the 2005-2009 years after doing the floristic studies in the area 208 endemic taxa were determined. As a result of the evaluations of these endemic taxa which were done according to IUCN, 7 taxa were critically endangered (CR), 11 taxa were endangered (EN), 26 taxa were vulnerable (VU), 56 taxa were near threatened (NT), 106 taxa were least concern (LC), conservation status of 2 taxa weren't stated. Conservation status of 15 taxa which are in EN-VU-LC categories according to IUCN (Ver. 3.1) 2001 criteria (*Arabis alanyensis* H. Duman **(EN)**, *Pentanema alanyense* Duman & Anderberg **(EN)**, *Origanum husnucan-baseri* H. Duman, Z. Aytaç & A. Duran **(EN)**, *Cephalaria isaurica* Matthews **(EN)**, *Arnebia purpurea* S. Erik & H. Sümbül **(EN)**, *Verbascum nudatum* Murb. var. *spathulatum* Hub.-Mor. **(EN)**, *Aethionema alanyae* H. Duman **(VU)**, *Arabis davisii* H. Duman & A. Duran **(VU),** *Centaurea bourgaei* Boiss. **(VU),** *Sideritis brevibracteata* P.H. Davis **(VU),** *Chrysophthalmum gueneri* Aytac & Anderb. **(VU)**, *Scorzonera ulrichii* Parolly & N. Kilian **(VU)**, *Cephalaria gazipashensis* H. Sümbül **(LC)**, *Allium enginii* N. Özhatay & B. Mathew **(LC)**, *Calamintha pamphylica* Boiss. & Heldr. subsp. *pamphylica* **(LC)** and also conservation status of 2 taxa which weren't stated (*Allium koyuncui* H. Duman, *Bellevalia mathewii* N. Özhatay & B. Koçak) are raised to **CR** category. In this way, numbers of taxa which are CR category in area are raised to 24. In this poster is taken into consideration plants of CR category to be showed a distribution in area. This study is supported by photographs of new taxa in recent years to be described in area.

Keywords: IUCN categories, CR, Endemic, Alanya, Turkey

GENETIC DIVERSITY AND POPULATION STRUCTURE OF *JUNIPERUS EXCELSA* M. BIEB. IN THE EAST MEDITERRANEAN BASIN.

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A first genetic investigation on East Mediterranean populations of *Juniperus excelsa* is proposed. Its genetic diversity and genetic differentiation were evaluated in the light of the historical fragmentation of its populations. Among thirty three nuclear microsatellite primers tested, only three were informative and, thus, used to genotype 360 individuals from thirteen different populations sampled in Greece, Turkey, Ukraine, Cyprus and Lebanon.

All populations had the same level of genetic diversity. Over all populations, the three microsatellites showed a relatively low level of allelic richness (*Na* averaging 8.923). Both, the expected heterozygosity (He), as well as the total genetic diversity (Ht) were high and ranged, respectively, from 0.714 to 0.807 and from 0.771 to 0.923, while the fixation index (Fis) showed a strong deviation from the HWE with an excess of homozygotes. This unexcpected deviation can be explained by the Wahlund effect and/or by the presence of null alleles. AMOVA showed a high level of within population diversity and, thus, a low but significant genetic differentiation among populations with Fst = 0.076 ($P<0.001$). A clear geographic pattern was observed with a congruent result obtained according to PCA, Dendrogram tree and Structure. The three most orophilic, old and vestigial Lebanese populations clustered together separated from all the other populations. This result indicates a strong differentiation of these populations with a high genetic diversity "freezed" in time. The other Lebanese populations from lower altitudes, consituted a subgroup separated from the populations of Greece, Ukraine, Turkey and Cyprus. The high genetic diversity observed suggests a recent separation of these Lebanese populations.

Keywords: Nuclear microsatellites, *Juniperus excelsa*, East Mediterranean, Genetic diversity, Genetic differentiation.

GEOPHYTES OF YAZILIKAYA (HAN-ESKİŞEHİR)

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This research has been carried out between March 2009 and January 2010 to examine the floristic structure of the Ancient Midas City, known as Yazılıkaya, located in B3 of the Davis's grid system concerning Turkey. The name Yazılıkaya (Turkish for "inscribed rock") comes from the Phrygian ancient monument, entitled Midas Monument. Yazılıkaya village, which is 80 km far from Eskişehir, located on "Phrygian Plateau" that is a square shaped area bordered by Eskişehir district on the North, Kütahya on the West, Afyonkarahisar on the South, and Seyitgazi on the Northeast. There are plenty of ancient Phrygian remains and monuments near the village. The research area, which is located in a zone between steps and forest, has remarkable soil structure and plateau characteristics.

The aim of the research is to identify different species, risk categories, protection situations and to reveal new record species both for Eskişehir and B3 square which Eskişehir located in. In this poster, it is particularly concentrated on geophytic species in the region among many other plant species of analyses. Actually, 42 geophytic taxa belonging to 10 families and 21 genera are gathered from the investigation area. 1 taxa are new records for B3, 8 taxa are endemic and 3 taxa are rare to Turkey. According to floristic regions, 12 Mediterranean elements are ranked first, followed by 6 Irano-Turanian elements and 2 Euro-Siberian elements. 24 of the identified species are widespread and of unknown phytogeographic origin. In addition, 37 of the collected taxa are determined to be monocotyledons and the remaining 5 are dicotyledons. The families with the most taxa in the research area are Hyacinthaceae 8 and Iridaceae 7. Concerning the number of species, the major genera in this region are as follows: *Crocus* (6) *Allium* and (5) *Gagea* (4).

Keywords: Geophyte, Flora, Yazılıkaya, Eskişehir, Turkey.

SOME ENDEMIC AND RARE PLANTS OF KORKUTELİ (ANTALYA) DISTRICT

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Antalya is one of the cities stand out with its rich flora in Turkey. Along with its rich flora, it also has a wide diversity of habitats. High rising mountains in short distances, valleys, rock cliffs, coastal dunes, macchie, woods, variety of soil structures and climate provide unique environment for the biological diversity of Antalya. Antalya is also the source of economically important species of herbs, shrubs and trees.

The floristic researches around the town of Korkuteli, introduce the richness of flora with the number of the endemic species in the area. Korkuteli, 60 km NW of Antalya, situated on a high plataue surrounded with the mountains. Dominant climates, mediterranean and territorial, and the topographical variety provide the biological diversity in the area. With this study, 15 of the endemic and rare taxa presented, displayed with the photos and their morphological characteristics.

Keywords:, Endemic, rare plant, Antalya, Korkuteli, Turkey

FINE–SCALE GENETIC STRUCTURE OF C*ENTAUREA CINERARIA* SUBSP. *CINERARIA* (*ASTERACEAE*) IN RELATION TO ITS FRAGMENTED HABITAT IN THE MEDITERRANEAN BASIN

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Centaurea cineraria L. subsp. *cineraria* (*Asteraceae*) is an endemic, sea-cliff-dwelling plant from southern Italy that reproduces sexually by cross-pollination. However, individuals of *C. cineraria* subsp. *cineraria* are spatially subdivided into two subpopulations located, respectively, on the island and continental parts of the cliff, and separated from the sea.
Genetic diversity and population structure have been investigated through the analysis of neutral hypervariable markers such as simple sequence repeats (SSRs) to unravel the impact of habitat fragmentation of this species habitat that could have led to present genetic differentiation between the populations.

We found that the genetic diversity was considerable (average *He* = 0.496-0.863), together with a low differentiation among populations, as estimated by F_{ST} = 0.229 and a high inbreeding level (F_{IS}= 0.449). Bayesian analysis suggests that the current populations of *C. cineraria* subsp. *cineraria* are structured into two gene pools.
SSR data indicated significant deviation from random dispersal of genes and genotypes between the two groups, suggesting that mating occurs mainly among individuals within subpopulations, thus, favouring the divergence between the two groups. This microevolutionary differentiation scenario might have been caused by a coupled effect of past genetic drift and reproductive system, as a result of the geological activity in the Mediterranean.

The identification of such genetic structure in this narrow endemic prompts a management strategies of its single extant population.

Keywords *Centaurea cineraria* subsp. *cineraria;* microsatellites; habitat fragmentation; plant genetic diversity.

IMPACT OF THE INVASIVE *CARPOBROTUS EDULIS* ON *ARMERIA PSEUDARMERIA* AT CABO DA ROCA

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Armeria pseudarmeria (Murray) Mansfeld is an endemic plant of Portugal, mainly found in the Sintra region at Cabo da Roca. It has been considered a threatened species for the last twenty years and according to the Red List of Threatened Plants published in 1997 by IUCN is "Endangered".

Carpobrotus edulis (L.) N. E. Br. is an invasive plant from South Africa introduced in Portugal during the 19th century that nowadays dominates a vast area of the country. Some references suggest the negative impact of *C. edulis* on *A.pseudarmeria* located at Cabo da Roca.

The aim of this work is to study the impact of *C. edulis* on *A.pseudarmeria* by analysing two nearby populations of Cabo da Roca, one free (site 1), the other growing together with *C. edulis* (site 2).

In an area of 400 m^2 from each site the native species were identified, the *Armeria* clusters were counted and the cluster and leaf sizes were quantified.

Site 1 is characterized by a great diversity of native species together with *Armeria*, which co-exists among them, except in small patches where a few woody species grow and dominate. Site 2 is dramatically dominated by *C. edulis*, which completely covers not only the whole site, but also a vast area much beyond. It is also notorious a drastic reduction in other plant species, besides *Armeria*. Only a few representatives of the species identified for site 1 could be observed at site 2.

The statistical analyses of the results indicate that, in fact, the presence of *C. edulis* affects the population of *A. pseudarmeria* in relation to both size of clusters and of leaves (length and width). However, in what concerns the number of clusters, there is no significant difference between the two sites.

Keywords: *Plumbaginacea, Aizoaceae*, endangered plant, endemic plant, plant/plant interaction

MEDICINAL AND AROMATIC PLANT COLLECTION AT PLANT GERMPLASM BANK OF THE UNIVERSIDAD POLITÉCNICA DE MADRID (BGV-UPM)

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The Universidad Politécnica de Madrid Plant Germplasm Bank began its activity in 1966, with a collection of Brassicaceae family seeds started by Professor Gómez Campo. Subsequently, the project Artemis began in 1973and focused on *ex situ* conservation of plant species endemic to the Iberian Peninsula, Balearic Islands and the Macaronesian region. After over 40 years of collecting activities more than 10.000 plant accessions are stored at the BGV-UPM facilities. Most of these accessions came from the Mediterranean basin which is the centre of speciation of several plant species used since antiquity for its aromatic and medicinal uses. The BGV-UPM has managed to compile a significant amount of medicinal and aromatic plants (MAP) throughout its history despite not having been a conservation priority group. Currently the BGV-UPM has a total of 375 samples of this type of species, being the genus *Salvia* the largest with a total of 55 samples from Spain, Portugal, Morocco and Greece. Other important genera are widely represented like *Gentiana*, *Hypericum* and *Thymus* with 44, 29, 27 samples respectively.

Only at the beginning of the new millennium specific projects aimed at the characterization of medicinal and aromatic species began. These projects have focused on Spanish populations of *Rosmarinus* and *Origanum*. The characterization has been largely using molecular techniques and germination protocols.

The main priorities within MAP for the coming years are focused to increase the collecting number of species and accessions as well as stimulate systematic characterization of plant genetic resources.

Keywords: Medicinal and Aromatic Plant, *ex situ* conservation, BGV-UPM, genetic resources

PALYNOLOGICAL, MORPHOLOGICAL, ECOLOGICAL AND TAXONOMIC PROPERTIES OF *AUBRIETA CANESCENS* (BOİSS.) BORNM AND *A. ANAMASICA* PEŞMEN & GUNER IN TURKEY

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The genus *Aubrieta* Adans. (Brassicaceae) is represented by 8 species and 1 subspecies in Turkey. 6 of 9 taxa (66.6%) are endemic to Turkey. In this study two endemic species of this genus were investigated. *Aubrieta canescens* (Boiss.) Bornm. has 2 subspecies (subspecies *canescens*, and *cilicica* (Boiss.) Cullen.). *A. anamasica* Peşmen & Güner is also endemic to Turkey and closely related to *A. canescens*. Pollen morphological structures of these taxa have been studied under light microscope (LM). Pollen slides were prepared according to the method of Erdtman (1960). The results of our study have shown that the pollen grains of investigated *Aubrieta* species are radially symmetric, isopolar, generally 3-colpate, surface ornamentation is reticulate. However pollen shape of *A. canescens* subsp. *canescens* is subprolat, *A. canescens* subsp. *cilicica* and *A. anamasica* is spheroidal. In addition to palynological characteristics morphological, ecological and taxonomic proporties were also mentioned.

Keywords: *Aubrieta*, Brassicaceae, pollen morphology, Morphological properties, taxonomic properties

FLORISTIC CHARACTERISTICS OF BAŞKENT UNIVERSITY BAĞLICA CAMPUS (ANKARA)

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The research field of 3637.000 m² is located on 20th km of Ankara-Eskişehir highway, in west Ankara region. It is in Central Anatolia, also in B4 squre according to grid system that applied for the Flora of Turkey by Davis. The area which shows steppe characteristics, is under the damaging effects of constructional and landscaping activities. Also the area belongs to Irano-Turanion phytogeographic region.

During the vegetation periods between the years 2008 and 2009, 768 plant specimen collected from the area. As a result 65 families, 410 taxa belonging to 244 genera were detected. While 41 taxa are cultivated, the rest are native plants. 61 taxa (% 16, 5) of this native plants are endemic to Turkey. Distribution of the phytogeographical elements are as follows: Irano-Turanian 99 (26,8%), Mediterranean 20 (5,4%), Euro-Siberian 14 (3,8%).

Keywords: Flora, Campus flora, Başkent University, Ankara, Turkey

PHYLOGENETIC RELATIONSHIPS OF TAXA OF *HYPOGLOTTIDEI* DC. SECTION IN GENUS *ASTRAGALUS* L. USING SEED STORAGE PROTEIN POLYMORPHISM

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The genus *Astragalus* are widely distributed in Turkey and have various taxonomic problems. The aim of this present work was to study the phylogenetic relationships of the taxa of *Hypoglottidei* section in genus *Astragalus*. Unique pattern of protein bands of total seed storage protein obtained from seventeen taxa was investigated by using sodium dodecil sulphate-polyacrylamid gel electrophoresis (SDS-PAGE). Phylogenetic relationships were displayed in NJ (Neighbor-joining) tree. The taxa were grouped on two main clads. The first clad composed of *A. melanocarpus* Bunge, *A. hartvigii* Kit Tan., *A. saganlugensis* Trautv. and *A. akmanii* Aytaç & H. Duman; and second clad composed of *A. vexillaris* Boiss., *A. scholerianus* Bornm., *A. ovatus* DC., *A. viridissimus* Freyn & Sint., *A. dasycarpus* D.F. Chamb., *A. cedreticola* A. Duran & Podlech, *A. lasioglottis* M. Bieb, *A.oreades* C.A. Mey, *A. viciaefolius* D.C., *A.sachanewii* Sirj., *A.bachmarensis* Grossh., *A. cicer* L. and *A. flaccidus* M. Bieb. According to the matrix of genetic distance, the lowest values were between *A. viciaefolius* and *A. flaccidus* (0.125), *A. viciaefolius* and *A. sachanewii* (0.167), *A. dasycarpus* and *A. sachanewii* (0.194). From genetic distance value and NJ tree, it may be concluded that *A. flaccidus* and *A. viciaefolius* belong to same species and similarly *A. dasycarpus* and *A. sachanewii* as well. Our findings from this study indicated that seed storage protein profiles could be useful markers in studies of phylogenetic relationships of the genus *Astragalus*.

Keywords: *Astragalus*, *Hypoglottidei*, SDS-PAGE, seed storage protein, phylogenetic analysis

A NUMERICAL TAXONOMIC STUDY IN THE TAXA OF GENUS *NIGELLA* L. (*RANUNCULACEAE*)

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A monographic study of the genus *Nigella* s.l. is ongoing by the authors. This numerical taxonomic study is based on about 155 specimens of *Nigella* collected from the field in Turkey, Syria, the Turkish Republic of Northern Cyprus and Greece or from the material deposited at various herbaria. The measurments and observations have been made on 67 morphological characters and they have been studied for 22 taxa as operational unit (OTU). The data were analysed with the NTSYSpc package program for understanding similarities among the OTU's. According to the obtained phenogram, the taxa belonging to the genera *Garidella* and *Komaroffia* are clearly distinct from the taxa of *Nigella.* The taxa belong to the *N. arvensis* complex are not clearly different from each other with higer similarity index. The complex requires further taxonomic and nomenclatural studies for resolving the relationship of them. Yellow flowered species of the genus are also close to each other the results according to this study.

Keywords: *Nigella*, phenogram, *Ranunculaceae*, taxonomy

MOLECULAR PHYLOGENETICS AND GENOME SIZE VARIATION IN *VERBASCUM* (*SCROPHULARIACEAE*)

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The genus *Verbascum* with approximately 350 species is one of the largest genera of Turkey with about 235 species, 80% endemic. Possible reasons for the high estimate of endemicity are successful adaptation to the dry, Mediterranean climate, diverse topography, variability in life history (annual, biennial, perennial) and a propensity for hybridization. The importance of each one of these factors is unknown. In a first step to unravel the success of *Verbascum*, I started a DNA-based phylogenetic analysis for the genus. For this purpose herbarium material was carefully checked and appropriate material collected for 120 species. Initial screening of nuclear ITS sequences and sequences of two cpDNA regions revealed first incongruencies. Results will be discussed in the light of existing taxonomic hypotheses for the genus and morphological characters. One character that will be investigated in parallel to the phylogenetic analysis is genome size evolution. Genome size is indicative of ploidy changes but also associated with breeding system and possibly life history variation. Intrageneric variation so far detected is low and does not support an influence of life history.

Keywords: cpDNA, genome size, ITS, *Verbascum*

TAXONOMY OF *COLLETOTRICHUM* SPECIES COLLECTED FROM IRAN

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In this study in order to collect different *Colletotrichum* species, different samples were collected from different crops especially from potato fields of Hamedan and Lorestan provinces. Samples were cultured on PDA medium and *Colletotrichum* species were isolated. The isolates were distinguished based on morphological characteristics including color of colonies, conidial and appressorial shape and size and presence or absence of setae and sclerotia. In this study 9 species and one variety of the genus *Colletotrichum* were identified including *C. acutatum, C. boninense, C. coccodes, C. dematium, C. destructivum, C. gloeosporioides, C. gloeosporioides var. minus, C. musae, C. trichellum* and *C. truncatum.* The sexual stages of some of the isolates such as *C. boninense* were produced in vitro. The teleomorph of *C. boninense* hadn't been reported before and was introduced as *Glomerella* sp. in this study. *C. coccodes* is the casual agent of potato black dot and was isolated from all of the samples from potato fields of Hamedan province. Potato black dot is the most important *Colletotrichum* disease in Hamedan province and its significance has been increased in recent years. The ITS regions (ITS1, ITS2 and 5.8S gene) of ribosomal DNA of 26 different isolates including 9 *C. coccodes* isolated were sequenced in order to examine the accuracy of the morphological identifications and to compare *C. coccodes* isolates. ITS sequences of *C. coccodes* isolates were studied separately and no genetic diversity was seen among them according to ITS sequences. Therefore the sequences of these regions are not useful for determining intraspecific diversities, whereas ITS sequences in other *Colletotrichum* species especially in ITS1 was very divergent and they are a good marker for distinguishing *Colletotrichum* species. Phylogenetic analysis based on ITS sequences of *Colletotrichum* species of this study and the ones obtained from gene bank, the species are divided into 6 main clades. The separation of these clades is compatible with morphological characteristics specially conidial shape. Among the identified *Colletotrichum* species in this study, the species *C. acutatum, C, boninense, C. destructivum* and the variety *C. gloeosporioides var. minus* are new for the mycoflora of Iran and the species *C. dematium* isolated from bean, *C. gloeosporioides* from ivy arum and *C. truncatum* from alfalfa are isolated for the first time from these hosts.

Keywords: *Colletotrichum*, anthracnose, ITS

GLOBAL CHANGE INFLUENCE ON DECORATIVE WOODY SPECIES OF MEDITERRANEAN FLORAL ELEMENTS

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Projections according to WHITE PAPER, Adapting to climate change: Towards a European framework for action, indicate that the increase of average global temperature and the concentration of carbon dioxide in the atmosphere will result in huge changes in the structure of the ecosystems and their functions. Further more there will be changes of ecological interactions and changes of geographical diameters with dominant negative consequences to biodiversity.

Bearing in mind forthcoming changes as well as the fact that woody taxa exist in fixed environment conditions (among which climate factors are dominant) paper researches and analyzes presence and adaptability of decorative woody species of Mediterranean floral element in Belgrade urban coenosis within conditions of changed temperate continental climate. The researched group consists of 13 taxa with 383 individuals. Two species from subdivision *Pinophyta* and 11 from subdivision *Magnoliophyta.*

The research has proved the increase of number of woody species of Mediterranean floral element on Belgrade green areas but also their adaptability to conditions of changed temperate continental climate. The analysis so far has reflected the urge of further researches in order to check the volume of acclimatization through the long term of studying and tracking of phenological changes which would provide the basics for creating bioclimatic maps.

Keywords: dendroflora, biodiversity, global heating, climate change

MEDITERRANEAN CENTRE OF ORIGIN OF *Anemoninae* (*RANUNCULACEAE*) INFERRED FROM KARYOTYPE HISTORY

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Comparative cytological analyses combined with phylogeny are a powerful approach for deciphering aspects of evolutionary differentiation that are thoroughly investigated in three closely related genera *Anemone*, *Hepatica* and *Pulsatilla* of the worldwide distributed *Anemoninae* (*Ranunculaceae*). Chromosome number, karyotype morphology, heterochromatin distribution and 35S and 5S rDNA localization are investigated in nine *Anemone*, three *Pulsatilla* species and *Hepatica nobilis*. The mechanisms involved in karyotype evolution are identified and interpreted in a phylogenetic context. The basic number of all investigated taxa is 7 and 8. Karyotypes of diploid *Anemone* and *Pulsatilla* species that have the basic number 8 are uniform consisting of three pairs of acrocentrics, one pair of acro-, submeta- to metacentric chromosomes, and four pairs of metacentric chromosomes. One to three 35S and one to three 5S rDNA loci were present in diploid and polyploid taxa. 35S rDNA loci are positioned on the short arm of acrocentric chromosomes, while for 5S rDNA loci there is no preferential chromosomal position. The karyotype of *A. narcisifolia*, the only investigated species with x=7 is similar to the karyotype of *Hepatica* species with one pair of acrocentric and six pairs of metacentric chromosomes. *A narcisifolia* possesses a unique karyotype: a satellite positioned on the short arm of the metacentric chromosome 3. Phylogenetic tree based on the cytogenetic data generally agree with the present classification. *Anemone* species have undergone multiple rounds of diversification, related to the very different ages of the clades. The hypothesis of the Mediterranean centre of origin is supported and an ancestral karyotype similar to *A. hortensis* (x=8) is proposed. The *Anemonidium* subgenus (x=7) evolved via major reconstruction of the karyotype: a change in the base chromosome number from x=8 to x=7. This study shows clear evidence that this change has arisen from fusion of two acrocentric chromosomes.

Keywords: 35S and 5S rDNA, *Anemone*, fluorescence *in situ* hybridization (FISH), karyotype evolution, *Pulsatilla*

THE ANATOMICAL AND MICROMORPHOLOGICAL STRUCTURE OF *GYPSOPHILA OSMANGAZIENSIS* ATAŞLAR & A. OCAK (*CARYOPHYLLACEAE*)

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In this study the anatomical and micromorphological characteristics of *Gypsophila osmangaziensis* which is new for Flora of Turkey are investigated. Root, stem and leaf cross-sections are investigated for anatomical studies and seed and leaf surfaces are investigated for micromorphological studies. Root show perennial characteristics. Cortex layer carries druse crystal densely. Pericycle layer of stem is composed of sclerenchymatic cells which have 15-17 line, very thick cell wall. Huge triangle-like shapes of some cells in leaf epidermis draw attention. Mesophyll is isobilateral and carry druse crystal partly. Seed surface is of obtus tubercule. In the micromorphological structure of leaf, huge cells of epidermis can be observed in details.

Keywords: *Gypsophila osmangaziensis*, anatomy, SEM

COMPARATIVE ANATOMICAL STUDY OF THE FRUITS OF *SESELI* L. (*APIACAEAE*) IN TURKEY

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Seseli L. genus represented by 11 species and 1 subspecies at Flora of Turkey. A comprehensive revision of Turkish *Seseli* genus has been completed recently by authors in Turkey. The two species that couldn't be collected at revision (*S. grandivittatum* (Somm. & Lev.) Schischkin ve *S. foliosum* (Somm. & Lev.) Manden). *Libanotis transcaucasica* Schischkin had been given in synonymous of *S. libanotis* in the fourth volume of the Flora of Turkey. But *L. transcaucasica* had named as *Seseli transcaucasica* by Pimenov & Sdobnina in 1975. This species has been accepted by authors and it was added to the list at the end of the revision study. As a result of revision the number of species was determined as 10 species and one subspecies. In this study the comparative anatomical features of the fruit of 11 *Seseli* taxa also completed.

Mericarp structure in the all investigated species of *Seseli* is typical for the members of family Apiaceae. It is built of three main parts; exocarp, mesocarp and endocarp. The features of these layers differs between species. The mericarp shape, vascular bundle shape, existance of oil ducts, vittae shape and size are the distinctive characters. In this study the general feature of the genus for each mericarp layer and the differences between species are given comparatively. The mericarp anatomy features of the species are given in detailed table, determination key of the species is prepared according to the mericarp anatomy, and also are supported by the mericarp transvers section photograps. The results would support the traditional classification system which is based on gross morphology. Fruit anatomical characters seem to have potential for evaluating infrageneric relationships in the genus *Seseli*.

Keywords: *Seseli*, fruit, anatomy, Turkey, *Apiaceae*

THE DISTRIBUTION OF THE GENUS *ROSA* L. IN ITALY

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The aim of this research, based on personally collected specimens and herbarium vouchers, is to update the distribution of the genus *Rosa* in Italy.

Recent researches on *Rosa* in some Italian regions (Lazio, Basilicata, Molise, Marche, Lombardia) have increased the knowledge of this critical genus. The *Rosa* taxonomy in Pignatti (1982), based on Boulanger (1924-1925), overlooked species as *Rosa subcanina* (Christ) Vuk., *R. subcollina* (Christ) Vuk., *R. pseudoscabriuscula* (R. Keller) Henker et G. Schulze, *R. chavinii* Rapin ex Reut. The identification of these *taxa* was made easier by some recent studies (Timmermann & Müller, 1994; Henker, 2000; Wissemann, 2000), focused on well-defined characters.

The Checklist of the Italian Vascular Flora (2005) quoted 42 entities of *Rosa* (39 native, 3 non-native). In accordance with Klástersky (1968) we considered *R. nitidula, R. squarrosa, R. andegavensis* and *R. deseglisei* as true species and not as varieties of *R. canina* and *R. corymbifera*. Some Alpine species quoted for Trentino Alto Adige or Piemonte, and collected in the last centuries, can not be found any more. The *Herbaria* of the Natural Museums of Bergamo and Brescia preserve recent specimens of some rare, alpine species: *Rosa abietina* Gren. ex Christ, *R. rhaetica* Gremli, *R. uriensis* Lagger et Pugget ex Cottet. Unfortunately *R. marginata* Wallr, from Liguria and Piemonte (1892 - 1898, TOHP), exists nowadays only as cultivated ex-situ (Rome Botanical Garden). *Rosa sherardii* Davis, found in Piemonte (Soldano, Wissemann, 2005), is new to the Italian flora. The non-native *Rosa rugosa* Thumb. doesn't seem to show an invasive behaviour (unlike in N-Europe). *R. agrestis* Savi and *R. canina* are the commonest species in Italy, while the rarest species are *R. stylosa* Desv. and *R. viscosa* Jan ex Guss., found only in Lazio and Calabria respectively.

Keywords: Distribution, update, *Rosa*, Italy

PRELIMINARY MOLECULAR CYTOGENETICS STUDIES OF *CROCUS* FROM BOLU IN TURKEY

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Natural distributed *Crocus* taxa in Bolu provience were used to attempt for the application of molecular studies, such as, "genomic in situ hybridization (GISH)". This method allows chromosomes from different parents or ancestors to be distinguished by means of differential hybridization of entire genomic probes. It has been aimed that application of this technique on some *Crocus* taxa and to be diagnosed any hybrid origins. Beside these molecular studies, karyotypes of those *Crocus* taxa have also been prepared.

In order to identify, whether there is any hybrid among those *Crocus* taxa, genomic DNA of each taxon (*C. abantensis* T. Baytop et Mathew, *C. ancyrensis* (Herbert) Maw, *C. biflorus* Miller subsp. *pulchricolor* (Herbert) Mathew, *C. olivieri* Gay subsp. *olivieri* Gay, *C. specious* Bieb. subsp. *specious*) was labelled by fluorescein and applied the chromosomes of others. Although, there was no hybridization signal detected among these taxa, the known hybrid *Crocus* x *paulineae* Pasche & Kerndorff taxon gave signal with *C. olivieri* subsp *olivieri* and *C. abantensis*. The application of method was succeded and therefore, similar studies can be applied on to different species to identify their parental origins.

Keywords: Bolu, *Crocus*, GISH, Karyotype, Molecular cytogenetics

PIGMENTS, TOTAL PROTEINS AND GENOME SIZE VARIATION IN *SYMPHYANDRA HOFMANNII* INDUCED BY DIFFERENT ENVIRONMENTAL CONDITIONS

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In the present study the pigments, total proteins content and genome size were investigated in six populations of endemic species *Symphyandra hofmannii* Pant. from Bosnia and Herzegovina. The intrapopulation analysis of individuals developed under different light conditions was performed in two populations. It revealed increasing of chlorophyll *a*, total chlorophyll, carotenoids content, *a/b* ratio and decreasing of chlorophyll *b* content in heliophyte individuals. Statistically important differences between heliophyte and sciophyte individuals, from the same population, in chlorophyll *a* and *b* content including *a/b* ratio were apparent. The other four studied populations, where intrapopulation light conditions were stabile, were clearly recognized as helio-, semi- or sciophilous. This interpopulation analysis couldn't confirm intrapopulation findings, with exception of chlorophyll a/b ratio. Interpopulation pigments' variation couldn't be correlated with light as only differential ecological parameter. This variation was related to total proteins or DNA amount and depended on combined environmental conditions, such as geological substrate, altitude or anthropogenic factors.

Keywords*: Campanulaceae*, *Symphyandra hofmannii*, DNA amount, total proteins content, photosynthetic pigments

ORCHIDS OF CEKMECE NUCLEAR RESEARCH ENSTITUTE (ISTANBUL/TURKEY)

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This study which presents orchids of Cekmece Nuclear Research Enstitute (CNRE) is a part of "The flora of Cekmece Nuclear Research Enstitute (Istanbul) and its Environs" master thesis. CNRE is located on the European side of Istanbul and its geographical location according to Davis's location system for Turkey is A2(E). The area having nearly 3 km² and its altitude is 50 m from sea side, is saved since 1959 and it has a rich orchid diversity and population.This study has been carried out between 2003-2005. At least one sample for each taxon was prepared by herbarium techniques and kept at the Herbarium of Istanbul University Science Faculty (ISTF).

At the end of this study 11 taxa which belongs to Orchidaceae family has been identified. These taxa are; *Anacamptis pyramidalis* (L.) L.C.M. Richard, *Ophyrs bombyliflora* Link, *Ophyrs oestrifera* Boiss. subsp. *oestrifera***,** *Ophyrs umbilicata* Desf. subsp. *umbilicata***,** *Ophyrs vernixia* Brot. Subsp. *vernixia***,** *Orchis collina* Banks & Sol., *Orchis coriophora* L., *Orchis laxiflora* Lam., *Orchis papilionacea* L. var. *papilionacea***,** *Orchis purpurea* Hudson, *Serapias vomeracea* (Burm. fil.) Briq. subsp. *laxiflora* (Soò) Gölz et Reinhard.

Keywords: *Orchidaceae*, Cekmece, Istanbul, Turkiye.

VEGETATIVE ANATOMY OF *Orchis italica* Poiret (*ORCHIDACEAE*) IN TURKEY

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Anatomical characteristics of the vegetative parts of *Orchis italica* Poiret in Turkey have been investigated in this study. *Orchis italica* samples were collected from Ezine (Çanakkale), Selçuk (İzmir) and Milas (Muğla) between 2007 and 2009. Permanent microscopic preparations were made of plant material fixed in field in 70 % alcohol. Cross sections of the leaves, stem, tuber and root and surface sections of leaves taken by free-hand and stained with Sartur solution and Safranin. The well-staining sections were photographed on Leica DFC295 color camera type, Leica DM2500 light microscope.

The leaves are anomostomatic and tetrastic, have no trichomes. The cuticle thickness (abaxial and adaxial), epidermis cell size (abaxial and adaxial) and stomata dimensions and stomata index were measured. The epidermis are lined parellel by the midrib and surrounded by cuticle. In cross sections of the lamina, upper epidermis are larger than lower epidermis. Vascular bundles are collateral and consist of xylem, phloem and sclerenchyma cells. Raphide are observed in the mesophyll tissue. Midrib has lacunas. Chlorenchyma has been scattered homogeneous. In cross sections of stem, the epidermis consist of a single layered, flattened, roundish or ovate cells and surrounded by thin cuticle layer. Parenchyma and chlorenchyma were observed along cortex. Vascular bundles are collateral type and are surrounded by sclerencymatic tissue. In cross sections of the tuber, parenchymatic pith cells have starch and raphide. A single layered epidermis, exodermis, parenchymatic cortex, a single layered endodermis, periscyle, and vascular bendle have been observed in cross sections of the root.

Keywords: *Orchis italica*, Orchidaceae, leaf anatomy, stem anatomy, tuber anatomy, root anatomy, raphide.

PL@NTMEDIT: A COLLABORATIVE NETWORK ON MEDITERRANEAN FLORA

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Both global food crisis and biodiversity extinction crisis induce the need for consequently increased plant knowledge and data accessibility. For example, in the circum-Mediterranean area we can find more than 30.000 species. A scientific and associative consortium funded by the French “Agropolis Fondation” has proposed the Pl@ntNet project as a collaborative network integrating solutions to overcome at global level this alarming situation.

One of the case studies of this project is Pl@ntMedit, focusing on the circum-Mediterranean flora. Our principal current objective is to reinforce trans-Mediterranean partnership in the aim of constituting working groups on Maghrebian flora and from other western-Mediterranean countries.

All the groups can work parallely with a common taxonomical referential :
- Chorology : phytogeographical and grid-based maps for each taxa
- Herbaria : plant checklist and collection data for each institutional or private herbarium collection
- Photos : general view and detailed view of organs for each taxa
- Traits : biological traits (biogeography, dissemination, longevity, phenology, pollination, etc.) for each taxa

All the data could be collected on the Pl@ntNote database system or other compatible systems. The data collected will be assembled in the Pl@ntNet project website and/or within the e-Flore application on Tela Botanica website. The case study is an opportuniy to develop IDAO applications (computer-assisted identification) and to test the IKONA software (image-based recognition).

Keywords: Pl@ntNet project, Maghrebian flora, working groups, transversal applications.

ONOPORDUM SPECIES OF TURKEY

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The genus *Onopordum* (Compositae) is represented by 18 species (total 19 taxa) in Turkey. These are listed below. Among them 6 species (total 7 taxa) are endemic to Turkey.

O. acanthium L., *O. anatolicum* (Boiss.)Eig (**Endemic**), *O. armenum* Grossh., *O. boissieri* Willk. (**Endemic**), *O. bracteatum* Boiss. & Heldr. var. *bracteatum*, *O. bracteatum* Boiss. & Heldr. var. *arachnoideum* S.Erik & H. Sümbül (**Endemic**), *O. candidum* Náb., *O. carduchorum* Bornm. & Beauverd, *O. caricum* Hub.-Mor. (**Endemic**), *O. davisii* Rech. fil. (**Endemic**), *O. heteracanthum* C.A. Meyer, *O. illyricum* L., *O. majori* Beauverd, *O. myriacanthum* Boiss., *O. polycephalum* Boiss. (**Endemic**), *O. sibthorpianum* Boiss. & Heldr. (**Endemic**), *O. sirsangense* Rech. fil., *O. tauricum* Willd., *O. turcicum* Danin

In this study, the distribution areas and some morphological characters of the *Onopordum* species are introduced by their orginal photographs.

Keywords: *Onopordum*; *Compositae*; Turkey.

KARYOTYPE ANALYSES OF FOUR *FIBIGIA* MEDIK. (*BRASSICACEAE*) TAXA FROM TURKEY

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Somatic chromosome number and chromosome morphology was defined for the first time in four taxa of *Fibigia* namely; *F. clypeata* Medik., *F. eriocarpa* Boiss., *F. macrocarpa* (Boiss.) Boiss. and *F. suffruticosa* (Vent.) Sweet. All taxa contained diploid chromosome number of as 2n=16. The total haploid chromosome lengths ranged from 10.05 to 18.37 μm with average chromosome lengths from 0.87 to 3.07 μm. The median (m) and submedian (sm) chromosomes are found to form the main part of chromosome complement while the subterminal point (st) chromosomes were rare or absent. Karyotypes of taxa were made using an Image Analysis System (IAS). Chromosome numbers are new for science world except *F. clypeata*. The importance of the results is discussed with regards to their karyological and taxonomical position and the relationship between the examined taxa.

Keywords: *Fibigia, Brassicaceae*, chromosome, karyotype, Turkey

MEDITERRANEAN FLORISTIC ELEMENT AND ITS INFLUENCE IN THE ALLIANCE *OSTRYO-CARPINION ORIENTALIS* HT. 1954 IN KOSOVO

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Territory of the Republic of Kosovo consists of the Kosovo and Dukagjini Plains surrounded by ridges: the Albanian Alps in the west which represents a continuity of the Dinaric, on the south Sharri Mountains and Kopaonik in the north. Kosovo plain is influenced by continental climate, whereas Dukagjini plain, by modified Submediterranean and Mediterranean climate coming from Adriatic Sea through the river valley Drini i Bardhë. Geographical position, relief, distance from the sea and other factors have influenced in the alliance *Ostryo-Carpinion orientalis* in Kosovo to be rich with habitats and species that belong to Mediterranean floristic element. This alliance is extended throughout the whole territory of Kosovo up to 900 m altitude.

The objective of the study is research of the Mediterranean floristic element and its influence in the phytocenosis which belongs to the alliance *Ostryo-Carpinion orientalis.*

Some of the species which belong to Mediterranean floristic element are: *Colutea arborescens, Asparagus tenuifolius, Pyrus amygdaliformis, Acanthus balcanicus, Juniperus oxycedrus, Coronilla emeroides, Paliurus spina-christi, Syringa vulgaris, Scutellaria orientalis, Euphorbia myrsinites, Teucrium polium* etc.

Keywords: Kosovo, Mediterranean, *Ostryo-Carpinion orientalis*

CHROMOSOME NUMBER AND GENOME SIZE ASSESSMENT OF LEBANESE TAXA OF *ASTRAGALUS* GENUS

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The Mediterranean basin is one of the world's major centers for plant biodiversity, where 10% of the world's higher plants can be found in an area representing only 1.6% of the Earth's surface (Médail F. & P. Quézel, 1997). Within the Mediterranean Basin, Lebanon is a recognized center of plant diversity and is considered as global biodiversity hotspot (Myers N. *et al.*, 2000). Its floristic richness includes 2,600 vascular plant species of which ca. 92 are endemic to Lebanon (3.5%) (Mouterde P., 1966, 1970, 1983).

The genus *Astragalus* L. constitutes a key component of this plant biodiversity in Lebanon since it is represented by 59 species of which ca. 47 are endemic (Tohmé G. & H. Tohmé, 2007). *Astragalus* is not only the largest in number of taxa rather it is also considered as one of the most diverse and taxonomically difficult genera in legumes.

Therefore, the delimitation of *Astragalus* at various taxonomic ranks poses considerable taxonomic problems worldwide. It has been widely established that morphological characters alone are not sufficient to explain the systematic relationships and evolutionary processes among *Astragalus* species.

In order to obtain a better understanding of the phylogenetic relationships among species and of the karyotype evolutionary mechanisms that have operated in *Astragalus* genus, we undertook the assessment of chromosome number, karyotype evolution, genome size and ploidy level of the Lebanese species of *Astragalus* with special emphasis on endemic taxa.

To our knowledge, no genome size data is available for *Astragalus* genus. Values obtained in our study varied between 1.68 pg/2C for *Astragalus angulosus* DC. and 10.97 pg/2C for *Astragalus deinacanthus* Boiss. For most of the studied taxa, the chromosome number seems to be stable with $2n = 2x = 16$ chromosomes.

Keywords: *Astragalus* L., Chromosome Number, Genome Size, Endemism, Lebanon

FLORAL ASSOCIATIONS OF *HALICTUS* (*HALICTIDAE*:*APOIDAE*:*HYMENOPTERA*) OF TURKEY'S MEDITERRANEAN REGION

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Information deficiencies exist regarding the floral associations of wild bees. The main objective of this study was to investigate the plant preferences of *Halictus* (Halictidae: Apoidea: Hymenoptera) species that are distributed in Mediterranean Region of Turkey. Field studies were performed in spring and summer seasons of 2008 and 2009. All bee specimens were collected via nets. Meanwhile, the plants that have been visited by bees also recorded or collected for diagnosis. In total, 76 stations were checked in 15 provinces. As a result, 500 bee specimens from 19 species were collected. 53 plant taxa were found related with *Halictus* species. Most common genera and families of visited flowers were discussed regarding the plant taxa preferences of this species.

Keywords: *Apoidea, Halictus,* Flowers visits, *Asteraceae,* Turkey

SEED CHARACTERISTICS AND TESTA TEXTURES OF TURKEY SPECIES FROM THE SECTION *PLATYSTYLIS* (SWEET) BÄSSLER *(LATHYRUS* L., *FABACEAE*)

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In this study, the seed morphologies and testa properties of 15 taxa belonging to the *Plathystylis* section of the *Lathyrus* (Fabaceae) genus have been analyzed. These taxa are the following; *L. pallescens* (Bieb.) Koch, *L. brachypterus* Cel. var. *brachypterus*, *L. brachypterus* var. haussknechtii (Sirj.) Davis, *L. karsianus* P. H. Davis, *L. satdaghensis* P. H. Davis, *L. nivalis* Hand.-Mazz, *L. armenus* (Boiss. & Huet) Širj., *L. cyaneus* (Stev.) Koch var. *cyaneus*, *L. digitatus* (Bieb.) Fiori, *L. tukhtensis* Czecz., *L. variabilis* (Boiss. & Ky.) Maly, *L. spathulatus* Cel. *L. elongatus* (Bornm.) Sirj., *L. cilicicus* Hayek & Siehe, *L. boissieri* Sirj. For each taxon 100 seeds have been analyzed which are collected from three different localities making the total number of analyzed seeds 300. The analyzed morphological properties are the seed shape, color, length, width, surface shape, hilum length and hilum width. Also the testa properties of the seeds were analyzed from the photographs taken by using a scanning electron microscope (SEM). The stereo microscope and scanning electron microscope (SEM) photographs of the taxa have been added to the study.

Keywords: *Lathyrus*, Section *Plathystylis*, seed morphology, testa textures, Turkey

THE POLLEN MORPHOLOGY OF SOME *LATHYRUS* L. (*FABACEAE*) SPECIES IN THE THRACE (TURKEY-IN-EUROPE)

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Eleven wild species of *Lathyrus* grown in Thrace, such as *L. niger* (L.)Bernh. subsp. *niger*, *L. palustris* L. subsp. *palustris*, *L. digitatus* (Bieb.) Fiori, *L. tuberosus* L., *L. sphaericus* Retz., *L. setifolius* L., *L. clymenum* L., *L. nissolia* L., *L. aphaca* L. var. *aphaca*, *L. aphaca* var. *affinis* (Guss.)Arc, *L. aphaca* var. *bifilorus* Post, pollen morphology have been examined. Preparations have been prepared using the **Wodehouse** and **Acetolyse** methodes. The shapes, structures, sculptures and apertureties of pollen were measured in light micrescope. The pollen morphology of species were also studied using a scanning electron microscope (SEM). In addition, some photographs included in this work were taken using both light microscope and scanning electron microscope (SEM).

Keywords: *Lathyrus*, pollen morphology, Thrace, Turkey

THE CHOROLOGY OF THE GENUS *SEMPERVIVUM* L. IN TURKEY

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The genus *Sempervivum* L**.** comprises about 50 species and 17 hybrids throughout the world but mainly distributed in mountainous regions of Central and Southern Europe, Southwest Asia, Caucasia and the Mediterranean. Its centre of diversity lies in the Euro-Siberian, Mediterranean and Irano-Turanian phytogeographic regions.

The genus *Sempervivum* was previously revised by Muirhead for the Flora of Turkey in which it includes 12 taxa. Since the publication of the flora, three more species, one subspecies and one hybrid have been described from Turkey. As well as, *S. minus* Turrill var. *glabrum* Wale have been raised to species level as *Sempervivum ekimii* (Wale) F.Karaer.

Between 1999 and 2002, as a part of a revisional study of *Sempervivum* in Turkey, the authors carried out extensive field studies and collected a large number of specimens. In the field, the specimens' GPS coordinates, habitat and relevant field observations were recorded. The present study reviews the chorology of the genus *Sempervivum* in Turkey based on recent taxonomic revision and available specimen data.

Keywords: *Crassulaceae, Sempervivum*, chorology, revision, Turkey.

NUTLET MORPHOLOGY OF FOUR *SALVIA* L. (*LAMIACEAE*) SPECIES IN TURKEY

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In this study, nutlets of *S. araminesis* Rech. fil., *S. cedronella* Boiss., *S. potentillifolia* Boiss. & Heldr. ex Bentham and *S. recognita* Fisch. & Mey. distributed in Turkey were examined to describe and investigate their seed morphology by light and scanning electron microscopy. The basic shape of studied nutlets is prolate-spheroidal, subprolate and prolate. The nutlet surface sculpturing pattern is classified in three types: colliculate, reticulate and verrucate. Exocarp cells are penta-hexangular, rounded or irregular. The variation in size, shape and sculpturing of the nutlets was found to be useful as diagnostic characters.

Keywords: *Lamiaceae*, *Salvia*, SEM, Nutlet morphology, Turkey

THE GENEBANK DATABASE OF PALERMO'S BOTANICAL GARDEN

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The recent numeric increase of seed banks in Europe is matched by the establishment of specific networks in response to the *ex situ* conservation demand by international conventions. In Italy, the association RIBES - Rete Italiana di Banche del germoplasma per la conservazione Ex Situ della flora spontanea - promotes and coordinates activities in 18 seed banks. Gene-bank management is quite complex. New accessions need to be acquired, classified and characterized with respect to agronomic features or systematic interest; harvesting work has to be reduced by creation of core collections; existing collections are to be maintained and identified; optimal methods of regeneration to avoid genetic erosion are to be defined.

Therefore, the setting up of a database for practice standardizing among all institutions working for *ex situ* conservation of wild plant biodiversity represents a focal step.
With this aim the schemes of 2 already in use banks (Seedbank project and Genmedoc) were used to design the structure of the Palermo's genebank database. Its tables are related to accessions, treatments, germination data and exchanges with other structures.

This DB is under testing in Palermo, once fixed the backbone, user-friendly input masks will be realized, at first for off-line use, and subsequently for online data input at disposal of other structures.

The outputs of this DB will be both public (e.g. the accessions in the bank) and of internal use (e.g. germinability tests)

Keywords: Biodiversity, Seed Bank, RIBES, *ex situ* conservation.

SEQUENCE VARIATION AND DISPERSAL ABILITY BY EPIZOOCHORY IN MEDITERRANEAN *CYNOGLOSSUM* (*BORAGINACEAE*): PRELIMINARY EVIDENCE FROM ITS AND FRUIT TRAITS

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Cynoglossum comprises ca. 75 biennial to perennial (rarely annual) herbs in the Old and New World, mainly growing in open habitats and especially pasturelands. A major centre of diversity is the Mediterranean, where some 30 species range from Anatolia to the Iberian peninsula and north Africa. Taxonomists know that their identification is often difficult mainly due a weak phenotypic differentiation in vegetative and reproductive characters. Available karyological data also indicate highly conserved chromosome complements. This may be associated with a relatively recent radiation triggered by the onset and spread of nomadic and transhumant pasture in the Mediterranean pre-history, perhaps between 10.000 and 8.000 y.a. The role of migrating herds of sheep and other mammals as effective agents of long-distance dispersal in epizoochorous plant groups has been experimentally shown by various authors. *Cynoglossum* is one such groups, its fruits being provided with characteristical glochids that allow the immediate interlocking to the fur of wild and domesticated mammals, especially sheep and goats. We tested this hypothesis using a combined morphoanatomical and phylogenetic approach. The dispersal ability of the fruits was evaluated based on structural features examined using LM and SEM microscopy with EDX microanalysis; their attachment potential to sheep and cattle coat was estimated by means of the General Linear Models by Römermann et al. (in Oikos 110: 219-230, 2005). Nuclear DNA ITS sequences were then generated for nearly all Mediterranean species. These were used to open a window on the phylogeny of *Cynoglossum* and to evaluate the level of ITS variation as compared with other genera of Boraginaceae characterized by mainly non-epizoochorous strategies of seed dispersal.

Keywords: *Cynoglossum,* epizoochory, fruit morphology, molecular systematics, seed dispersal, sequence variation

NEW DATA ON DIVERSITY OF *PYRUS* (*ROSACEAE*) IN SICILY

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The high diversity in the genus *Pyrus*, in Sicily, has recently allowed the description of some news species – i.e. P. *vallis-demonis*, *P. castribonensis* and *P. sicanorum* – in addition to the previously known *P. spinosa*, *P. pyraster* and *P. communis*. Recent observations have also stressed the great variability of the populations and the hardeness to definite the most meaningful and frequent expressions of the variation within taxonomic units. The genetic diversity of the above mentioned new taxa has been also compared with *P. spinosa*, *P. pyraster* and *P. communis*. The results show a high similarity between *P. castribonensis* and *P. spinosa*, and between these and *P. communis* and *P. pyraster*. *P. sicanorum* appears rather distinct; finally, *P. vallis-demonis*, appearing close to *P. cordata*, is therefore quite distinct from all the above mentioned taxa.This variability is referred to both previous and active hybridation processes, as well as to the gene flow between the wild taxa and the huge number of *P. communis* cultivated forms, produced by millenary agricultural activity in Sicily. Infact, about 150 ethno-varieties have so far been counted, more than 50% of which occur in the Madonie mountains, that are among the most important Sicilian centres of wild diversity. Another remarkable centre is found on the Nebrodi mountains, where the census of cultivated forms is still in progress.

In this context, a new population consisting of different aged indiduals which constantly bear peculiar morphological characteristics has been found confined in the Mediterranean-temperate belt of the Madonie mountains. It could be delimited as a new taxon of specific rank related to *P. spinosa*.

Keywords: Taxonomy, *Rosaceae*, *Maloideae*, Sicilian flora.

NOMENCLATURAL AND TAXONOMIC REMARKS ON *"PRUNUS CUPANIANA"* (*ROSACEAE*) FROM SICILY

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"Prunus cupaniana" is a *nomen nudum* doubtfully given by Gussone (1842) to some Sicilian populations close to *Prunus mahaleb* L. from which they are distinct by both biological and ecological characters. This name was later cited by Nyman (1878) which did not provide its validation, contrary to the erroneous IPNI report "*Prunus cupaniana* Guss. ex Nyman -- Consp. Fl. Eur. 1: 213. 1878 [Sep 1878]". Fiori (1926) applied the Gussone's epithet to the infraspecific combination "*Prunus mahaleb* β *cupaniana* (Guss.)", which is invalid being based on a *nomen nudum*. Before Fiori, Lojacono (1891) treated the same populations under *P. mahaleb* var. *prostrata.*

Recently Raimondo & Spadaro [in Fl. Medit. 19: 309 (2009)] treated the population of "*Prunus cupaniana*" as *Prunus mahaleb* subsp. *cupaniana*. This latter name is invalid too.
In order to maintain the subspecific rank, the examined taxon is here treated as:

Prunus mahaleb subsp. ***prostrata*** **(**Lojac.) Raimondo & Spadaro **st. nov.**
[Bas. *Prunus mahaleb* var. *prostrata* Lojac., Fl. Sic. 1(2): 164 (1891); *Prunus mahaleb* subsp. *cupaniana* (Guss.) Raimondo & Spadaro, *nom. inval.*]

This subspecies differs from *P. mahaleb* subsp. *mahaleb* by its characteristic prostrate or ascending many-stemmed bushy habit; leaves cordate, coriaceous; corymb poor with small flowers; fruits small, ovoid, slightly flattened, black when ripened. It is also ecologically distinct.

Keywords: Taxonomy, Nomenclature, Flora, Sicily.

THE EURO+MED – PESI VIEW OF THE *OROBANCHACEAE* IN ARMENIA

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The Euro+Med database, initially produced by 11 partner institutions and supported within the Vth Framework of the European Union from 2000-2003, was not consistently edited as far as taxonomy, distribution and nomenclature are concerned. and was then not ready for being placed in the public domain. The PESI (Pan-European Species-directories Infrastructure) Project, funded within the VIIth Framework of the European Union, fosters updating of Euro+Med PlantBase as part of its workplan. The Department of Botany of Palermo University is participating in PESI by, among other things, critically revising some Euro+Med families, including the *Orobanchaceae*. That revision is now available for online consultation. It is based solely on a review of literature. It does not follow the recent proposal of splitting *Orobanche* in two segregate genera (*Orobanche* s. str. and *Phelipanche*) on the basis of an alleged polyphyletic origin of *Orobanche* as traditionally circumscribed.

The present study updates the Euro+Med information of the family for the Armenian territory, plus Nakhichevan and Karabakh. The last *Orobanchaceae* treatments encompassing that area were those of Cvelev in Flora SSSR in 1958, of Caturjan in 1970, 1974, and in Flora Armenii in 1987. They all recognised 3 genera: *Cistanche*, *Orobanche*, and *Phelypaea* (or *Diphelypaea*), with 3 + 44 + 3 (Flora SSSR) and 3 + 39 + 3 (Flora Armenii) species. The Euro+Med Database lists 2 + 41 + 2 species for the same genera.

The present critical revision demonstrates that the reliability and completeness of published information is rather poor for Armenia, as it is for Caucasian countries in general. Our new assessment of the taxonomy and distribution of Armenian *Orobanchaceae* shows that 8 of the previously recorded species are absent from or doubtfully present in the area, whereas 3 are newly recorded.

Keywords: Taxonomy, *Orobanche*, *Cistanche*, *Phelypaea*, Broomrape.

NEW MATERIALS FOR *FLORA SICULA* BY K. B. PRESL IN PRAGUE

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In 1817, the young botanist K. B. Presl reached Sicily to prepare his degree dissertation on the *Gramineae* of this region. Once there, he became keen on Sicilian flora and – after realising the lack of a such work of synthesis – decided to provide a compendium.

In 1826, the first volume of Presl's *Flora Sicula* was published. But his research project was not followed by the second volume for several reasons: an unexpected lack of funding, the beginning of more demanding works on the New World Flora and finally the publishing of the substantial work on *Prodromus Florae Siculae* by Giovanni Gussone (1827-1832).

The first volume of Presl's *Flora Sicula* includes the complete list of the Sicilian wild or usually cultivated vascular plants; the protologue in note of the new species and the description; localities and phenology of the taxa belonging to the families, naturally arranged, from *Ranunculaceae* to *Rutaceae* included.

Researches carried by Dr. J. Křesálková at the archives of the National Museum in Prague, have led to the finding of several manuscripts written by K. B. Presl, including his *Diary* dedicated to his travels in Italy and Sicily, as well as several other materials used by Presl for the draft of his *Flora Sicula*.

From the analysis of these manuscripts we came to know the existence of a text ready for printing of the second volume of Presl's *Flora Sicula*: from *Celastrinae* to a pert of *Umbelliferae* and several advanced notes on the missing families with the only exception of *Gramineae* and *Pteridophytes*.

This finding allows us to acquire new data on the introduction, diffusion and frequency of several plants in addition to those treated in the recently published Presl's travel in Sicily.

Keywords: Sicily, Vascular Flora, C. Presl.

TAXONOMICAL AND CHOROLOGICAL DIVERSITY OF NATIVE WOODY FLORA OF ITALY AT REGIONAL SCALE

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This study, after relating about the up-to-date statistics of native woody flora of Italy, analyses: 1) taxonomic diversity at genus and unit (species and subspecies) ranks, 2) chorological spectra, both at the level of administrative region (20 regions). The data set, derived from the Checklist of the Italian Vascular Flora and revisions, includes all the units definitely occurring in Italy at present. Native woody flora of Italy consists of 508 units (6.68% of total units), 467 species, 135 genera and 60 families. Trees are 116 units, shrubs 374, and lianas 18.

The richest families are: Rosaceae (140 units), Fabaceae (62), Salicaceae (43), Pinaceae and Fagaceae (18), Caprifoliaceae (14), Rhamnaceae (16), Cistaceae (12). The richest genera are: *Rubus* (54 units), *Rosa* and *Salix* (39), *Genista* (27).

The chorological spectrum of woody plants of Italy shows the prevalence of stenomediterranean (21.0%), european (18.4%) and endemic (14.8%) taxa. Namely, woody endemic plants (including subendemics s.l.) are 74, 50 of which (67.57%) are stenoendemic units (occurring in one region) and 24 (32.43%) euriendemic (occurring in more than one region). The endemites are divided into 17 families and 26 genera. The families and genera richest in endemites are: Fabaceae (27 units), Salicaceae (16), Rosaceae (9), *Genista* (20), *Salix* (16), *Adenocarpus* and *Santolina* (4).
Data clustering highlighted that:
-woody units divided Italy into: 1) peninsular Italy + Sicilia, 2) Sardegna; 1.1) peninsular Italy, 1.2) Sicilia; 1.1.1) Northern Italy, 1.1.2) Central-Southern Italy.

-woody genera divided Italy into: 1) Northern + Adriatic Italy, 2) Central-Southern + Thyrrenian Italy + major islands; 1.1) Northern, 1.2) Adriatic Italy, 2.1) Southern, 2.2) Thyrrenian Italy, 2.3) major islands.

-chorotypes divided Italy into: 1) peninsular Italy, 2) major islands; 1.1) Northern, 1.2) Central-Southern Italy; 1.1.1) Valle d'Aosta, 1.1.2) Northern Italy, 1.2.1) Puglia 1.2.2) Central-Southern Italy.

Keywords: checklist database, chorotypes, Italy, woody endemites, woody plants.

LAND UNIT DEFINITION FOR POTENTIAL DISTRIBUTION OF ENDANGERED SPECIES

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In Europe several mapping techniques to lay out plant distribution exist. Most of them, however, are focused on actual and not on potential species distribution range. Spatial predictions become more important for rare and endangered taxa because their conservation is related to existing as well potential biotopes. The large part of detailed distribution models applies advanced statistics on a large data-set of environmental variables. Data-input availability limits the choice of the prediction model for species distribution and application of results in a detailed scale. Distribution pattern accuracy determinates its applicability in environmental management (for tracing edges, defining protected areas, etc.).

A simple distribution model for endangered taxa is here outlined, based on ecologically homogenous units (land-units) defined with a deductive process. Land-units defined with a hierarchical classification approach are usually employed for modelling phytocoenosis distribution. The spatial model used is based on main structural factors: bioclimate, lithology and landforms. The data set is implemented with land-use information.

This model was tested with two case study in Sicily: *Erica sicula* subsp. *sicula* and *Abies nebrodensis*. The former is nowadays confined only to Mt. Cofano (W Sicily) but was reported also from Mt. San Giuliano (Erice) and Marettimo Island (W Sicily), the latter occurs with a natural population of 32 individuals in the Madonie Mountains (N Sicily).
This predicting method allowed to identify suitable areas for reintroduction or where the taxa could still occur and floristic investigation should be focused.

Keywords: Distributions mapping, landscape units, G.I.S., *Abies nebrodensis*, *Erica sicula* subsp. *sicula*.

ANATOMIC AND MORPHOLOGICAL STUDY ON *OROBANCHE SIDEANA* (*OROBANCHACEAE*), AN ENDEMIC SPECIES OF TURKEY

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Orobanche is the largest genus among the holoparasitic members of *Orobanchaceae*. This genus is mainly distributed through subtropical and temperate regions of the northern hemisphere, and the Mediterranean region is one of the most important centers of diversity for this group. *Orobanche sidena* was firstly described by Gilli in 1971 and known as an endemic species from Mediterranean region of Turkey. This taxon is found in a restricted area in Side (Antalya) and it is allied to *O. hadroantha*, but they have some different morphological characters and their distribution area is completely different. *O. hadroantha* is an endemic species that is found in a limited area in Ankara, center of Turkey, belonging to the Irano-Turanian region. A comprehensive study has been carried out in this species in respect of morphology, anatomy, pollen and seeds. A distribution map of this species is also given. This taxon differs from the other species with its habitat, dense spike, short bracts and flower form characterized by small size of flower and apiculate lobs of lower lip in corolla. *O. sideana* is not an agricultural pest and it parasitizes *Polygonum*.

Keywords: Endemic, *Orobanche*, Mediterranean, Taxonomy, Turkey

SEED MORPHOLOGY OF SOME TURKISH *MENTHA* L. (*LAMIACEAE*) TAXA.

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The seed morphology of 11 *Mentha* L. taxa (*M. pulegium*, *M. aquatica*, *M.* x *piperita*, *M.* x *dumetorum*, *M. spicata* subsp. *spicata*, *M. spicata* subsp. *tomentosa*, *M.* x *villosa-nervata*, *M. longifolia* subsp. *longifolia*, *M. longifolia* subsp. *typhoides*, *M.* x *rotundifolia*, and *M. suaveolens*) which are belong to section *Pulegium* and section *Mentha*, was investigated by Scanning Electron Microscopy (SEM). For each taxon, detailed description and photos taken in their habitats were given. For seed morphology and size parameters, approximately 20 nutlets obtained from their wild populations were measured. Seed size ranged from 0. 59 to 1. 00 mm in length and from 0. 44 to 0. 80 mm in width. The smallest nutlet was found in *M.* x *villosa-nervata* and the biggest nutlet was found and in *M. aquatica*. The shape of studied seed varied from broadly obovate to ovate, only in *M. pulegium* was observed as oval. Seed color varied from pale brown or chestnut to dark brown. Moreover, short or long trichomes were observed on the surface of mericarps of *M. aquatica*, M. x *dumetorum*, *M. spicata* ssp. *tomentosa*, *M. longifolia* ssp. *longifolia*. Seed surface sculpturing exhibits three types: rugulate-foveate, rugulate-foveolate and reticulate-foveate. In conclusion, it can be said that some seed characteristics (i.e. size, shape, hairness, sculpturing pattern) may be taxonomically useful in the genus *Mentha*.

Keywords: Seed morphology, *Mentha*, *Lamiaceae*, SEM, Turkey

DISCUSSION BETWEEN TWO *ERYNGIUM* SPECIES FROM TURKEY: *E. HELDREICHII* BOISS. AND *E. DAVISII* KIT TAN &YILDIZ

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Eryngium L. genus belongs to the Apiaceae family with about 250 species; it has a cosmopolitan distribution practically all around the world. It is the most species of the Apiaceae. 24 species (%46 of endemic) grow in Turkey. The species of *Eryngium heldreichii* is known as *E. bourgatii* subsp. *heldreichii* in Flora of Turkey and East Aegean Islands. This species is closely related to *E. davisii.* Differences are from *E. davisii;* shorter stem height, prickly petiols, parted leaf segments up to half, prickly margin of bracts, linear-lanceolate bracteols, oblong fruits without ridges, small vittae in mesocarp and crystals in endocarp.

Furthermore; *E. davisii* is contain Quercetin 3-glucoside and Apigenin 7-glucoside, *E. heldreichii* is not contain this substance (flavonoids).

Keywords: *Eryngium*, Umbelliferae, *E. heldreichii*, *E. davisii*, Turkey.

THE ANATOMICAL AND MICROMORPHOLOGICAL STRUCTURE OF *PEUCEDANUM OZHATAYIORUM* AKPULAT & E.AKALIN (*APIACEAE*)

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In this study the anatomical and micromorphological characteristics of *Peucedanum ozhatayiorum* Akpulat & E.Akalın species which is new for Flora of Turkey are investigated. Root, stem and leaf cross-sections are investigated for anatomical studies and leaf and fruit surfaces are investigated for micromorphological studies. Outward of stem are filled with lacunar collenchymatic cells. Paranchymatic cortex structure carry secretory canals. Vascular bundles are in groups and their relation is provided by sclerenchyma cells. Leaf mesophyll is dorsiventral and secretory canals are in this area. There is no bundle sheath around vascular bundles which are collateral. In the micromorphological structure of leaf surface, short single-celled eglandular hairs are seen in binches through mid vein. Cells which contain little undulate are observed in the micromorphological structure of fruit surface.

Keywords: *Peucedanum ozhatayiorum*, anatomy, SEM

ARE ARCHAEOLOGICAL SITES THE LAST REFUGIA FOR WILD RELATIVES OF CROP PLANTS? A FLORAL SURVEY IN FERTILE CRESCENT ON TILMEN HÖYÜK/GAZIANTEP-TURKEY

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Tilmen Höyük is located in the "Fertile Crescent" where the first area humans started cultivating crops and abandoning the gatherer and hunter basis of their life around 10,000 B.P. Nowadays, it is still possible to find wild relatives of cultivated plants such as barley, olive, grape and fig tree, etc. in the present-day flora of archaeological sites at Fertile Crescent.

The vascular flora and vegetation of Tilmen Höyük were extensively surveyed at 2006. More than 400 plan specimens were collected from research area. Total vascular flora of Tilmen Höyük area has been determined as 220 plant taxa at species and subspecies ranks belonging to 156 genera and 52 families. The first three largest families of vascular taxa are *Fabaceae* (34 taxa), *Asteraceae* (34 taxa) *Poaceae* (25 taxa). Nearly, 70 % of spontaneous plant species growing in Tilmen Höyük were found as wild relatives or progenitors of crop plant species. Also, 25 % of the total flora in Tilmen Höyük is medicinal plants. Some of plant species such as herbs, shrubs and trees in the Flora of Tilmen can be introduced and cultivated as ornamental plants. There is no doubt that these plants were used by ancient local people.

Conservation of Archaeological sites flora is very important for the archaeological and environmental heritage and also to keep important genetic resources for the future generation of humanity.

Keywords: conservation, Flora, wild crop relatives, archaeological site

PHYLOGENETIC RELATIONSHIPS OF TAXA OF *DISSITIFLORI* DC. SECTION IN GENUS *ASTRAGALUS* L. USING SEED STORAGE PROTEIN POLYMORPHISM

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The genus *Astragalus* are widely distributed in Turkey and have various taxonomic problems. The aim of this present work was to study the phylogenetic relationships of the taxa of *Dissitiflori* section in genus *Astragalus*. Unique pattern of protein bands of total seed storage protein obtained from twelve taxa was investigated by using sodium dodecil sulphate-polyacrylamid gel electrophoresis (SDS-PAGE). Phylogenetic relationships were displayed in NJ (Neighbor-joining) tree. The taxa were grouped on two main clads. The first clad composed of *A. kastamonuensis* D.F. Chamb. & V.A. Matthews and *A. nigrifructus* Podlech & Aytaç; and second clad composed of *A. beypazaricus* Podlech & Aytaç, *A. nitens* Boiss. & Heldr., *A. gladiatus* Boiss., *A. subulatus* Pall., *A. taochius* Woronov, *A. argyroides* Beck, *A. cornutus* Pall., *A. viridis* Bunge, *A. aucheri* Boiss. and *A. leptothamnus* Bunge. According to the matrix of genetic distance, the lowest values were between *A. aucheri* and *A. leptothamnus* (0.071). From genetic distance value and NJ tree, it may be concluded that *A. aucheri* and *A. leptothamnus* belong to same species. Our findings from this study indicated that seed storage protein profiles could be useful markers in studies of phylogenetic relationships of the genus *Astragalus*.

Keywords: *Astragalus*, *Dissitiflori*, SDS-PAGE, seed storage protein, phylogenetic analysis

MICROMORPHOLOGICAL STUDIES ON *BILACUNARIA* AND *CACHRYS* (*APIACEAE*) FROM TURKEY

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Formerly considered *Hippomarathrum* Link, the genera *Bilacunaria* M.Pimen.& V. Tichomirov represented by four species and *Cachrys* L. represented by two species in Turkish Flora were studied in terms of micromorphologic characteristics. In this study, pollen and fruit morphology of the genera *Bilacunaria* and *Cachrys* were examined by using scanning electron microscope (SEM) and also pollen samples of the species were prepared according to Wodehouse and examined with light microscope (LM).

Pollen type of the species of the genera *Bilacunaria* and *Cachrys* is tricolpate. All of the taxa examined have similar pollen surface ornamentation described as striate-rugulate. In relation to P/E ratio, pollen shape of *B. microcarpa* and *C. cristata* is perprolate and that of *B. scabra*, *B. aksekiense*, *B. anatolica* and *C. crassiloba* is subprolate.

In addition to pollen characteristics, fruit micromorphology of the taxa was examined in great detail by using scanning electron microscope (SEM). It is observed that fruit micromorphology is a distinguishable character for the species of *Bilacunaria* and *Cachrys*.

Keywords: *Bilacunaria*, *Cachrys*, SEM, pollen, Türkiye

THE NEW PHYLOGENETIC CLASSIFICATION OF *HIPPOMORATRUM* LINK. (*APIACEAE*) GENUS IN TURKEY

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The genus *Hippomoratrum* Link. (*Apiaceaee*) is distributed in Mediterranean, Middle Asia and Middle East countries and represented by almost 15 taxa in the world. The revision studies based on the molecular data present clear, reliable findings regarding taxa's phylogenetic relationships and their systematic positions. The taxonomic problems of the taxa have been started to be solved with the DNA-based molecular analyses which are developed in recent years and not affected by the environmental conditions in contrast to the phenotypic analyses. The genus *Hippomoratrum* divided into two genera according to molecular and morphological data. Two *Cachrys* L. and four *Bilacunaria* Pimenov et V.N.Tikhom taxa of the genus are available in Turkey. In this study, the DNAs of the taxa which belong to the *Cahyrs* and *Bilacunaria* genera, which grown naturally in Turkey and collected from the different localities, are isolated with the CTAB method. Using the ISSR as the DNA finger printing method, the molecular connection of the *Cachyrs* and *Bilacunaria* genera with *Prangos ilanae* are studied and their phylogenetic relations are revealed with the dendogram which is prepared by the NTSYSpc 2.1 software.

Keywords: Phylogeny, *Cahyrs*, *Bilacunaria*, molecular, Turkey

KARYOTYPE ANALYSIS OF THREE ENDEMIC TAXA IN *TRIPLEUROSPERMUM* SCH. BIP. (*ASTERACEAE*) FROM TURKEY AND ITS TAXONOMIC SIGNIFICANCE

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Tripleurospermum Sch. Bip. belongs to the tribe Anthemideae of the Asteraceae family and comprises *c.* 40 species distributed mainly in Europe and temperate Asia, with a few species also in North America and North Africa. Karyological studies have been largely used for solving of the taxonomic problems of the genus. In this study, chromosome number and morphology of *T. baytopianum* E. Hossain, *T. rosellum* (Boiss. & Orph.) Hayek var. *album* E. Hossain and *T. kotschyi* (Boiss.) E. Hossain were investigated. The root tip meristems obtained directly from natural populations or germinated from seeds were used for karyotype analysis. Their chromosome numbers were as follows: *T. baytopianum* and *T. rosellum* var. *album* $2n = 2x = 18$; *T. kotschyi* $2n = 4x = 36$. Karyotype analysis showed that the karyotypes of these taxa consist of median and submedian centromered chromosomes. Chromosome morphology of the studied taxa are new to science. Some correlations between ploidy levels and morphological characters are noted and several systematic and evolutionary aspects of the genus are discussed in the light of karyological data.

Keywords: *Asteraceae*, Karyotype analysis, Ploidy level, *Tripleurospermum*, Turkey

PALYNOLOGICAL, MORPHOLOGICAL, ECOLOGICAL AND TAXONOMIC PROPERTIES OF *PTILOSTEMON AFER* (JACQ.) GREUTER SUBSP. *EBURNEUS* GREUTER

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Ptilostemon afer (Jacq.) Greuter subsp. *eburneus* Greuter is an endemic taxon to Turkey. In this research detailed pollen morphological structure have been studied under light (LM). Pollen slides were prepared according to the method of Erdtman (1960). The LM studies were made by an Olympus CX41 microscope with the aid of an apochromatic oil immersion objective and periplan eye pieces. Measurements were based on 30 pollen grains. Mean, standard deviation (SD) and variation of measurements were calculated by SPSS package program. The terminology in this study corresponds to that used by Erdtman (1952). The results of our study have shown that the pollen grains of species are radially symmetric, isopolar, generally 3-colporate and prolate (P/E=1,49). Amb is triangular and the apoporium is wide. The ***shape*** of the ***pores*** is similar to fusiform. The surface ornamentation is echinate. The purpose of this study is to provide palynological information of *P. afer* subsp. *eburneus* which would be helpful to establish classification. Besides palynological characteristics morphological, ecological and taxonomic proporties were given.

Keywords: *Ptilostemon afer*, Asteraceae, endemic, pollen morphology

DETERMINATION OF THE GENETIC RELATIONSHIPS OF *VELEZIA* L. (CARYOPHYLLACEAE) SPECIES BY USING RAPD MARKERS

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In the present study, RAPD (Random Amplified Polymorphic DNA) markers were evaluated to facilitate the identification of *Velezia* L. species from Turkey. A total of 432 amplified bands were obtained using 14 RAPD primers. The polymorphism in random amplified polymorphic DNA (RAPD) markers was high (98.61 %) and sufficient for distinguishing each of the species. The degree of band sharing was used for evaluating the genetic distance between species and for constructing a dendrogram based on UPGMA. The relationships among the species discovered were found to be totally consistent with those obtained by the use of morphological characters. The results indicated that the RAPD technique could be successfully used for the identification of species as well as the determination of genetic relationships between *Velezia* species. Further, it can be employed efficiently in future studies, especially to provide preliminary data for conservation of the endangered *Velezia* species.

Keywords: *Velezia* L., taxonomy, genetic relationships, RAPD

CAPSULES OF THE TURKISH *ALLIUM* SPECIES (SUBGENUS *MELANOCROMMYUM*)

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Subgenus *Melanocrommyum* is represented by four sections with 23 taxa in Turkey: **Sect. Acanthoprason** (*Allium akaka* S.G. Gmelin, *A. cristophii* Trautv.), **Sect. Melanocrommyum** (20 taxa), **Sect. Kaloprasum** (*A. schubertii* Zucc.) and **Sect. Pseudoprason** (*A. cardiostemon* Fisch. & Mey.). Sect. *Melanocrommyum* is the largest section and represented by the following 19 taxa. *Allium aschersonianum* W. Barbey, *A. asclepiadeum* Bornm., *A. chrysantherum* Boiss. & Reuter, *A. colchicifolium* Boiss., *A. cyrilli* Ten., *A. elmaliense* İ.G. Deniz&Sümbül, *A. hirtifolium* Boiss., *A. karamanoglui* Koyuncu & Kollmann, *A. kharputense* Freyn & Sint., *A. lycaonicum* Siehe ex Hayek, *A. nabelekii* Kamelin&Seisums, *A. nemrutdaghense* Kit Tan&Sorger, *A. nigrum* L., *A. noeanum* Reuter ex Regel, *A. orientale* Boiss., *A. rhetoreanum* Náb., *A. shatakiense* Rech.fil., *A. stenopetalum* Boiss. & Kotschy, *A. woronowii* Miscz.

PhD. Study is carrying out on this section and 250 specimens collected during the 2006 -2009 years from all around the Turkey. According to the investigations we realize that the capsule and valve shapes can be used as diagnostic character.

In this poster presentation 23 taxa of subgenus *Melanocrommyum* presented with the photos taken in the natural habitats, photos of capsules taken with stereomicroscope, and drawings of valves.

Keywords: *Melanocrommyum*, *Allium*, capsule, valve, Turkey.

ORCHIDS OF ANTALYA

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Turkey is one of the rich countries when considering the number of species belonging to the *Orchidaceae* family. According to the results of the researches conducted in recent years, approximately 170 orchid species growing naturally in Turkey have been identified. Antalya and Muğla regions stand out among the other places of Turkey with having approximately three-quarters of *Orchidaceae* species distributing in our country. However, the salep flour produced from the tubers of dried wild orchids, is used to make ice cream and a kind of beverage. Vast quantities of tubers are collected for this reason. Although it is not allowed to export the tubers any more, still the tubers are used in Turkey. On the other hand, urbanisation and the custom of building summer homes in coastal areas where you find macchies and phryganas are threating the species. According to the researches have been conducted since 6 years in Antalya, observed that the population of the species decreasing due to over collecting and grazing. In this study, the orchid species distributing in Antalya are listed, along with some photos, descriptions and the conservation project for the threatened endemic and rare species.

Keywords: Antalya, conservation, endemic, *Orchidaceae*, salep

GENOME SIZE OF *ECHINOPS* L. (*ASTERACEAE, CARDUEAE*) IN THE WEST BALKANS: AN ATTEMPT TO ELUDE THE FRESH MATERIAL REQUIREMENT

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Echinops is a large genus comprising more than 100 species distributed in tropical Africa, the Mediterranean basin and other temperate regions of Eurasia. Seven of the species of this genus (with several subspecies) are present in the Balkan region.

Genome size is an important biodiversity character of great interest in ecological, taxonomical and evolutionary studies. Fresh material is generally required to estimate the genome size by flow cytometry (FCM), and therefore, once collected, the majority of plant species must be analyzed within a rather short time interval. This constitutes an important problem for determining the nuclear DNA amount of plants growing in remote places and/or collected during long expeditions.

This work aims (1) to analyze the genome size from two material types, silica-gel dried and fresh tissues, with a view to test whether material collected in the field is suitable for genome size measurements when conserved in silica-gel; (2) to test the influence of the preparation of nuclei suspensions by different methods in the genome size measurements; (3) to investigate biological and ecological parameters that could influence the nuclear DNA amount within the group of species considered.

This work provides the first genome size reports for 21 populations of 8 taxa, and the first chromosome number determination for *Echinops graecus, E. sphaerocephalus* subsp *albidus*, and *E. spinosissimus* subsp *neumayeri*. Our preliminary results do not support the use of silica-gel dried material for genome size measurements. On the contrary, the preparation method of the material and the conservation method of the standard (silica gel dried or not) do not significantly affect genome size measurements. Genome size values discriminate each one of the taxa considered (species or subspecies), and could be related to parameters such as altitude and latitude.

Keywords: Compositae, chromosome number, dried tissues, flow cytometry, nuclear DNA amount.

THE ROLE OF BIRDS AND MAMMALS IN *CHAMAEROPS HUMILIS* L. (*ARECACEAE*) SEED DISPERSAL

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Chamaerops humilis L. (*Arecaceae*) fruits are rather atypical from both a botanical and an ecological point of view. They are polycarpic, coming from 1–3(4)-carpelled flowers. Each unit is an ellipsoid drupe with a smooth exocarp, a fleshy mesocarp and a poorly developed endocarp; hereafter, each of these units will be called a fruit due to its ecological meaning during consumption and dispersal by frugivores. These fruits are one-seeded, brown, not visually conspicuous (only orange during a short period of time when ripening) but very smelly when ripe, with a smell of old cheese or rotten butter. They are distributed in a, frequently compact, infructescence and available for consumption from November to January (February in dry years). The seed dispersal biology of this palm remains unknown in a wide framework. Here we approach to it both in current conditions as well as reproducing potential past situations. Samples from seeds dispersed naturally (mostly lagomorphs and carnivores) were taken in different populations of SW Spain (Huelva, Seville and Cadiz). Seeds treated by the digestive tract of potential dispersers (mostly birds and mammals) were also obtained by fruit offering or baiting. Finally, germination tests and viability analyses using tetrazolium chloride staining were used to evaluate the quality of different dispersers. Nowadays, the distribution of *C. humilis*, one of the two native palms occurring in Europe and the only one in western Europe, is confined to the western Mediterranean, both on the European and on the African sides (including most of the western Mediterranean big islands) but was more widely spread in the past, being, somehow, a living fossil whose phylogeography has been modelled by more than 30 Ma of geological and climate changes. It is in this context where our result of a non-specific mammal-dispersal syndrome is discussed.

Keywords: *Chamaerops humilis* L., frugivory, Quaternary, seed dispersal, Tertiary

DIGITIZATION OF *EXCICCATA* AND DATABASE THE HERBARIUM C RABAT "RAB"

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- To digitize *exciccata* of RAB herbarium (types and other important moroccan taxa: endemic, endangered or rare).
- To provide a digital database of RAB herbarium.

Work is done in close relationship with Tela Botanica, following the same methodology than in MPU herbarium. The following steps are involved:

1. Selection of relevant material
2. Eventually plant restoration when necessary for a good quality image
3. Creation of a high quality image using the Herbscan digitizing unit developed by Kew
4. Image quality check
5. Databasing of label data on Sonnerat database (MNHN, Paris)
6. Transfer of images to Paris for intermediate storage
7. Data quality check
8. Data extraction and transfer to ALUKA in agreed format, jointly with related images

The project is currently in progress: c. 600 types have been digitized and databased up to now, and 400 endemic or rare taxa are being processed.

Rabat plans to extend this initiative to all North Africa by starting the following study:

Compiling a Checklist of North African type specimens and endemic vascular plants: Feasibility study

Floras of north african countries shows many common characters. Rabat thus plans to extend this digitization and databasing project to all this region, firstly with a study of project feasibility. It consists in a compiled checklist of type specimens and endemic vascular plants, that will enable to locate herbaria, to identify each country's competence, to synthesize data and to identify taxinomic and nomenclatural complex groups.

Keywords: *exciccata*, herbarium RAB, types taxa, Checklist, Morocco, North Africa.

EXOTIC FLORA OF CONTINENTAL PORTUGAL – A NEW ASSESSMENT

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We present a new assessment of the exotic flora of continental Portugal, five years after our last study. In 1999, we have assessed 500 exotic species of vascular plants (invasive or more or less naturalised). From 1999 to 2004, 57 new plant species records were added (11.4 % more), attaining a total of 557 taxa (including, as in precedent works, species, subspecies and some hybrids), belonging to 112 families (Almeida & Freitas, 2006). At the present time, we have a list of 633 taxa (13.6 % more than our previous work, and more than 17 % of the total number of taxa of the Portuguese flora), included in 120 different families.

Keywords: Exotic species, flora, continental Portugal.

VARIABILITY IN PRICKLY SOW THISTLE (*SONCHUS ASPER* (L.) HILL) FROM WESTERN MEDITERRANEAN REGION

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We studied morphological variability of *Sonchus asper* in Western Mediterranean region by means of a multivariate analysis using a score of characters, in order to clarify possible taxonomic differentiations. Most biologically congruent grouping deals with anthers length, which show a clear bimodal frequency distribution. These two groups range from 0.80 to 2.40 mm (mode 1.30) and from 2.41 to 4.00 mm (mode 3.10) and show differences in florets size which are determinant of unlikely attractiveness during anthesis and, probably, denotes differences in reproductive systems. Floral morphotypes show a clear geographic pattern, big anther group being restricted to three areas: South France (Provence and Côte d'Azur coast area), South Italy – Sicily, and Atlas – Rif Ranges in North Africa; but plants from these areas do not share similar vegetative morphotypes. Chromosome number 2n = 18 is common to the whole *S. asper* range but plants fom Atlas – Rif show a differentiated karyotype with regard to the common karyological characteristic of the group.

Possible taxonomic implications of found variability are discussed. Obviously, big anthers plants should be segregated as differentiated taxa, but a detailed genealogic analysis is required to clarify if all of them form a monophy-letic group or, on the contrary, they constitute a grouping of convergent independent evolutionary lines.

Keywords: cluster analysis, idiogrammatic formula, morphometrics, taxonomy

GENETIC DIFFERENTIATION IN *SONCHUS* SECTION *PUSTULATI* THREATENED TAXA (*ASTERACEAE*)

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Genus *Sonchus* section *Pustulati* Boulos consists of three species: *S. pustulatus*, *S. fragilis* and *S. masguindalii*, which clearly constitute a monophyletic group within the genus (Kim, 2007). The species are confined to coastal and low altitude rocky walls enclaves from both sides of Western Mediterranean Basin, although *S. pustulatus* is the single taxa occurring in northern side. All species has been considered very scarce in Morocco (Fennane & Ibn Tattou, 1998), meanwhile *S. pustulatus* is cataloged as "critically endangered species (CR)" in Spain (Bañares et al., 2003), where exclusively some hundreds of individuals have been registered.

In order to study the genetic diversity of populations and phylogeographic patterns among them, we genotyped 167 individuals from seventeen populations using AFLP molecular analysis technique. Three chosen primer combinations generated 249 unambiguously DNA fragments. Genetic distances were analysed at different group levels to detect the presence of specific barriers to gene flow. Different methods such as neighbour-joining, AMOVAs, principal co-ordinate analysis and Bayesian clustering (STRUCTURE) revealed that Mediterranean Sea and Gibraltar Strait are acting as an efficient barrier between Moroccan and Spanish *S. pustulatus* populations. F_{ST} values also indicate that populations from Western Rif should be considered as a large metapopulation. On the other hand, in *S. masguindalii,* eastern populations showed the highest values of rare fragment index (DW), genetic diversity, and number of polymorphism fragments, indicating a long-term isolation, in spite of the continuous distribution pattern.

In general, population genetic diversity (H_j) ranges from 0.09 to 0.17, Iberian *S. pustulatus* populations showing lowest values of genetic diversity. This factor and the low number of individuals indicate that these populations show the highest extinction risk in the group.

Keywords: W Mediterranean, ALFP, phylogeography, genetic diversity, conservation.

GENOME SIZE DATA AND CHROMOSOME NUMBERS ON SOME SPECIES OF THE GENUS *PETRORHAGIA* FROM TURKEY

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The genus *Petrorhagia* (Ser.) Link (*Caryophyllaceae*) comprises 32 species and it is mainly distributed across Europe, West Asia and the Mediterranean basin, where Greece and Turkey might be considered as important focuses of diversification. In the last country, this genus is represented by 12 taxa, four of them being endemics. Three of the species (*P. hispidula*, *P. lycica* and *P. pamphylica*) are vulnerable, while in contrast, the species *P. peroninii* has a low risk status according to IUCN and Red Data Book of Turkish plants. Despite the interest that these species could raise, by the fact of being some of them endangered, studies devoted to this genus are very scarce and their taxonomic delineation still remains unclear.

Among the Turkish species of the genus, we have selected three endangered species (*P. hispidula*, *P. pamphylica* and *P. peroninii*) and four additional ones (*P. cretica*, *P. dubia*, *P. prolifera* and *P. saxifraga*) in order to establish comparisons among them.

The main goals of this work have been, i) to charaterize these taxa from the karyological point of view; ii) to assess the nuclear DNA amount (C value) in the species selected and, iii) to analyse the obtained results in order to detect differences at genome size between the endangered species and those widely distributed.

Our results indicate that all populations of the studied species are diploid, and the most common chromosome number is 2n=30 agreeing with the previous counts. Genome size ranged from 1.24 pg of *P. hispidula* to 2.32 pg of *P. peroninii*,and no relationship was found between genome size data and the degree of treat of the species.

Keywords: chromosome numbers, endangered species, nuclear DNA amount *Petrorhagia,* Turkey.

MORPHOLOGICAL VARIATION OF *JUNIPERUS OXYCEDRUS* SUBSP. *MACROCARPA* (*CUPRESSACEAE*) FROM THE MEDITERRANEAN REGION

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Juniperus oxycedrus subspecies macrocarpa belongs to the section *Oxycedrus* of the genus *Juniperus*. It occurs on dunes or maritime rocks along the Mediterranean coast and sometimes forms groves, as for example In Italy, Spain,Greece, Tunisia and Marocco.

The intra- and interpopulational geographic variation of four distant populations of *Jniperus oxycedrus subsp. macrocarpa* was the aim of the present work. Populations were examined biometrically on the basis of morphological characters of needles, stomata, cones and seeds. Four populations of *J. oxycedrus subsp. macrocarpa* from Italy, Greece, Turkey and Spain were examinnated on the basis of characters of 10 needles and 10 cones from mostly 30 individuals from each population. Results of the discriminating analysis and the cluster analysis showed that population from Turkey and Crete in Greece are morphologically most close to each other. The most different from all the other appeared is population from Spain which is also the most distant. The separation by distance can be a reason of these differences.

Keywords: *Juniperus oxycedrus subsp macrocarpa*, plant taxonomy; morphological differentiation; plant variability; biometry

MULTIPLE ORIGINS OF TETRAPLOID *VERONICA CHAMAEDRYS* ON THE BALKAN PENINSULA

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Veronica chamaedrys (Plantaginaceae) is a widespread tetraploid species in Europe occurring mainly in open forests and forest margins from sea-level to the subalpine zone. Diploid individuals are mainly known from southeastern Europe, where they fall into morphologically distinct species or subspecies (*V. chamaedryoides*, *V. vindobonensis*, *V. chamaedrys* subsp. *micans*, *V. orbelica*, *V. krumovii*). The distribution of these diploid species suggests survival in Pleistocene forest refugia.
Using genome size estimations, AFLP fingerprints, cpDNA markers as well as morphological characters, taxonomical and phylogeographical questions were addressed. The analyses support three geographically separated diploid taxa and one additional diploid, possibly hybridogenic taxon, all of which correspond to previously recognized morphologically defined diploid species. Tetraploids originated multiple times within the diploid groups apparently almost exclusively as autotetraploids. Despite separate origins from morphologically distinct diploids, tetraploids are morphologically not easily distinguishable. Diploid cytotypes dominate in the south of the distribution area of *Veronica chamaedrys* s.l., while tetraploids are increasingly important towards the North.

Keywords: AFLP, cpDNA, morphometrics, polyploidy, *Veronica chamaedrys*

ARCHAEOBOTANY, HISTORICAL AND ICONOGRAPHICAL SOURCES, FROM ROMAN TO MEDIEVAL AGE TO RECONSTRUCT THE DIFFUSION OF *PRUNUS PERSICA* IN ITALY

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This research was done in the framework of the activities of the EU PaCE project, as a joint work on archeobotany and iconography. Authors are members of the Palaeobotany group and Applied Botany group of SBI and of the IWGP. The parallel use of historical sources, iconographical portrayals, and archaeobotanical data supplies information on the introduction of peach tree into Italy.

Prunus persica (L.) Batsch, widely cultivated in the Mediterranean basin, is native to western China. The diagnostic features of peach wood and pollen are not sufficient to discriminate the species, while endocarps allow the determination to the species level.

Columella (*Rei Rusticae Libri*, 60-65 AD) and Plinius (*Naturalis Historia*, 77-78 AD) mention *mala persica*. Plinius indicates that this fruit tree was introduced thirty years before the writing of his work (ca. 40-50 AD). He also reports different varieties and the great commercial value of the fruit. The oldest artistic representations of peaches are found in wall paintings of the 1st century AD from Herculaneum, and probably also in "festoons" and sculptures of Augustan age from Rome. The oldest finds (first decades of 1st cent. AD) are from northern Italy, from both a town context (Modena) and two necropolis ones (Angera, Manerbio) and probably from Naples harbour. These finds would antedate peach introduction in Italy at least of one decade.

Abundant finds from the Medieval site of Imola confirm the diffusion of this fruit also in the following centuries. Sparse finds are from Medieval/Renaissance sites from the northern and central Italian peninsula (e.g. the Este Court of Ferrara), while we ignore the existence of contemporary records from southern and insular Italy. A future challenge of this study will be determining the amount of different cultivars, possibly using both the morphometric parameters and the aDNA analysis of stone endocarps.

Keywords: peach, archaeobotany, cultural heritage, Italy

TESTING THE ORIGINS AND RELATIONSHIPS OF THE BALKAN SERPENTINE ENDEMICS IN *ONOSMA* (*BORAGINACEAE*): INSIGHTS FROM nrDNA ITS SEQUENCE DATA

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Plant adaptation to serpentine soils is an ideal system for studies in evolutionary ecology and satisfies key requirements for addressing mechanistic questions of adaptive evolution in nature. Differential adaptation of closely related plants to serpentine and "normal" soil is phylogenetically and geographically widespread, having evolved independently in different parts of the world and angiosperm groups. The large genus *Onosma* L. of Boraginaceae tribe Lithospermeae is one such groups, including several serpentine endemic and tolerant taxa especially in Anatolia and the eastern Mediterranean. At least seven obligate endemics originated on distinct outcrops of the Balkans: *O. elegantissima, O. pygmaea, O. stridii, O. euboica, O. kittanae* and *O. bulgarica,* plus *O. troodi* from the ultramafics of Cyprus. In addition, four species are facultative serpentinophytes that can grow also on other basic Mg-rich substrates, such as calcareous-dolomitic rocks. This condition offers an ideal system to test the evolutionary dynamics of serpentine adaptation in a complex of narrow-ranged and allopatric "island" endemics sharing the same edaphic specialization in the ecologically discontinuous habitat of the southern Balkans. Does serpentine adaptation in this group represent a shared charater associated with phylogenetic affinity or did it evolved in unrelated lineages through parallel processes of adaptive evolution under the strong pressure imposed by soil anomalies? Molecular markers and a phylogenetic approach were used to bring light on this point ad to open a window on the still unknown relationships in *Onosma*.

Keywords: *Boraginaceae*, molecular phylogeny, *Onosma*, serpentine adaptation

MALE FLOWERS IN LILIACEAE ARE MORE FREQUENT THAN PREVIOUSLY THOUGHT

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The adoption of sub-dioecious and sub-monoecious sexual models is rare among angiosperms. In particular, the female-sterile reproductive systems – andromonoecy and androdioecy – are considered the rarest strategies, being known for about 4,000 angiosperm species which are approximately 1% of the total number. Despite the general rarity of female-sterile reproductive systems, even including particular cases such as gender disphasy, in the last twenty years a growing number of studies are emphasizing the occurrence of these strategies within the monocot order Liliales, where about 20% of the ca. 1600 species are known to be dioecious (i.e. the whole family Smilacaceae; *Chamaelirium luteum* – Melianthaceae), about 1% is known to show female-sterile systems (Colchicaceae: *Wurmbea dioica*; *Colchicum stevenii*; Melanthiaceae: *Veratrum nigrum*; *Zigadenus paniculatus*; Liliaceae: see over) and only 0.2% to show male-sterile systems (*Chionographis*).
Accordingly, Liliales show an inverted proportion in occurrence of male-sterile and female-sterile systems, respect with other angiosperms, where gynomonoecy/gynodioecy is much more frequent than andromonoecy/androdiocey. Within Liliaceae, several species have been hitherto reported to be andromonoecious and/or androdioecious, like for instance *Gagea* spp. (incl. *Lloydia*) and *Fritillaria camtschatcensis*.
The occurrence of male flowers is here documented also in *Fritillaria involucrata* (from Maritime Alps, SE France), *Fritillaria messanensis* (from Calabria, S Italy), *Fritillaria montana* (from several populations in central and southern Italy), *Fritillaria persica* (from Botanical Garden of Pisa University), *Lilium bulbiferum* subsp. *croceum* (from Tuscany, C Italy) and *Tulipa sylvestris* (from Emilia-Romagna).
Increasingly frequent observations of female-sterile systems within the order, and particularly in Liliaceae, suggest they could have an evolutionary significance.

Keywords: androdioecy, andromonoecy, *Fritillaria*, *Liliaceae*, *Lilium*, *Tulipa*

AILANTHUS ALTISSIMA (MILLER) SWINGLE IN SARDINIA (ITALY), REMOTE SENSING AND GIS TO ASSESS INVADED HABITATS

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Ailanthus altissima, a deciduous tree commonly called Tree of Heaven, native in Taiwan and central China, was first introduced in Italy (Padova botanical garden) in 1760 and planted mainly as ornamental species. It can propagate by seeds but it spreads mainly vegetatively, forming dense stands. At European level, it is generally described as common in urban areas, old fields, along roadsides, woodland edges and forests. It is generally described as polygamous, with perfect and male flowers in terminal or axillary panicles. We considered the presence and abundance of *Ailanthus altissima* in the invaded habitats in Sardinia as a proxy indicator for habitat environmental quality. Since 1991, the Italian Ministry of the Environment, funded the "Carta della Natura" project. The Map of Nature is being realized according to Corine Biotopes legend of habitats. The data collected with this project was compared with the Ailanthus distribution evaluation obtained from previous works. Satellite images (Landsat TM) represented the informative layer to provide a synoptic view of the whole territory. The classification methodology used spectral features of the data and ground control points (or areas) acquired by GPS positioning. Furthermore, in a second step, classification was thematically enhanced by using logical niche models of species and habitats derived from assessed relationships between species-habitats. The distribution patterns and available predictors, i.e. GIS thematic layers (DTM, soil, geology and land-use) were also considered to built the thematic map. In the final step, we compared by overlaying the Tree of Heaven presence, using records from over 7,000 sites (presence/absence/abundance scores) distributed on the whole Sardinia. Although this alien is mainly present in ruderal sites, we detected a significant rate of invasion also in Mediterranean sub-nitrophilous grasslands, dunes juniper thickets and woods, meso-Mediterranean calcicolous garrigues, showing its spreading ability to colonize also semi-natural and natural habitats.

Keywords: *Ailanthus*, habitat, Map of Nature.

PHYLOGENY AND BIOGEOGRAPHY OF THE GRASS GENERA *ANTHOXANTHUM* L. AND *HIEROCHLOË* R.BR. (*POACEAE*; *POOIDEAE*).

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The taxonomic status of the genera *Anthoxanthum* L. and *Hierochloë* R. Br. has been widely discussed. Traditionally, *Anthoxanthum* includes grasses with one fertile and two barren florets and which naturally occur in Eurasia and Africa, whereas *Hierochloë* presents more than one functional floret and also occurs in Oceania and the Americas, but not in Africa. The distinction between these two genera, quite clear in the European context where both were first described, are blurred in other regions.
In our study, we aim at clarifying the phylogenetic, the taxonomic and the biogeographic relationships between the two genera and among their species. For this, we use plastid (trn*L*-*F*, trn*H*-psb*A*) and nuclear (ITS) DNA markers. Our preliminary results indicate that *Hierochloë* is paraphyletic, whereas *Anthoxanthum* is clearly monophyletic only when the morphologically transitional forms between both genera are included. Besides, we postulate that *Anthoxanthum* colonized Africa at least twice and that the polyploids *A. amarum* Brot. and *A. maderense* Teppner originated from Mediterranean diploids.

Keywords: *Anthoxanthum* , *Hierochlo. Poaceae*, Phylogeny, Biogeography

ENDEMIC TAXA OF THE SECTION *COTA* (J.GAY)RUPR. (*ANTHEMIS* L.), THREATENED CATEGORIES AND CONSERVATION MEASURES

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Genus *Anthemis* L. (*Asteraceae*) is represented by about 215 species from all over the world. These species are distributed in Europe, Southwest Asia, North and East Africa. The genus comprises 79 taxa belonging to 3 sections in Turkey. Among them 29 taxa are endemic to Turkey. Some of these endemics are widespread, while remainings are restricted in small areas. In this study, threat categories of some of 7 endemic plant species belonging to section *Cota* (J.Gay) Rupr. were rearrenged according to IUCN criteria, their distribution maps were given and also photos of them were presented.

Keywords: *Anthemis*, Section *Cota*, endemism, IUCN categories, Turkey.

EVALUATION OF THREAT CATEGORIES OF THE ENDEMIC PLANTS OF SAKARAT MOUNTAIN (AMASYA/TURKEY)

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This study based on the vegetation field survey between 2004 and 2005 is done for the purpose of determining the vegetation of Sakarat Mountain (Amasya). During the plant vegetation seasons, 2000 plant samples were collected. These were determined to be belonging to 494 taxa from 283 genera and 78 families. In the survey area, six different vegetation types forest (deciduous, mixed coniferous and deciduous), subalpine, steppe, rocky, wet grassland and segetal were present.

The threat categories of the endemic species of Sakarat Mountain were determined and evaluated according to 'Red Data Book of Turkish Plants', which was prepared by using IUCN criteria.

A total of 40 plant taxa were determined as endemic (8,09 % of all taxa). Highest ratios of endemic taxa were from families *Fabaceae* (15 %) and *Lamiaceae* (15 %). Phytogeographic elements among endemic taxa were listed as Irano-Turanian (32,5 %), Euro-Siberian (22,5 %), Mediterranean (2,5 %), while phytogeographic origin of 42,5 % of endemic taxa were unknown.

As endemic taxa and their threat categories are evaluated, 1 (2,5 %) species was found to in endangered, 3 (7,5 %) in near threatened and 36 (90 %) in least concern according to IUCN criteria. When the life forms of plant taxa were analysed, it was determined that hemicryptophytes have the most number of plant taxa with 82,5 %, therophytes and geophytes have the less number of plant taxa with 2,5 %.

Keywords: Sakarat Mountain, A6, Amasya, Turkey, Endemic Plants, Threat Categories, IUCN

EVALUATION OF THREAT CATEGORIES OF THE ENDEMIC PLANTS OF DEVECİ MOUNTAINS (YOZGAT-TOKAT/TURKEY)

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This study based on the vegetation field survey between April 1993 and October 1997 is done for the purpose of determining the vegetation of Deveci Mountains (Yozgat-Tokat). During the plant vegetation seasons, 1400 plant samples were collected. These were determined to be belonging to 456 taxa from 262 genera and 63 families. In the survey area, five different vegetation types coniferous and deciduous forest, scrub, steppe, rocky and wet grassland were present.

The threat categories of the endemic species of Deveci Mountains were determined and evaluated according to 'Red Data Book of Turkish Plants', which was prepared by using IUCN criteria.

A total of 64 plant taxa were determined as endemic (14,03 % of all taxa). Highest ratios of endemic taxa were from families *Fabaceae* (17,18 %) and *Lamiaceae* (15,62 %). Phytogeographic elements among endemic taxa were listed as Irano-Turanian (53,12 %), Eastern Mediterranean (4,68 %), Euxine (3,21 %), Euro-Siberian (1,56 %), while phytogeographic origin of 37,5 % of endemic taxa were unknown.

As endemic taxa and their threat categories are evaluated, 1 (1,56 %) species was found to in EN, 4 (6,25 %) in VU, 7 (10,93 %) in NT and 52 (81,25 %) in LC according to IUCN criteria.

Keywords: Deveci Mt. , Endemic Plants, IUCN Threat Categories, Yozgat-Tokat, Turkey,

MORPHOLOGICAL AND GENETIC VARIATION OF POLYMORPHIC SPECIES *PICRIS HIERACIOIDES* (COMPOSITAE) IN CENTRAL AND SOUTHWESTERN EUROPE

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Picris hieracioides is a highly polymorphic and taxonomically critical species widespread in Europe, extending to Asia, and introduced to other continents. Up to ten different subspecies have been recognised in Europe, but critical evaluation of the species variation across a large geographic area and using advanced taxonomic tools is still missing. Here we aim to undertake a large-scale taxonomic revision and get insights into the evolution of *P. hieracioides*, focusing on morphological variation (field-collected and cultivated population samples), molecular AFLP markers, and their correlation with previously published genome size data. For comparative purposes, the closely related species *P. hispidissima*, *P. japonica* and *P. nuristanica* are included.

Morphometric analyses of field-collected and cultivated samples of *P. hieracioides* delimit two morphotypes, the 'higher altitude' (HA) morphotype and the 'lower altitude' (LA) morphotype, differing also in their life history traits, ecological preferences, and genome size. Whereas *P. hispidissima* and *P. nuristanica* can be morphologically clearly separated from *P. hieracioides*, individuals of *P. japonica* are intermingled within the HA morphotype of *P. hieracioides*. Results of AFLP analyses reveal two genetically separated groups within *P. hieracioides*, corresponding to the above-mentioned morphotypes. Further genetic structuring is observed within both groups, which is partly congruent with the genome size data and shows geographic patterns. Furthermore, AFLP data support a distinct position of both Asian taxa (*P. japonica* and *P. nuristanica*). On the other hand, *P. hispidissima* appear to be genetically very close to *P. hieracioides*.

In conclusion, the infraspecific pattern in *P. hieracioides* strongly contrasts with traditional taxonomic concepts. The two morphological and genetic groups circumscribed here warrant taxonomic recognition, and we suggest their recognition at the subspecific level. Hypotheses on their evolutionary and phylogeographic history are discussed.

Keywords: *Pıcrıs hieracioides*, Asteraceae, AFLP, multivariate morphometrics, taxonomy

ISOLATION AND SPECIATION IN THE MEDITERRANEAN BASIN: *HYPOCHAERIS LAEVIGATA* L. (*ASTERACEAE, LACTUCEAE*) COMPLEX AS A STUDY MODEL

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The Mediterranean Basin is considered as a hotspot of plant biodiversity, with more than 25.000 species. This heterogeneity is the result of geologic and bioclimatic changes which occur during millions of years, shaping the species distributions and promoting local expansions or extinctions, depending on the capacity of each taxa to adapt to the changing habitat. Precisely, the most drastic factors that affected the distributional area of the species, in the last two million years, are the establishment of the Mediterranean climate (2.3 my) and the processes of contact and isolation between the different land masses, due to the sea-level fluctuations during the glacial and interglacial periods, at the Pleistocene.

We focus this study in three species belonging to *Hypochaeris* sect. *Seriola* (*H. laevigata*, *H. rutea*, and *H. saldensis*). *Hypochaeris laevigata* is restricted to North West Africa (Morocco, Algeria and Tunisia), South Italy and Sicily; *H. rutea* is endemic to South Spain, and *H. saldensis* lives only in Algeria. These three species are closely related, and we assess the relationship between species, and their population structure nowadays, with the purpose to infer how their ancestral area was. For this purpose we applied AFLP ("Amplified fragment length polymorphism"), which are dominant molecular markers, highly polymorphic, to 273 individuals and 35 populations in all the distributional area of the species. The role of the main geographical barriers which affect the phylogeographic patterns founded is discussed.

Keywords: *Hypochaeris*, population structure, AFLP, Strait of Gibraltar, and Mediterranean Basin.

INTEGRATING MOLECULAR AND TRADITIONAL TAXONOMY IN *RUMEX BUCEPHALOPHORUS L.*

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Rumex bucephalophorus is a very polymorphic species, for which Press (1988) distinguished four subspecies (*bucephalophorus*, *canariensis*, *hispanicus and gallicus*) that vary in diaspore peduncle and valve morphology. The objective of this work is to integrate molecular and traditional taxonomy. On one hand, we have taken measures of both longitude and width of pedicels and fruit valves of one population of each subspecies, selecting exclusively populations that strictly correspond to subspecies description. On the other hand, we have carried out genetic analysis by means of molecular techniques (AFLP) in a larger number of populations. Preliminary results using the two techniques indicate that, in general, traditional taxonomy coincides with molecular data. In both cases *R. bucephalophorus* subsp. *bucephalophorus* and subsp. *canariensis* appear well defined while the limits among the other two subspecies are still unclear (*hispanicus* and *gallicus*). However, in some subspecies, wider sampling showed a higher variability in morphological traits than it has been previously described. For example, in *R. bucephalophorus* subsp. canariensis, some populations have the typical diaspore of the subspecies and other populations have not; however molecular data show these populations in the same cluster.

Keywords: *Rumex*, morphological traits, AFLP.

MICHELE LOJACONO-POJERO'S CENTURIAE IN THE HERBARIA AND ARCHIVES IN GENEVA

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Michele Lojacono Pojero, author of a five-tomes "Flora Sicula", is less famous among Sicilian botanists than he deserves. Little is known of his birth (in Palermo in 1848 or 1853), life, death (in Messina, some time in 1919) and botanical activities. His botanical mentor was Agostino Todaro. For a lifetime, he collected and studied the flora of Sicily and its surrounding islets. His botanical writings started in 1878 with a clover monograph and a botanical survey of the Eolie Islands.

In the archives of the Geneva Conservatoire Botanique, 64 unpublished letters by Lojacono to Boissier (7), Barbey (4), Briquet (3), Burnat (34), and other Geneva botanists (16) are conserved. The first, of October 1878, was addressed to Boissier, whose reply (unknown) may well have triggered the prepation and sale of Lojacono's exsiccata of rare and imperfectly known plants of his home country.

The Geneva library and archives also hold various lists of Lojacono's exsiccata. Between 1879 and 1884 Lojacono distributed 7 Centuriae of *Plantae Siculae Rariores,* numbered I toVII. In 1885 he started a second series, *Plantae Italicae Selectae,* of which the 4th, apparently last Centuria was ready in 1888. The corresponding lists are autographic (handwritten lithographed) documents, except for the first Centuria of *Plantae Italicae,* which was set in type. We found no copy of Centuria II of *Plantae Italicae;* but at least one edition (there must have been various) of all other lists, of 1000 numbers in total, are present. They are here presented in transcribed form.

The herbaria in Geneva (Burnat Herbarium, kept separate; Barbey-Boissier Herbarium, merged in the general herbarium) include two sets of Lojacono exsiccata. Examples were verified; type material of some of Lojacono's own new species *(Cirsium vallis-demonis, Anthemis ismelia, Centaurea aeolica)* has been traced.

Keywords: Lojacono Pojero, Flora, Sicily, Italy, Exsiccata, Centuriae, types.

POLLINATION SUCCESS OF *BARLIA METLESICSIANA* (*ORCHIDACEAE*) ENDEMIC ON TENERIFE

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The distribution of the orchid species *Barlia metlesicsiana* W.Teschner is restricted to the Canary Island of Tenerife. Based on previous molecular analyses almost all individuals of this species on Tenerife seem to be thoroughly interconnected via gene flow (Kropf *et al.* 2005). Regardless, this world population is characterised by a patchy structure with several subpopulations and individuals growing solitary. Therefore, plants might be difficult to reach for pollinators (i.e. bumblebees), and pollination success should by strongly pollinator-limited. Moreover, occasional fires on Tenerife influence the overall reproductive success representing an important factor for the long-term survival of this endangered orchid species.
We monitored *Barlia metlesicsiana* and its pollination success in four representative subpopulations on Tenerife during the years 2004 to 2010. Despite some yearly fluctuations (Bernhardt *et al.* 2009), the study years 2004, 2005, and 2007 indicated relatively constant population sizes (230 to 246 plants per year), and reproductive success was also relatively constant throughout the years 2004, 2005, and 2006 (yearly fruit set of 26.0% to 36.6%).

However, following a fire in July 2007 numbers of plants, portion of flowering plants, and pollination success dropped down, dramatically. In the first two years after the fire (2008-2009) only three plants managed to flower, and only one of those plant individuals obtained pollination. In 2010, subpopulations beginning recreation are still characterised by low absolute numbers of plants reappearing, but with the highest proportion of individuals flowering over all seven study years (33.7%). Otherwise, pollination success (fruit set of 21%) is still at the lower end of the regular yearly fluctuations of this species. Therefore, our data show a strong influence of catastrophic events (i.e. fire) not only on the appearance and dormancy of terrestrial orchids in general, but also specifically on the pollination success of the orchid *Barlia metlesicsiana* on Tenerife.

Keywords: *Barlia metlesicsiana*, deceptive orchid, fire, fruit set, Tenerife island endemics.

DISTRIBUTION OF *LEPIDIUM* L. TAXA IN TURKEY

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Genus *Lepidium* L. is one of the largest genera in the *Brassicaceae*, consisting of ± 175 species worldwide (Bowman et. Al., 1999). It is distributed wordwide,mainly in temperate and subtropical regions. The genus is poorly represented in Arctic climates, and in tropical areas it grows in the mountains (Mummenhoff et. Al. 2001). According to Flora of Turkey, 14 taxa is disturbed in Turkey (Hedge, 1965 and Güner 2000).

In this study is shown distribution of Turkish *Lepidium* L. which are *L. campestre* (L.) R.Br., *L. spinosum* Ard., *L. sativum* subsp. *sativum* L., *L. sativum* subsp. *spinescens* (DC.) Thell., *L. ruderale* L., *L. perfoliatum* L., *L. vesicarium* L., *L. caespitosum* Desv., *L. cartilagineum* subsp. *cartilagineum* (J. May.) Thell., *L. cartilagineum* (J. May.) Thell. subsp. *crassifolium* (Waldst. & Kit.) Thell., *L. latifolium* L., *L. lyrtaum* L., *L. graminifolium* L., *L. virginicum* L.

Keywords: *Brassicaceae, Lepidium*, Distribution, Turkey.

A TAXONOMIC REVISION OF *SCUTELLARIA* L. THE SECTION *SALVIIFOLIAE* (BOISS.) J.R.EDM. (*LAMIACEAE*)

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As part of a recent revision of the genus *Scutellaria* L. (Lamiaceae) in Turkey, the taxonomic revision of *Scutellaria* L. section *Salviifoliae* (Boiss.) J.R.Edm., including a key to the species, detailed morphological descriptions, distribution maps, and illustrations, is presented here. The study is based on herbarium materials kept at the herbaria AEF, ANK, BM, EGE, GAZI, HUB, ISTE, ISTF, JE, K, LD, OXF, W and WU, and field observations. The section *Salviifoliae* is considered to comprise four species, distributed in the range from East Mediterranean to Caucasus. Of these species, *S. salviifolia* Benth. is endemic to Anatolia. *S. diffusa* Benth. and *S. heterophylla* Montbret & Aucher ex Benth. are restricted to East Mediterranean. *S. pontica* K.Koch is only occurs in Euxine province. These four species are distinguished from one another by their habit, corolla and leaf morphology. The phytogeography of the section and close affinities of the species within the section are discussed. The section is characterized by impressed-veined leaves resembling those of the genus *Salvia* and secund flowers in one-sided inflorescence. The members of the section *Salviifoliae* are 5-45 cm height, prostrate to ascending, and perennial herbaceous plants, found in a variety of habitats, such as clearings in *Pinus*, macchie, scrubs, rocky and stony slopes, grassy slopes, and alpine pastures. Pollen and nutlet characteristics of the species are also studied in detailed with light and electron microscopies. The pollen type of the section is tricolporate. The pollen shapes of the species are prolate-spheroidal or oblate-spheroidal. Sculpturing in the mesocolpium and the apocolpium is bireticulate. Polar axis vary from 17.5 to 29.7 µm and the equatorial axis from 19.3 to 29.5 µm. Nutlets are grey-black, ovoid, ca. 1.5 mm, and have adpressed hairs covering completely the surface.

Keywords: *Scutellaria*, section *Salviifoliae*, *Lamiaceae*, revision, taxonomy

SEED MORPHOLOGY OF THE GENUS *FRITILLARIA* L. (*LILIACEAE*) IN TURKEY

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The seeds of 35 species and 6 subspecies of the genus *Fritillaria* L. (Liliaceae) were studied by scanning electron microscope (SEM). Seed morphology of the examined specimens exhibits some variation in shape and size. Seed size ranges between 8-15 mm and 3-4.5 mm lenght, 5-9 mm and 2.5-3.5 mm in width. They are elliptic, oblong, oblanceolate, obovate, obovate-orbiculare, triangular. The results of SEM investigation of seed coat sculpturing also revealed three distinct types of surface structure of the seeds, which are mainly correlated to external morphology of the species. In addition, the unknown seed features of *Fritillaria* are given for the first time here in detail.

Keywords: *Fritillaria*, *Liliaceae*, seed, micromorphology, SEM

EDIBLE WILD PLANTS AND THEIR CONSUMPTION DURING WINTER IN A RURAL VILLAGE ON MOUNT IDA

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The objective of this study is to document wild edible plants in a village and report the consumption habits of the inhabitants during winter to see their role in diet.

The current study is a student project carried out in a rural village on Mount Ida (Boztepe-Ayvacık-Çanakkale), with population 70-80. Twelve volunteer women participated in a questionnaire; one was chosen as the main informant and took part in 5 field tours for herbarium sample collection and photographic documentation in December 2009 and January 2010. The questionnaire consisted of 8 questions for each plant. Structured data for wild plant consumption habits of villagers were collected. Additional non structured data were also collected for common medicinal use of the selected plants.

Most of the 52 edibles were from *Apiaceae* and *Asteraceae* family. Almost all plants in the questionnaire were identified with the same local name, edible parts were mostly aboveground. Most of them were never purchased from local market. They were eaten alone or together with other edible wild plants. Most of them were eaten boiled or sautéed with onion. All of the plants were consumed at least 1-2 times, some more than 6 times a year. The continuation of the tradition of gathering, and high number of edibles indicate their significant role in local diet during winter. All participants agreed that the plants normally come from olive orchards, that their numbers are decreasing and that the main reason for this decrease is the increasing use of herbicides and the tilling of orchards.

Keywords: wild edible plants, Mount Ida, Çanakkale, eating habits, ethnobotany, Turkey

TAXONOMIC REMARKS ON EIGHT *ALLIUM* TAXA (SECT. *CODONOPRASUM*) FROM SOUTH ANATOLIA

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The genus *Allium* L. is represented by about 185 taxa grouped under 14 sections in Turkey. The Sect. **Codonoprasum** is one of the most difficult section characterized by long spatha with unequal 2-valves. This section consists of 44 taxa of which 18 are endemics to the country. The *Allium* genus Sect. Codonoprasum in Turkey carried out by Mine Koçyiğit as Phd study. The result of this project, two new records (*A. dentiferum* Webb & Berthel. and *A. dodocanesi* Karavokyrou&Tzanoudakis) and three new species added to the Flora of Turkey and the number of the taxa of Sect. Codonoprasum increased to 49 of which 21 endemics. In this poster presentation 8 taxa distributed in Southern Anatolia will be demonstrated:

A. dentiferum Webb & Berthel. (**new record**), *A. deciidum* Özhatay & Kollmann subsp. *deciduum* (**endemic**), A. *deciidum* subsp. *retrorsum* Özhatay & Kollmann (**endemic**), *A. dodocanesi* Karavokyrou&Tzanoudakis (**new record**), *A. bassitense* Thieb., *A. pseudoflavum* Vved., *A. pallens* L., *A. glumaceum* Boiss. (**endemic**)

Keywords: *Allium*, Sect. *Codonoprasum*, South Anatolia, Turkey.

POLYPHYLY OF *VERONICA ORIENTALIS* USING NUCLEAR AND PLASTID DNA AND MORPHOLOGICAL DATA

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Amplified fragment length polymorphisms (AFLP) and plastid markers were used in conjunction with 53 morphological characters to study relationship among 28 accessions of *Veronica orientalis* and closely related species of *Veronica* occurring in Turkey and adjacent areas of Georgia and Armenia. 330 fragments were generated and analyzed using Principal Coordinate Analysis (PCoA), Neighbour-joining (NJ) as well as Neighbour-Net (NN) analyses and produced two major groups. Morphological characterization utilizing the Principal Component Analysis (PCoA) recognizes three morpho-groups, most of which correspond to the groups delimited by the AFLP fingerprint data. In contrast, plastid DNA sequences generated a largely incongruent phylogeny for the samples. Finally, neither the AFLP nor the plastid DNA results are matching geographic groups. The results highlight the heterogeneity of *V. orientalis* and the necessity to study variation in this superspecies in conjunction with related species such as *V. multifida*, *V. fushii*, *V. kurdica* and *V. oltensis*. Additional information necessary is ploidy level, which is so far lacking for most populations.

Keywords: AFLP, cpDNA, morphometrics, *Veronica orientalis*

THE TAXA OF CR AND EN CATEGORIES BELONG TO SECTIONS *HYPOGLOTTIDEI* DC. AND*DISSITIFLORI* DC. OF *ASTRAGALUS* L. IN TURKEY

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According to latest records, the genus *Astragalus* L. in Turkey, represent with about 450 taxa. Among them, 151 taxa are thorny members whereas 299 taxa are non-thorny and the endemism rate for genus is about 45%. In this study, the threat categories of members of sections of *Hypoglottidei* and *Dissitiflori* are given. In Turkey, the section *Hypoglottidei* has 16 taxa, three taxa are in category of CR and two taxa are in category of EN. In addition, the section *Dissitiflori* has 11 taxa in Turkey, 4 taxa are in CR category and one taxon in EN category. In this study, localities of each species, habitat information and reasons for threat categories are discussed.

Keywords: *Astragalus*, *Hypoglottidei*, *Dissitiflori*, Turkey.

SPECIES IMPERFECTLY KNOWN IN FLORA OF TURKEY: *Parnassia vanensis* Azn.

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In the present study, the circumstance of *Parnassia vanensis* in Flora of Turkey and the East Eagean Islands was tried to be explained . The specimens were collected from Norduz plateau during field studies. The taxon was catagorized as imperfectly known in flora of Turkey.

Parnassiaceae presented with one genus and one species in Flora of Turkey. Aznavur collected the specimen in 1918 from Erek mountain which is close to our investigation area and published as *Parnassia vanensis* Azn.; The *P. vanensis* differs from *P. palustiris* L. in the basis of angled staminod, ovat petals rather than oblong or oblong-spathulat. Later, Al-Rawi reported to collect the species in 1964 from northern Iraq which is also close to our investigation area. The author made the description of genus in Flora of Turkey proposed that the specimen could be a synonium of *P. palustris* because he had not seen the specimens mentioned.

This study presents the existence, detailed descriptions, drawings, colour photograps taken from field and ecological specifications of *Parnassia vanensis* Azn.

Keywords: *Parnassia vanensis*, Flora, Van, Turkey,

MICROMORPHOLOGICAL CHARACTERISTICS ON THE GENUS *ORIGANUM* L. SECT. *MAJORANA* (Miller) Bentham IN TURKEY

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Most of the members of the *Labiatae* family have economic importance as they include secondary metabolites such as essential oils. Most of these plants known as oregano which includes 5 genera from this family are from the genus *Origanum* L. Of the 9 taxa exported under the name of oregano, 5 are from the genus *Origanum*. *Origanum* species are divided into 10 sections and three of the taxa, [O. *majorana* L., *O. onites* L., O. *syriacum* L.subsp. *bevanii* (Holmes) Ietswaart] too, that are in the section *Majorana* (Miller) Bentham are exported. In order to distinguish the members of the section *Majorana* easily, which can easily be distinguished from the others as it has 1-lipped calyces that similar to the bracts, their micromorphological characteristicss have been throughly examined. *O. majorana* is the taxon with the biggest stomata in size and the smallest diameter in the Labiatae type secretion cell. Labiatae type secretion cell/ mm^2 in epidermis is about 2-4. *O. onites* has the smallest epidermis cells. Although *O. syriacum* subsp. *bevanii* is including the most intense stomata cell in the lower epidermis, the number of the stomata on the upper surface is really low, moreover, it has been found out that there has been no stomata in some samples. This taxon has the smallest stomata and the stomata index has been calculated as 45 for both of the surfaces.

Keywords: *Origanum*, Oregano, Sect. *Majorana*, Micromorphology

THE ENDEMIC PLANTS OF DUZCE AND THEIR CONSERVATION STATUS

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Düzce is situated on Melen River Basin in the Western Black Sea Region of Anatolia. It is located in the north of the Elmacık Mountain range and the south of Kaplandede Mountain. Düzce region is in the A3 grid square by considering categorization of P.H.Davis. It is under the influences of Euro-Siberian, Mediterranean and Irano-Turanian phytogeographic regions. Recently flora and vegetation investigations of Düzce region, the number of total vascular plant is reached to more than one thousand taxa. There are 71 endemic taxa in Düzce Region and the endemism ratio is 7%. The conservation status of 71 endemic vascular plants of Düzce Region in Western Black Sea Region of Turkey, is reviewed. Field survey reports, recovery plans, herbaria holdings and observations have been utilized to assess each taxon's current range and status. Six species (*Centaurea yaltirikii, Cephalaria duzceënsis, Festuca rubra* ssp. *pseudorivularis, Lythrum anatolicum, Lamium purpureum* var. *aznavourii, Verbascum degenii*) are categorized as Critically Endangered, four species (*Corydalis wendelboi* ssp. *congesta, Centaurea kilaea*) Endangered, five species (*Cirsium boluënse, Lathyrus undulatus, Seseli resinosum, Silene sangaria*) Vulnerable and fifty nine as Lower Risk (46 as Least Concern and 13 as Near Threatened) when subject to the IUCN Red List criteria. With the aim of evaluating the risk of extinction and of providing management tools for natural habitats in these species, the distribution, size and structure of its population have been measured according to IUCN criteria. Thus, their natural habitats are under threat of animal grazing, road and dam constructions. Conservation management options are discussed.

Keywords: Düzce, Endemic plants, Conservation Status, IUCN, Turkey

EVALUATION OF THREAT CATEGORIES OF THE ENDEMIC PLANTS OF SİVRİHİSAR MOUNTAINS (ESKİŞEHİR/TURKEY)

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This study based on the vegetation field survey between 2003 and 2004 is done for the purpose of determining the vegetation of Sivrihisar Mountains (Eskişehir). During the plant vegetation seasons, 1100 plant samples were collected. These were determined to be belonging to 337 taxa from 184 genera and 49 families. In the survey area, six different vegetation types degraded forest, scrub, steppe and rocky were present.

The threat categories of the endemic species of Sivrihisar Mountains were determined and evaluated according to 'Red Data Book of Turkish Plants', which was prepared by using IUCN criteria.

A total of 54 plant taxa were determined as endemic (16,02 % of all taxa). Highest ratios of endemic taxa were from families *Lamiaceae* (16,6 %) and *Fabaceae* (11,11 %). Phytogeographic elements among endemic taxa were listed as Irano-Turanian (55,55 %), Eastern Mediterranean (5,55 %), while phytogeographic origin of 38,88 % of endemic taxa were unknown.

As endemic taxa and their threat categories are evaluated, 1 (1,85 %) species was found to in vulnerable, 5 (9,25 %) in near threatened and 48 (88,88 %) in least concern according to IUCN criteria. When the life forms of plant taxa were analysed, it was determined that hemicryptophytes have the most number of plant taxa with 59,25 %, cryptophytes have the less number of plant taxa with 1,85 %.

Keywords: Sivrihisar Mountains, B3, Eskişehir, Turkey, Endemic Plants, Threat Categories, IUCN

THE GENETIC DIVERSITY OF THE *GALANTHUS* L. SPECIES IN TURKEY

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Galanthus L., widely known as snowdrops, is a genus of bulbous monocotyledons, consisting of 19 distinct species. The genus is confined to Europe, Asia minor and the Near East. Morphological and molecular characteristics of *Galanthus* taxa, represented by 12 species (14 taxa) and one hybrid in Turkey, were investigated. Genetic diversity of the *Galanthus* species was studied using both nuclear and chloroplast markers. Nuclear ribozomal DNA intragenic spacer region ITS1, ITS2 and 5.8S rDNA and chloroplast *trn*L(UAA) intron sequences as well as the intergenic spacer between *trn*L(UAA)3' and *trn*F(GAA)5' genes were examined. Phylogenetic trees were constructed using the sequencing data with 3 phylogenetic methods: maximum parsimony, neighbour joining and minimum evolution. Phylogenetic trees showed that species of the same geography clustered together, in contrast to the presently recognized taxonomy based on morphological chacters. In particular, the taxonomical status of *G. alpinus*, *G. krasnovii* and *G. trojanus* displayed significant differences compared to classification table based solely on morphology. This study clearly establishes the geographical distribution of *Galanthus* taxa populated within Turkey.

Keywords: *Galanthus*, distrubituon, morphology, genetic diversity, Turkey

PLANT DIVERSITY IN HASANLAR DAM LAKE (DÜZCE) AND ITS SURROUNDINGS

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The Hasanlar Dam Lake is situated at the north eastern part of Düzce, in the northern part of The Western Black Sea Region. The total research area is 5000 ha and the elevation of the area varied between 100 and 1200 meters above the sea level. The study area is located the transition zones between two different phytogeographical regions namely the Euro-Siberian and the Mediterranean Floras.1300 specimens were collected during 48 field trips in the research area in 2007 and 2008. 93 families, 295 genera and 537 taxa were identified. The study area is in the A3 square according to the Flora of Turkey's grid system. 62 of the identified specimen were the new record for the A3 square. The 16 of the collected specimen were endemic, and endemism ratio is % 3.0. The rates of taxon belonging to the certain phytogeographical regions are as follows: Euro-Siberian elements: % 25.33, Irano-Turanian elements: % 1.67, Mediterranean elements: % 14,15 The rates of cosmopolitan and phytogeographically unknown species are % 58.85. The largest family was *Asteraceae* with 34 genera, the family including the most species was *Fabaceae* with 66 taxa and the largest genus is *Trifolium* with 12 taxa. The plant life forms of Raunkiaer systems that were identified in the study area included 79 (% 14.71) Phanerophytes, 19 (% 3.54) Chamaephytes, 232 (% 43.20) Hemicryptophytes, 55 (%10.24) Cryptophytes [48 (% 8.94) Geophytes + 7 (%1.30) Hydrophytes] and 139 (% 25.88) Therophytes. 13 (% 2.43) taxa life forms were unknown.

Keywords: Flora, Raunkiaer, Hasanlar Dam Lake, Düzce, Turkey

A SYNECOLOGICAL AND SYNTAXONOMICAL RESEARCH OF THE SECONDARY VEGETATION CAUSED BY OVERGRAZING ON ARAT MOUNTAIN (ŞANLIURFA, TURKEY)

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Prolonged intervention of forest in Anatolia settled for thousands of years caused to broaden the boundaries of anthropogenic steppe vegetations. This research was carried out for the synecological and syntaxonomical investigation of the steppe vegetation of Arat Mountain. The research area is located in the western part of the Southeastern Anatolia. According to Sözer (1984), Southeastern Anatolia located between the outer edges of the southeastern arc of Taurus Mountains and Turkey-Syria border, which is notable with a wide plateau view, generally appeals with simple and plain geomorphologic features. The plateau consisting of dish basin integrated with domed mountains and hills of medium height gradually descend from north to south and eventually meet the Mesopotamian plain. Diyarbakır basin located on eastern half of the region is surrounded by Taurus Mountains in the north and northeast side, Mardin-Midyat threshold in the south and Karacadağ volcanoes in the west sides.

The vegetation of the research area was analyzed by Braun-Blanquet (1965) approach and three new steppe associations were determined. These associations and their upper syntaxonomic units are as below:

Class: *Astragalo microcephali – Brometea tomentelli* Quézel 1973

Order: *Onobrychido armenae – Thymetalia leucostomi* Akman, Ketenoğlu & Quézel 1985

Association: *Hyperico retusi – Gundelietum armatae* ass. nov.

Association: *Minuartio formosae – Astragaletum diphtheritae* ass. nov.

Association: *Astragalo emarginati – Asphodelinetum brevicaulis* ass. nov.

Keywords: Arat Mountain, synecology, syntaxonomy, overgrazing, Turkey.

ISSR ANALYSES ON GENUS *FIBIGIA* MEDIK. (*BRASSICACEAE*) IN TURKEY

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Abstract: *Fibigia* Medik (*Brassicaceae*) genus is distributed in Southern Europe, Caucasus, Middle East, Egypt and represented by almost 16 taxa in the world. The four taxa of the genus are available in Turkey. In this study, *Fibigia* species were collected from different localities in Turkey. Genomic DNA was isolated from silica gel dried leaves following the procedure of Doyle & Doyle (1987). Out of 22 primers used in preliminary tests, 10 most suitable ones (in terms of repeatability, scorability and the ability to distinguish between species) were selected for identification. The amplified fragments were scored for markers being either present (1) or absent (0). The molecular connection of the *Fibigia* taxa with the *Physoptychis*, *Bornmuellera* and *Aurinia* genus was studied and their phylogenetic relations were revealed with the dendrogam which was prepared by the NTSYSpc 2.1 software.

Keywords: *Fibigia*, *Brassicaceae*, ISSR, NTSYS, Turkey

INTROGRESSIVE HYBRIDIZATION AND EXTINCTION RISK OF *ONOPORDUM HINOJENSE*

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The study of hybrid zones has a great biological importance and has attracted considerable attention in recent years. Hybridization between a rare plant species and a more common congener may result in a decline in the number of individuals of the rare species.

In this study we used molecular data based on Amplified Fragment Length Polymorphisms (AFLPs) analysis to assess the extinction risk of *Onopordum hinojense* Talavera et al., a rare species restricted to the Doñana National Park (Huelva, Spain). *O. hinojense* coexists in this area with its more widespread congener *Onopordum nervosum* Boiss and they form a hybrid known as *Onopordum x onubense* González- Sierra et al.

The results indicated two categories of hybrid individuals: first generation hybrids and backcrossed hybrids to *O. nervossum*. This situation could cause the extinction of the rare species *O. hinojense*.

Keywords: Hybrid zones, AFLP, *Onopordum*, SW Mediterranean.

HIGH LEVELS OF GENETIC DIVERSITY CHARACTERIZE THE NORTHWARD POSTGLACIAL COLONIZATION IN THE WIDESPREAD *CAREX NIGRA* (L.) REICHARD

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Carex nigra is the most widespread *Carex* species in Europe. It occurs across Central and North Europe, but also in the high Mediterranean mountains. In addition, it shows a typical Amphi-Atlantic disjunction with occurrences in Iceland, Greenland and NE North America. We used AFLPs and plastid sequences (*ycf*6-*psbM*) to study genetic polymorphism and unravel its biogeographic history. Genetic structure analyses revealed two main genetic groups: one covering most of the species' range and one located in W-C the Mediterranean, with contact areas in N-C Iberian Peninsula, Massif Central and Moroccan Atlas. The marginal southern populations from Sicily and Rif are depauperated, while the extensive populations from Sierra Nevada and Atlas have higher genetic diversity. Southern populations in both genetic groups often showed higher rarity (DW) values than those from North Europe, suggesting southern glacial refugia. High diversity was also found in W Russia, suggesting an eastern origin of North European populations. In AMOVA analyses, 18.09% of the variation was found among populations, but only 9.03% was explained among geographical regions. Thus, most of the variation is found in local populations, and differentiation among populations from the same area can be greater than among populations from remote regions. Several populations from Fennoscandia and North America (42.8%) showed quite high gene diversity, and some of them also had high DW values. These results suggest a more complex postglacial history than peripheral differentiation and recolonization from few refugia, possibly involving introgression from closely related taxa in some areas.

Keywords: AFLP, Amphi-Atlantic disjunction, biogeography, glacial refugia, *ycf*6-*psb*M

COMPONENTS OF POLLINATOR EFFECTIVENESS AT SEED PRODUCTION IN *LINARIA LILACINA* LANGE (*PLANTAGINACEAE*)

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We recorded the activity of all bees visiting *Linaria lilacina* Lange (Plantaginaceae), an endemic herb of mountain ranges in Southeastern Spain, in two populations and seasons, to evaluate the influence of pollinator quantitative (abundance) and qualitative (bout length and related pollen mixture) traits as predictors of their relative importance for seed production. We identified all visitor species, their effectiveness in all flowers visited in each bout, and their visitation likelihood (related to their abundance). From these observations we calculated the effect on seed production of each pollinator group at individual flower and plant levels. We found significant differences among pollinator groups (*Apis*, *Bombus* and *Anthophora* bees) in flower (bout length) and plant (number of bouts) visitation likelihood. The effect of bout length on seed set differed for each pollinator group. Thus, pollinator effectiveness at a flower level depended upon the flower visitation order. A comparable effectiveness among the three pollinator groups was found in the first flower visited, while *Apis* effectiveness decreased at higher rates, compared to the other pollinator groups, in subsequent flowers visited. Since pollinators were more effective in the first flowers visited in each bout, the mean number of seeds produced per flower was higher for those making repeatedly shorter bouts than for those making fewer but longer bouts. Thus, less abundant pollinators with higher per flower effectiveness may contribute more to plant reproductive success than more abundant ones with lower per flower effectiveness.

Keywords: pollinator effectiveness, pollinator abundant, bout length, seed production, *Linaria lilacina*.

RESEARCH ON SOME MEDICINAL PLANTS COMMERCIALLY SOLD IN THE HAVRAN AND BURHANİYE REGION (BALIKESİR)

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This study focussed on the commerce of medicinal plants, an important category for ethnobotany. It was carried out with the purpose of identifying commercially used medicinal plants that grow wild in the Havran and Burhaniye regions.

The main material of this study being plants gathered and sold in the regions mentioned above. Field work was concentrated in the zones where the plants in question are most intensively gathered, as well as in the local markets where the plants are offered for sale.

Results and observation in the course of the reserach indicate that the *Hypericum perforatum* (Hypericaceae), *Lavandula stoechas*, *Melissa officinalis* ssp. *altissima*, *Salvia tomentosa*, *Sideritis athoa*, *Origanum onites*, *Origanum vulgare* ssp. *hirtum*, *Teucrium polium* and *Thymbra spicata* var. *spicata* (Labiatae) were among plant types intensively used for commerce.

The nine taxa named above are the medicinal plants the most intensively gathered and sold in the region. Due to the rapid increase in medicinal plant gathering, and haphazard gathering in the region, an important threat to these plants have been observed.

Keywords: Ethnobotanical, Medicinal Plants, Commercial Plants, Havran, Burhaniye

ANATOMICAL, MORPHOLOGICAL AND PALYNOLOGICAL STUDY ON TURKISH ENDEMIC *FRITILLARIA BASKILENSIS* BEHÇET (LILIACEAE)

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Fritillaria baskilensis Behçet (*Liliaceae*) is described as a species nova in 1998 from Turkey. This species grows in Elazığ-Baskil province (Şelil Dağı) in East Anatolia and known only from one locality. In this study, endemic *Fritillaria baskilensis* Behçet is presented with anatomical, morphological and palynological features. Plant samples have been collected from type locality in Elazığ, Baskil. The most important features that distinguish this species from other species are, it has got a shorter stem, smaller perianth and exerted stamens. In addition to the morphological features described in the flora of Turkey, fruit and seed characteristics are also given. The anatomical and palynological features of *Fritillaria baskilensis* are reported for the first time in this study. For anatomical studies cross-sections of the root, stem and leaves and surface sections of the leaves of *Fritillaria baskilensis* have been investigated. It has been determinated that polen type is monosulcate, polen shape is subprolate, ornamentation is reticulate in investigated species.
Although threat category of the species is given as Endangered (EN) in the Red Data Book of Turkish Plants, its category could be reclassified as Critically Endangered (CR) according to our field observations".

Keywords: *Fritillaria baskilensis*, endemic, morphology, anatomy, palynology.

STUDY ON *ERICA ANDEVALENSIS* ADAPTATION STRATEGIES AND DISTRIBUTION

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Erica andevalensis Cabezudo & Rivera is a vulnerable edapho-endemic species of the Iberian Pyrite Belt, where it grows on acidic soils (pH 2.5-3.5) particularly contaminated with toxic metals. Its main interest, besides its taxonomic position within genus *Erica*, relies on its potential use for soil reclamation and landscape restoration.

An interdisciplinary study has been undertaken in order to evaluate the tolerance strategies of this species to survive and colonize the mining areas of the Pyritic Belt. Major and trace element concentrations were determined in different soil samples and plant parts of *Erica andevalensis* growing in Riotinto mining area and different experiments under controlled conditions with different Cu, Zn and Pb concentration in a nutrient solution were carried out. In addition, SEM obervations were done to study localization of some toxic metals (Cu and Pb) at tissue levels.

Erica andevalensis tolerance might be associated with preferential accumulation of metals in roots which avoids its translocation into aboveground parts and increased synthesis of organic ligands (e.g. histidine in the case of Zn and Cu exccess) and polyamines (in the case of Cu exccess).

Microscopic observations showed that at root level, Pb was mainly localized in the epidermal tissues which act as an effective barrier limiting the transport throught the other tissues. At leaf level a mechanism of Cu compartimentation in the abaxial epidermis was observed that restrict its accumulation in the mesophyll.

The results of soil analysis showed a wide spatial heterogeneity of element concentrations in the study area, even if the general feature is a low and/or an imbalanced content of several essential elements. This makes difficult to know which are the soil characters which may particularly affect the species geographical distribution.

Keywords: *Ericaceae*, contamination, metal tolerance, metal uptake.

ANATOMY, TRICHOME AND NUTLET MICROMORPHOLOGY OF *SALVIA VERMIFOLIA* HEDGE & HUB.-MOR. (SECT. *AETHIOPIS*, LAMIACEAE) ENDEMIC TO TURKEY

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The anatomical and micromorphological characteristics of *Salvia vermifolia* Hedge & Hub.-Mor. (Sect. *Aethiopis*, Lamiaceae) are studied using light microscopy (LM) and scanning electron microscopy (SEM) for the first time. *S. vermifolia* is a perennial endemic herb growing on igneous and serpantine slopes in south of Sivas in Central Anatolia. According to the results of the anatomical investigations, stems are composed of 4-8-collenchymatous tissue, 1-3-layered chlorenchymatous tissue, vascular bundles separated by parenhymatous cells, blades are amphistomatic, bifacial, with 2-3-layered palisade cells on the adaxial, midribs comprise one or two larger bundles that are very close to each other, and petioles have three large central bundles and three small subsidiary bundles. *S. vermifolia* carries peltate and capitate glandular trichomes, as wel as, non-glandular trichomes. The capitate glandular and non-glandular trichomes can be divided into several types. The peltate glandular trichomes are abundant on the calyx and corolla and capitate glandular trichomes are predominant on the calyx, corolla, inflorescence axis, pedicel and petiole. The acicular non-glandular tirchomes are mainly distributed on the calyx, corolla, inflorescence axis and pedicels, wherea the floccose non-glandular trichomes are common on the both sides of the leaf, inflorescence axis and petiole. The nutlets are 2.70-2.90 mm long and 1.90-2.13 wide, brown, ovoid-oblong in their outline and their surface is glabrous and colliculate.

Keywords: Anatomy, *Lamiaceae*, Nutlet, Trichome, *Salvia vermifolia*

THE FLORA OF KİRAZLIK(BARTIN) DAM

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In the research area Bartın-Ulus hasbeen done to establish the plants in the area that will be under the lake dam . In he research area 525 taxa belonging to 94 families , 102 subspecies and 42 varieties have been determined. This reseach area is in the Euro-Siberian flora region. According to the data the flora regions of the taxa are 26.36 %wide spread, 20.50 % Euro-Siberian, 10.04 % Mediterranean, 5.65 % Euxine, 2.30 % Iran-Turan, 1.05 % Hyrcano-Euxine and the plants whose flora regions aren't known are 34.10 %, The plants determined in the study area are Spermatophyta 97 %(509 taxa) and 11%(57 taxa) of this are Monocotyl and 89% (452 taxa) are Dicotyl.3% of the taxa are the elements of Pteridophyta. Also 85%(447 taxa) of the defined taxa are herbaceus and 15%(78) are woody.This are isn't one of the areas whose endemism proportion is high.

Keywords: Bartın, Flora, Taxa, Dam, Kirazlık

A STUDY ON THE FLORA OF SÜLÜKLÜGÖL

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This study covers the flora of Sülüklügöl area and has been carried out during 2009. Sülüklügöl is situated on Mudurnu River Valley (Mudurnu and Göynük-Akyazı) in the Western Black Sea region of Anatolia. The Sülüklügöl lies in a north-west to south-east direction and is somewhat quadrangular shape in between 200 and 1650 m elevation above the sea level. It is located in the south of the Abant Mountain range and its average altitude is approximately 1200 m. The lake is surrounded by mountains as high as 1650 m. The research area is about 6200 ha

The research area is in the A3 grid square by considering categorization of P.H.Davis. The study area is under the influences of Euro-Siberian and Mediterranean phytogeographic regions. Also, southern boundary of Sülüklügöl is range of the Irano-Turanain flora region, because of it has been to the transition area of steppe in western Black Sea Region of Anatolia. Thus, Sülüklügöl Region is the meeting place of three phytogeographical regions: Euro-Siberian, Mediterranean and Irano-Turanian.

Landslides which have occurred on the river bed, formed Sülüklügöl and this area was declared as a nature conservation area in 1968. Biological diversity of the area was conserved as a result of not allowing any construction around the area. With these objectives, we expect to contribute to the Flora of Bolu and Adapazarı planned to be written in the future, and to determine the endemic species, new records for the A3 grid square and IUCN categories of the taxa.

At the end of this preliminary study 60 families, 121 genera and 207 taxa are identified. The collected specimens are housed in the DUOF and NGBB Herbarium (Nezahat Gökyiğit Botanik Bahçesi).

Keywords: Sülüklügöl, Flora, Mediterranean, Euro-Siberian, Conservation

THE TURKISH GEOPHYTE COLLECTION AT THE NEZAHAT GÖKYİĞİT BOTANİK BAHÇESİ (NGBB) ISTANBUL TURKEY

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In 2001, Nezahat Gökyiğit Botanik Bahçesi (NGBB) started a living collection of bulbous plants from thoughout Turkey. In addition to adding to the collection as many Turkish species as possible, the objective of the project is to document their cultivation and propagation methods study identify and conserve threatened species; and the same time to increase public awareness about bulbous plants.

Excluding the *Orchidaceae* family, Turkey has 726 bulbous taxon and 380 of these are now represented in the NGBB geophyte collection. Many taxa have been collected from several different localities and the collection is maintained in 30 large raised beds made from re-cycled railway sleepers where they can be observed and studied.

One result of this study was the discovery of a new Juno iris species which has been described as *Iris nezahatiae* and work is in progress on a second iris species. Systematic studies are contining to identify other recently discovered species and a molecular systematic study on the Junos commenced this year which will shed new light on species relationships in this attractive group of small spring flowering group of Iris.

This is the first time that any collection of wild collected Turkish geophytes has been available for study in Turkey.

Keywords: Bulbous plants, *Iris*, NGBB, Turkey

MULTIPLE PATTERNS OF DISJUNCTION WITHIN *RESEDA* SECT. *PHYTEUMA* (*RESEDACEAE*) IN THE MEDITERRANEAN REGION BASED ON MORPHOLOGICAL AND MOLECULAR DATA

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Reseda sect. *Phyteuma* is composed of 14 species distributed in Europe, N Africa and SW Asia, with a centre of diversity in the Mediterranean basin. Most species are restricted endemics from the Western (mainly Iberian Peninsula and NW Africa) or Eastern (mainly Turkey and Middle East coasts) Mediterranean. Section *Phyteuma* is a natural group but characterised by taxonomic problems regarding species circumscription. We used morphological and molecular (nuclear ITS, plastid *trnL-F*) data to study the biogeography and clarify the taxonomic relationships within this group. *Reseda media* and *R. orientalis* have been traditionally considered distinct species in taxonomic treatments. Both usually grow in sandy wet soils; while the former is distributed in the W Iberian Peninsula, NW Africa, Azores and Madeira, the latter is found in the Mediterranean coast of the Middle East and Turkey. No clear morphological differentiation was found between both taxa and phylogenetic analyses showed a close relationship, suggesting their conspecifity and therefore implying a Mediterranean East-West remarkable disjunction at the infraspecific level. Morphological study and sequencing of wild *R. odorata* populations from NE Africa revealed that they should be considered the same species than accessions grown elsewhere in Europe. This fact lends support to the old hypothesis that this widely cultivated species originated in the SE Mediterranean region. In addition, we have found that some Cyprean and Cretan populations identified as *R. orientalis* to date are morphologically and phylogenetically distinct from this taxon, and that they probably constitute a new and still undescribed taxon. Furthermore, this taxon is morphologically close and sister in the plastid phylogeny to *R. odorata*, which may represent another interesting pattern of North-South disjunction in the Eastern Mediterranean Basin.

Keywords: Biogeography, Disjunction, Mediterranean, *Resedaceae*, Taxonomy.

SEED MICROMORPHOLOGY OF THE GENUS *OXYTROPIS* DC. (*FABACEAE*) IN TURKEY

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In this study, the seed micromorphology of 13 species of Turkish *Oxytropis* DC. (Fabaceae) was examined using both stereoscopic and scanning electron microscopy (SEM). Seed morphology of the examined specimens exhibits some variation in shape, ornamentation and size. The seed shape is orbicular or reniforme. According to surface ornamentations, 4 main types, striate-reticulate, psilate-reticulate, reticulate and striate-rugulate were defined. Seed size ranges between 1.75-4 mm in length, 1.5-2 mm in width. It is clear that external seed characters, especially ornamentation, could help in the classification of acaulescent *Oxytropis* species in Turkey.

Keywords: *Oxytropis*, *Fabaceae*, seed, micromorphology, SEM

KARYOLOGICAL STUDIES ON *TANACETUM ALBIPANNOSUM* HUB.-MOR. & GRIERSON AND *T. AUCHERANUM* (DC.) SCHULTZ BIP. FROM TURKEY

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Tanacetum L., which is one of the largest genera in the tribe Anthemideae, is a major ornamental genus, widely used as garden shrubs and also provide a valuable source of insecticidal compounds. It is distributed in temperate zone involving Asia, Europe and North America. In this study, karyotype analyses of *Tanacetum albipannosum* Hub.-Mor. & Grierson, which is endemic in Turkey, and *T. aucheranum* (DC.) Schultz Bip. were carried out. Karyological investigations were made from the root tip meristems using squash technique. The taxa have chromosome number $2n = 18$. In the karyotype of *T. albipannosum*, fourteen chromosomes are median centromered, two chromosomes are submedian centromered and two chromosomes are subterminal centromered. Third pair of median centromered chromosomes and second pair of submedian centromered chromosomes have satellites attached to the short arms. In addition, the following types of chromosome were identified in *T. aucheranum*: Fourteen chromosomes are median and four chromosomes are submedian centromered. Chromosome morphology of the two taxa is new to science. Chromosomal data are compared with previously published results.

Keywords: *Anthemideae*, Chromosome number, Karyotype analysis, *Tanacetum*, Turkey

EDAPHIC INFLUENCE ON THE MORPHOLOGICAL VARIABILITY OF *THLASPI ROTUNDIFOLIUM*

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High intraspecific variability is a well known feature of *Thlaspi rotundifolium* (Brassicaceae), which led to recognize variously ranked subspecific *taxa*, based on morphology and differently related to geographical or geological distribution, till supporting taxonomic uncertainties. We showed that three contiguous populations of *T. rotundifolium* growing on adjacent debris differing in lithology, *i.e.* calcschist, metabasite and serpentinite, displayed morphological variability. The style length, repeatedly considered as the main diagnostic trait of the subspecific units, was shorter on calcschist debris with respect to the siliceous substrates and did not follow the overall growth of the plants (biomass, leaf area), but was related with their Mg/Ca content ratio.

This research aims to establish if edaphic factors influence the morphological variability of *T. rotundifolium s.l.*, i.e. the style length, by affecting enzymatic processes driving plant growth.

In laboratory, different Mg/Ca ratios, mimicking the concentrations in populations grown on the different substrates, affect the activity of glyoxalase I, an enzyme, which is responsible of tolerance of salt, water and heavy metal stress in plants, but also supports cell division processes. Previous works showed that its highest concentration and activity in Brassicaceae is in the pistils. In this work, glyoxalase I activity is quantified in leaves and pistils of *T. rotundifolium* (15 μkat/mg protein using a standard assay mixture with Mg and no Ca) . Enzymatic assays carried on with the purified, commercial glyoxalase I show that its activity is reduced by a 1:12 Mg/Ca ratio mimicking that of plants growing on calcschists, with respect to the activity recorded with the 1:3-1:4 Mg/Ca ratios of metabasites and serpentinites. These differences in enzyme activity likely support the differences in style length. Edaphic factors seem to influence the intraspecific variability of *T. rotundifolium* through the activity of the anti-stress protein glyoxalase I.

Keywords: Hyperaccumulator - Magnesium/calcium ratio - Serpentine vegetation - Stress tolerance - Style length

PHYLOGENETIC RELATIONSHIPS OF TAXA OF *INCANI* DC. SECTION IN GENUS *ASTRAGALUS* L. USING SEED STORAGE PROTEIN POLYMORPHISM

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The genus *Astragalus* are widely distributed in Turkey and have various taxonomic problems. The aim of this present work was to study the phylogenetic relationships of the taxa of *Incani* section in genus *Astragalus*. Unique pattern of protein bands of total seed storage protein obtained from thirtysix taxa was investigated by using SDS-PAGE. Phylogenetic relationships were displayed in NJ (Neighbor-joining) tree.

The taxa were grouped on three main clads. The first clad composed of *A. micrancistrus* Boiss. &Hausskn.; and second clad composed of *A. olurensis* Podlech, *A. germanicopolitanus* Born., *A. frickii* Bunge, *A. nezaketae* A.Duran & Aytaç, *A. longisubulatus* Podlech, *A. czorochensis* Charadze, *A. zaraensis* Podlech, *A. polhillii* Podlech, *A. edinburghensis* Ponert, *A. achundovii* Grossh, *A. clavatus DC., A. sigmoideus* Bunge, *A. brachycarpus* M. Bieb, *A. spruneri* Boiss., *A. schizopterus* Boiss., *A. turkmenensis* Dural, *A. latifolius Lam.* and *A. glaucophyllus* Bunge, and third clad composed of *A. fodinarum* Bunge, *A. campylosema* Boiss subsp. *atropurpureus* (Bunge & Heldr.) D.F. Chamb, *A. campylosema* Boiss subsp. *nigripilis* Hub.-Mor. & DD Chamb., *A. campylosema* Boiss subsp. *campylosema* Boiss, *A. yildirimlii* Aytaç & M. Ekici, *A. sanguinolentus* M. Bieb, *A. cinereus* Willd., *A. tigridis* Boiss., *A. scabrifolius* Boiss *A. cariensis* Boiss, *A. elongatus* Willd subsp. *elongatus* Willd, *A. elongatus* Willd subsp. *nucleiferus* D.F Chamb., *A.subrobustus* Boriss., *A. humillimus* Freyn, *A.ancistrocarpus* Boiss. & Hausskn., *A. brevidentatus* Podlech, and *A. geocyamus* Boiss.

According to the matrix of genetic distance, the lowest values were between *A. sanguinolentus* and *A. duranii* (0.017). From genetic distance value and NJ tree, it may be concluded that *A. . brevidentatus* and *A. geocyamus* belong to same species . Our findings from this study indicated that seed storage protein profiles could be useful markers in studies of phylogenetic relationships of the genus *Astragalus*.

Keywords: *Astragalus, Incani,* SDS-PAGE, seed storage protein, phylogenetic analysis

ANATOMICAL INVESTIGATIONS ON *CALAMINTHA* MILLER (*LAMIACEAE*) SPECIES GROWING IN TURKEY

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The genus *Calamintha* is distributed in Europe, Eastern Mediterranean region, Central Asia, North Africa and Americas. In Turkey it is represented by 9 species and 12 taxa, five being endemic to Turkey. The ratio of endemism is over 45%. *Calamintha pamphylica* Boiss. & Heldr. subsp. *alanyense* S. Alan & A. Ocak has been published in 2007.

Calamintha is known as Güzel Nane, Dağ Nanesi, Miskotu, Tıbbi Miskotu, Yabani Oğulotu and used as folk medicine in Turkey. It also has horticultural uses.

The species of *Calamintha* growing in Turkey, have been anatomically investigated. In anatomical studies, internal structures of roots, flowering stems of species have been investigated. In all species collenchyma is found on the corner of herbaceus stems. In all species, there are a difference between the cell numbers of covering hairs and glandular hairs of stems.

Keywords: *Calamintha, Lamiaceae*, Anatomy, Turkey

MORPHOLOGICAL VARIATIONS OF *GALANTHUS ELWESII* HOOK. F. IN TURKEY AND DIFFICULTIES ON IDENTIFICATION

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Galanthus L. belongs to the Amaryllidaceae family, consists of 19 species (22 taxa) and it is represented by 12 species (14 taxa) and one hybrid in Turkey. *G. elwesii* has a wide natural distrubution and can be found in Bulgaria, northeastern Greece, the eastern Aegean Islands, southern Ukraine and Turkey. Within Turkey, this species has the widest distrubution among others and naturally grow in northwestern, western and southern Anatolia: Edirne, Adapazarı, Bolu, Yozgat, Ankara, Eskişehir, Afyon, İzmir, Isparta, Konya, Karaman, Niğde and Antalya provinces. In this study, morphological features of *G. elwesii* has been investigated. Leaf and flower morphology were studied on live material, both in the field and in cultivation, and herbarium specimens. Relations with the similiar species were shown with photos.

Keywords: *Galanthus elwesii*, morphology, variation, Turkey

DISTRIBUTION OF THE GENUS *ERYSIMUM* L. (*BRASSICACEAE*) IN ITALY

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The genus *Erysimum* L. (*Brassicaceae*) is represented in Italy by followings 16 species: *Erysimum aurantiacum* (Leyb.) Leyb., *E. bonannianum* Presl., *E. burnati* Vidal, *E. cheiranthoides* L., *E. cheiri* (L.) Crantz, *E. collisparsum* Jordan, *E. crassistylum* Presl., *E. jugicola* Jordan, *E. majellense* Polatschek, *E. metlesicsii* Polatschek, *E. odoratum* Ehrh., *E. pseudorhaeticum* Polatschek, *E. repandum* L., *E. rhaeticum* (Schleich.) DC., *E. sylvestre* (Crantz) Scop., *E. virgatum* Roth (POLATSCHEK (1982), POLATSCHEK (1983)).

Most species belong to the spontaneous Italian flora; the origin of *E. cheiri* (L.) Crantz is hybrid and *E. cheiranthoides* L. and *E. repandum* L. are exotic species for the Italian flora.
Based on the analysis of the available literature and herbaria sources (B, BM, BOZ, BP, BR , BRIX, BRNM, BRNU, C, CLU, E, FI, G, GDOR, GE, GJO, GOET, GZU, H, HAL, HBG, IB, IBF, K, KL, KR, L, LD, LI, Linz, LJU, M, MJG, MSTR, NAP, PAL, PAV, PESA, PR, PRC, RO , ROV, SBG, SIENA, TO, TSB, TUB, VER, W, WU and private herbaria), as well as the authors field research, the latest data of the 8 genus *Erysimum* species distribution in Italy are reported in dot maps.

The geo-referenced data were performed by means of the World Geodetic System - WGS 84, in order to guarantee full compatibility with international mapping standards.

Keywords: Distribution, *Erysimum*, Italy

CYTOGENETIC CHARACTERISATION OF TWO *CHOUARDIA* SPECIES: *Ch. lakusicii* (Šilić) Speta and *Ch. litardierei* (Breistr.) Speta

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Šilić (1990, 1991) described the new species *Scilla lakusicii* Šilić which was very close to *Scilla litardierei* Breistr. These two species are endemic of west Balkan region. Franz Speta (1998) grouped these two species in particular genus *Chouardia*. In this study we first determined the chromosome number of 2n=26 for both species, *Chauordia lakusicii* (Šilić) Speta and *Ch. litardierei* Speta. Besides, the classical and molecular techniques were used: Feulgen, Giemsa C-banding, fluorochrome banding (DAPI and chromomycin CMA), fluorescence *in situ* hybridization (FISH) and genome size assessment by flow cytometry. The karyogram is of bimodal type with one long pair, two middle-sized and 10 small chromosome pairs. Analysis of karyotype data show that two species could be the diploids with 2n=2x=26 or the paleopolyploids which have been affected by diploidisation and processes of disploidy. The particular cytogenetic characteristics as basic chromosome number x=13, specific morphology and size of chromosomes, heterochromatin pattern, rRNA genes organization and genome size justified the existence of two species, their exclusion from *Scilla* and inclusion in *Chouardia* genus.

Keywords: *Chouardia*, genome size, heterochromatin, karyotype, ribosomal genes mapping,

TAXONOMIC STUDIES IN THE *ALYSSUM MONTANUM – A. REPENS* COMPLEX (BRASSICACEAE)

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The *Alyssum montanum – A. repens* complex is a taxonomically critical group of taxa distributed in major part of Europe on calcareous, sandy and serpentine sites from the sea level up to the high mountains. Its taxonomic treatment is still controversial, and little is known about the evolutionary processes in this complex. Here we present the overall pattern of cytotype distribution in the area of Central Europe, Apennine and Balkan Peninsulas, and give first insights into the morphological and genetic variation of the complex.

Three ploidy levels have been found in altogether 175 studied populations, with only slight geographic tendencies observed – diploids are widespread in the western Balkan, tetraploids predominate in Central Europe, while hexaploids are rare and found scattered. First results of multivariate morphometric analyses on Central European populations indicate that the diploids and tetraploids cannot be distinguished morphologically. Recognition of two subspecies traditionally based on habitat preferences, *A. montanum* subsp. *montanum* (rocky sites) and subsp. *gmelini* (sandy sites), is neither supported, and the morphological characters usually reported do not allow to distinguish between them. Morphological investigation of Mediterranean populations is under progress. Ribosomal ITS sequences display substantial variation, but provide little resolution of the group. Chloroplast DNA haplotypes indicate distinct positions of some Balkan populations corresponding to e.g., *A. wierzbickii* (Romania), *A. reiseri* (Bulgaria), *A. densistellatum* (Greece), *A. scardicum* (Serbia), and show high diversity among the Apennine populations.

Keywords: Brassicaceae, DNA sequences, flow cytometry, multivariate morphometrics, polyploidy

COMPARATIVE STUDY OF THE ISOZYME VARIATION OF GENUS *CENTAUREA* IN SICILY AND SOUTH ITALY

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In the current work the data of the isozyme analysis of twenty *Centaurea* taxa from South Italy and Sicily were compared. They belong to *Centaurea parlatoris*, *C. cineraria*, *C. tenorei* and *C. jacea* groups. The first three groups are endemics, the last one shows a large distribution.

The total number of the alleles in the different groups ranges from 11 in *C. tenorei* gr. to 23 in *C. parlatoris* gr. The mean number of alleles per locus (A), is comparable in all the studied groups ranging from 1.46 (*C. tenorei* gr.) to 1.75 (*C. cineraria* gr.). The mean proportion of polymorphic loci varies from 41% (*C. cineraria* gr.) to 53.6% (*C. jacea* gr.). In *C. parlatoris* gr. 7 unique alleles and 5 rare ones are determined, while in *C. cineraria* gr. 6 rare alleles and 2 unique ones are registered. In *C. jacea* gr. there are two unique alleles, but no rare alleles are found. The mean values of H range between 0.16 (*C. tenorei* gr.) and 0.28 (*C. jacea* gr.). The high values of the genetic variability are usually associated with a large ecological plasticity. In the majority of *Centaurea* taxa the values of the inbreeding coefficient result negative. The inter-population variability coefficient (Fst) in Italian *Centaurea* taxa ranges from 0.24 (*C. cineraria* gr.) to 0.43 (*C. jacea* gr.). The low values prove a relatively recent differentiation of the taxa. These data are very well supported also by the values of the genetic distances among the studied *Centaurea* groups.

The results of the distribution of the genetic diversity in these groups show that Sicily could be considered as a centre of differentiation of the endemic taxa related to *C. cineraria* and *C. parlatoris.*

Keywords: Genetic diversity, *Centaurea*, Isozymes.

POPULATIONAL VARIATIONS OF *ECHIUM ITALICUM* L. BASED ON RAPD, FATTY ACID AND MICROMORPHOLOGICAL PATTERNS OF THE SEEDS

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In this study, natural populations of *E. italicum* distributing in 6 squares according to grid system of Turkey were analysed based on RAPD, fatty acid and micromorphological patterns of the seeds. It was detected some minor differences in seed morphology and the surface sculpturing. Total oil concentrations ranged from 19.3 (A2(E)) to 23.5% (A1) among the populations. Some variations of fatty acid quantities were also observed. Major unsaturated fatty acids were alpha-linolenic, linoleic, oleic, stearidonic and gamma-linolenic acids respectively. Significant differences were found for whole series and some proportions of the fatty acids ($p < 0.05$). Stearidonic (15.48%) and alpha-linolenic acids (7.66%) in the square A2(E) exhibited the highest values. The total amplified products of 15 RAPD primers was 220 (average of 14.6 bands per primer), of which 156 bands were polymorphic, corresponding to nearly 70.9% genetic diversity. The number of bands for each RAPD primer varied from 7 to 30. Percent of polymorphic bands ranged from 0.7% to 100%. The highest percentage of polymorphism was observed with primers OPC, OPD, OPA, OPD, OPC and OPA respectively. Investigated traits seem to be useful in population segregation of *E. italicum* .

Keywords: *Echium*, seed, SEM, fatty acid, RAPD, variation, population

THE AUTUMN-FLOWERING SPECIES OF THE GENUS *CROCUS* (*IRIDACEAE*) IN GREECE: TAXA AND DISTRIBUTIONS

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The genus *Crocus* L. (*Iridaceae*) is distributed from the Mediterranean basin to the western parts of China and covers the latitude between 30°N and 50°N. The majority of species are found in the eastern Mediterranean area and extend eastwards to the Irano-Turanian region.

A total of 32 taxa of *Crocus* are found in Greece (including the cultivated *C. sativus* L.), of which 17 are autumn- or early winter-flowering. Among them, 9 Greek endemics are found. Two taxa previously thought to be Greek endemics, i.e. *Crocus boryi* J. Gay and *Crocus hadriaticus* Herb. subsp. *hadriaticus*, should be considered as distributed in Albania as well. The former is already included in the Albanian flora and was collected close to Mavromati station at the border with Albania, whereas the latter was found near the village of Pogoniskos, c. 400-500 m away the Albanian border. *Crocus pallasii* Goldb. subsp. *pallasii*, previously thought to grow along the Greek East Aegean Islands, was also collected in the Greek mainland, at three different localities. The same taxon grows in the Balkans, Crimea, Turkey, Lebanon and Israel. Among the rarest autumnal taxa in Greece, *Crocus speciosus* M. Bieb. subsp. s*peciosus*, is only known from a very few localities at the western parts of the mainland.

The currently known distribution of all autumn-flowering *Crocus* taxa in Greece is presented in dot maps. A detailed work on the biosystematics of Greek *Crocus* taxa has been undertaken by the first author, at the Faculty of Biology, University of Athens.

Keywords: *Crocus*, *Iridaceae*, distribution, autumnal species, Greece.

THREAT STATUS of A RELICT ENDEMIC SPECIES (*Flueggea anatolica* Gemici) in TURKEY

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Genus *Flueggea* Willd., included in *Euphorbiaceae*, is represented by only *F. anatolica* in Turkey, while it comprises 15 species from all over the world. This relict endemic species is distributed in a limited area extending from Mersin towards Adana and Kahramanmaraş provinces in South Anatolia. *F. anatolica* is under threat, mainly due to grazing pressure, forest fire, illegal cutting and road construction. IUCN red list categories are widely accepted global approach especially for evaluating threatened plant and animal species. In this study, threat status of *F. anatolica* was assessed according to IUCN criteria and a new threat category was recommended.

Keywords: *Flueggea anatolica*, IUCN, relict endemic, threat status, Turkey

MOLECULAR TEST OF CURRENT TAXONOMIC CLASSIFICATION AND EVOLUTIONARY PROCESSES IN *THYMUS* SECT. *MASTICHINA* (MILLER) BENTHAM

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Thymus L. sect. *Mastichina* (*Lamiaceae* Juss.) is endemic to the Iberian Peninsula and includes three taxa: *T. albicans* Hoffmanns. & Link (2n = 30), *T. mastichina* (L.) subsp. *mastichina* (2n = 60) and *T. mastichina* subsp. *donyanae* Morales (2n = 30). The high similarity of their morphological characters has led to controversy on their taxonomic position and geographical distribution of this group.

This study has tested the current taxonomic classification from a molecular perspective, in order to infer the evolutionary processes that may have modelled the section. Two-hundred thirty-two individuals, collected over the entire distribution of the taxa were assayed with the AFLP technique.

The AMOVAS, NJ, PCO and MST of the genetic data were consistent with the currently recognized taxa, and gave genetic support to the taxonomic classification proposed by Morales (1986). Furthermore, high levels of genetic diversity also revealed the welfare of the section, even in the case of the threatened *T.albicans*.

In an evolutionary context it is likely that *T. albicans* may have had an older and wider distribution, followed by a recent habitat fragmentation, and might have originated the other two taxa by two independent evolutionary events. Thus, *T. mastichina* subsp. *mastichina* might have been originated by polyploidization and subsequent radiation to central and northern areas of the Iberian Peninsula, while *T. mastichina* subsp. *donyanae* might have been originated by geographic isolation after the recent formation of the Doñana area.

Keywords: *Thymus* sect. *Mastichina*, AFLP, taxonomy, evolutionary processes.

EURO+MED PLANTBASE – RECENT PROGRESS WITHIN THE PAN-EUROPEAN SPECIES-DIRECTORIES INFRASTRUCTURE (PESI)

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Euro+Med PlantBase (www.emplantbase.org/), currently hosted and coordinated by BGBM, continues to offer its service under the roof of the Pan-European Species-directories Infrastructure (PESI, see www.eu-nomen.eu/pesi). This initiative started in May 2008 and is funded by the European Union under the Framework 7 Capacities Work Programme: Research Infrastructures. Led by the University of Amsterdam, this three-year project involves 40 partner organisations from 26 countries. PESI provides standardised taxonomic information by integrating and securing Europe's taxonomically authoritative species name registers and nomenclators along with associated expertise networks that underpin the management of biodiversity in Europe. The database integration comprises the three main taxonomic information registers that have emerged in Europe, viz. the European Register of Marine Species, Euro+Med PlantBase and Fauna Europaea. Networks will be expanded by linking with other expert-edited Global Species Databases that contribute to Species 2000 and its Catalogue of Life, such as AlgaeBase, the Index Fungorum, the International Plant Names Index, and the World Register of Marine Species. For Euro+Med PlantBase, the current state (62 families online) and further action will be reported.

Keywords: Biodiversity informatics, taxonomic data bases, Europe, expertise networks, Mediterranean region.

THE HERBARIUM OF ANTOINE BRAS (1803-1883)

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Herbarium Mediterraneum Panormitanum; w.greuter@bgbm.org, raimondo@unipa.it

The French physician Antoine Bras, for many years Lord Mayor of Villefranche de Rouergue (Aveyron), at times member of the Department's Conseil Général, was also a prominent amateur botanist. His single major work, of 1877, is the "Catalogue des plantes vasculaires du Département de l'Aveyron". He also built a considerable personal herbarium, the trace of which had been lost. It was recently rediscovered, auctioned in November 2008 in Rodez (Aveyron), and purchased by the first author, to be donated to Palermo University where it is kept as a separate unit within the Herbarium Greuter (PAL-Gr). The declared purpose was to keep the herbarium in public property and make it accessible for research purposes. The plants are being remounted, the label information is databased and processed for online presentation, together with high-resolution digital specimen images. Duplicates are available for exchange with interested parties.

The Bras herbarium is reasonably well preserved, although untidy, with limited insect damage, rat gnawing, and label foxing, but no mould. Its main portion consists of 84 numbered parcels, arranged according to Grenier & Godron's "Flore de France". Moreover there are 2 bundles of mosses and lichens, 2 of "exotic" plants, 9 of mixed material, and 37 that are not directly associated with Bras. Bras collected not only in Aveyron but in the surrounding departments, the Pyrenees, Alps, Jura mountains, and Corsica. He received specimens from over 60 contemporary botanists.

This complete and original 19th Century herbarium offers excellent opportunities to reconstruct the world of contemporary French botany. A comparative study of labels and handwritings is in progress. Unfortunately no corollary archival documents could yet be traced except a portion of the final manuscript for the "Catalogue". Help in finding the accession and field books that must have existed, and Bras' botanical correspondence, would be greatly appreciated.

Keywords: Antoine Bras, historical herbarium, French floristics, specimen imaging, label data

FACTORS AFFECTING NATURAL VEGETATION OF EL-HAROUJ MOUNTAIN, CENTRAL PART OF LIBYAN DESERT (SAHARA)

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El-Harouj mountain in the Libyan desert (coordinates 7:45 - 29:00 north and 17:00 - 18:30 east) south from sea coast at a distance of about 260km a special ecosystem relatively rich when compared with the surrounding areas, however is characterized by poor and scarce vegetation with low diversity,and low percentage plant cover, in some depressions and valley beds,it varies between 15-40 % , where *Acacia tortilis* trees dominate , moreover several species are met such as *Tamarix aphylla, Pergularia tomentosa, Retama raetam, Zygophyllum sp.* and *Panicum turgidum.*

Some species grow on rocky heights as *Anabasis articulata and Andrachne telephioides* ,where they receive amounts of water mainly from fog and dew especially during nights however these areas are home of interesting biota.

The salt marshes (Sabkha) are characterized by halophytic species, such as *Nitraria retusa, Zygophyllum sp., Tamarix sp.* and *Salsola sp.*. However, the formation of these saline areas is due to spilling of water and flooding of plains from high altitudes, or the shallow water table.. Under these severe conditions as lack of drainage system and flooding of soil with slightly saline artesian water rapidly increases its salinity.

The flora of this region is constituted of 64 species (about 3% of total number of Libyan flora) belonging to 55 genera and 21 families, with one endemic species *Fagonia arabica* var *membranacea*. *Zygophylaceae* and *Chenopodiaceae* members are the most distributed species on the study area constituting 14.1% each, *Asteraceae* 12.5%, *Fabaceae*, *Poaceae* and *Brassicaceae* 7.8% and *Boraginaceae* 6.3 % .

Dry desert climate preveils on the study zone imposing a fragile ecosystem, with high temperatures and little rainfall, aggravating human activities. The most important processes in this area is agriculture, practiced mainly in the nearby oases, which resulted in the uprooting of natural vegetation, and the depletion of groundwater, and increasing soil salinity, grazing cause removal of the natural vegetation in depressions and valleys, but the most destructive activity is oil exploration and extraction in the different concessions in the zone, resulting in pollution, and solid waste disposal, and spilling of the waste water mixed with oil, which causes soil pollution, in addition to trampling due to vehicles and machineries activities around the oil wells and camps. Due to the above mentioned factors this area shuold be designated as a protected areas.

Keywords: El-harouj, mountain, vegetation, Libyan desert

ANCESTRALITY OR MORPHOLOGICAL CONVERGENCE IN THE MOLLISSIMA AND ITALICA GROUPS OF *SILENE* IN THE WESTERN MEDITERRANEAN BASIN.

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The 'mollissima' group of *Silene* is comprised of seven species, and is related to the 'italica' group which contains eight species. The 'mollissima' species display a slow-growing pattern and woody stocks, they share a similar ecology and exclusively inhabit rocky substrates and cliffs, often close to the sea. Most of them are endemics, some of which occur on the Western Mediterranean islands. The 'italica' species are more widely distributed over the Western Mediterranean region, and most of them are continental. All the species in both groups are perennial and monoecious. The two groups have been described as distinct, on a morphological and ecological basis. Using more than four hundred sequence data from two chloroplast markers (*trn*H-*psb*A and *trn*S-*trn*G) and one nuclear gene (ITS) on fresh material or herbarium specimens, we challenge the hypothesis that each of the two groups is monophyletic and that they were both derived, about 5 million years ago, from an ancestor of *Silene italica*, now found in South-Europe and the Middle-East. Our results clearly indicate that species of the two groups are interrelated and suggest a completely different evolutionary scenario for speciation and adaptation.

Keywords: speciation, adaptation, phylogeography, chloroplast and ITS sequences, Caryophyllaceae.

CLUSTERING GRIDS INTO PHYTOGEOGRAPHICAL REGIONS BY MEANS OF SPECIES DISTRIBUTIONS IN TURKEY

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Flora of Turkey and East Aegean Islands is the most comprehensive source for floristic researches in Turkey. The species distributions are one of the most accessed parts of the flora. Distributions of almost ten thousand species are covered in the flora according to grid squares. Davis' thirty grid squares constitute a grid system for Turkey and it is the one that researchers still use in their studies.

Today, it is possible to analyze large datasets as large as species distribution of Turkish flora. Availability of species distributions in digital format had motivated us to analyze this data. Thus, we have calculated pair wise similarities among the 30 grid squares by presence of species in the grid pairs. By using the similarity matrix, we constructed a phylogeny for the 30 grids squares and showed the result on a map. Our results were highly accurate when we compare with the phytogeographical regions.

Keywords: Phytogeographical regions, numerical taxonomy, species distributions, Davis' grids, Turkey

ELEMENTAL ANALYSES OF A MEDICINAL AND FOOD PLANT: *TRACHYSTEMON ORIENTALIS* (L.) G. DON

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The chemical constituents in plants, including trace elements and metal ions, are partially responsible for their medicinal and nutritional properties as well as their toxicity. The metals also play an important role in the plant metabolism and biosyntheses such as cofactors of enzymes.

Trachystemon orientalis (*Boraginaceae*) is a rhizomatous perennial herb, 30-40 cm tall. The plant is locally known as "Balıkotu, Hodan, Ispıt, Kaldırık, Acı hodan, or as Doğu hodanı". Phytochemical constituents are phenolic compounds, essential oils, mucilages, saponins and resins among others. According to literature it contains also some nitrates. *T. orientalis* is consumed as a food or vegetable plant and its recorded folkloric usages are as diuretic, blood purifier, emollient, antipyretic *etc*.

In this present study, macro (N, C, H, S, P, K, Ca, Mg, Fe) and micro trace elements (Na, Cu, Zn, Mn) and heavy metals such as Ni and Al of *T. orientalis* collected from three different localities were determined by using various techniques. N, C, H was determined by the dry combustion method using elemental analyses, P and S was measured by a colorimetric method, whereas K and Na by flame photometry. Finally Ca, Mg, Fe, Cu, Zn, Mn, Ni and Al was detected and quantified by atomic absorption spectroscopy (AAS). All experiments were performed qualitatively and quantitatively with comparison to a certified reference plant material statistically.

Keywords: *Trachystemon orientalis*, *Boraginaceae*, trace elements, macro elements, elemental analyses, certified reference plant material

TERTIARY FLORA OF TURKEY AND ITS ASSOCIATION WITH PRESENT-DAY FLORA

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Macro and micro fossil samples belonging to tertiary period in Turkey are mostly found in lignite coalfields. These fields are mostly located Western, Southwestern and East Anatolia regions. The fields are Miocene and Pliocene aged. A great number of macro plant fossils, fossil spores and pollens were found in these fields, some of them by us ("Tertiary flora of Western Anatolia Project" funded by Ege University Scientific Research Projects Unit, Project Number: 92 Fen 036). The results obtained demonstrate that the climate had humid and warm characteristics during the tertiary period, and that there was significant cooling during this sub-tropic period. During Pliocene period, the climate tended to cool down but did not lose its sub-tropic characteristic, and this continued partly during the Pleistosen period. Dominant vegetation suggests *Coniferae-Quercus* mixed forest. However, several genera and species which make up the present flora are of tertiary origin.

Keywords: Tertiary flora, present day flora, Turkey

REAL AND POTENTIAL UPPER BORDERS OF THE FORESTS IN WEST AND SOUTH ANATOLIA

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However, Northwestern Anatolia part of Mediterranean fitogeographic region are under the effects of Euro-Siberian fitogeographic region and the regions of the Mediterranean fitogeogrphic region facing Central Anatolia are under the effects of Irano-Turanion fitogeographic region. Our study found that the Mediterranean Region, Turkey has mostly high mountain vegetation. As in all other mountainous areas, high mountain vegetation has a very delicate balance in Turkey. This delicate balance is even higher in the Mediterranean Region. Stockbreeding and deforestation activities taking place hundreds of years in the region have destroyed the natural structure of the vegetation. Most of the present plant communities are in a state of paraclimax. Our study is mainly based on two projects: "The Flora and Vegetation on Bolkar Mountain, the central Taurus Mountains (funded by Ege University Scientific Research Projects Unit, Project Number: 1988/11)" and "High Mountain Vegetation and Flora of Western and Southern Anatolia (funded by TUBITAK, Proje Number: TBAG-993)". In these studies, plenty of information (data) was collected on the high mountain vegetation and flora of Western and Southern Anatolia. This presentation has focused on the upper borders of the forests in those areas. This topic is of importance in the conservation of biological diversity, in forestry and in the improvement of meadows in mountain ecosystems. Main factors designating the upper borders of the forests in our study are climate and topography; however, antropogenic effects are of equal importance too. Due to these effects, upper borders of the forests have descended and significant differences have arisen between the real and potential upper borders. The topics focused on in our study are real and potential upper borders of the forests, factors affecting these borders, tree species designating the upper borders and using fitosociological findings to determine the potential upper borders of the forests.

Keywords: Upper border of forests, Phytosociology, West and South Anatolia, Turkey

MORPHOLOGICAL VARIABILITY OF GENUS *BLACKSTONIA* HUDSON (*GENTIANACEAE*) IN THE IBERIAN PENINSULA AND BALEARIC ISLANDS

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Genus *Blackstonia* Huds. is widely distributed in the Mediterranean Region, where several infrageneric taxa have been described, all of them present in the Iberian Peninsula. As a contribution to "Flora Iberica", a study of the morphological variation in the genus has been carried out using multivariate analyses. Voucher specimens were selected covering the whole distribution area of the traditionally recognized taxa. Both vegetative and reproductive characters have been considered, most of them quantitative, and a Principal Component Analysis has been applied (SPSS for Windows). This study has revealed four well differentiated groups of plants, both by vegetative characters (leaf basal rosette, shape and connation degree of caulinar leaves) and reproductive characters (branching system of the inflorescence, shape and connation degree of sepals, size of petals, length of style). Some of these characters have been traditionally used in many floristic studies, but others have been used for the first time and have proved to be very useful in the taxonomy of *Blackstonia*. There is not agreement on how its morphologic variability must be treated, thus a same taxon has been considered at specific, subspecific or varietal level by different authours. Owed to the scarce overlapping of the variation range, and the geographic and ecological sympatric distribution, the species level is proposed for the four main morphological entities. These are *B. perfoliata* Huds., *B. grandiflora* (Viv.) Pau, *B. acuminata* (Koch & Ziz) Domin and *B. imperfoliata* L. fil. Within *B. perfoliata* and *B. acuminata* some infraspecific variability has been detected mainly in relation to the ratio between anther and stamen filament. In this study the taxonomic status to be given to these infraspecific groups is discussed.

Keywords: morphological variation, multivariate analysis, taxonomical characters, taxonomic status, Mediterranean region.

CYTOTAXONOMIC STUDIES WITHIN SOME *NIGELLA* TAXA (*RANUNCULACEAE*)

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The chromosomal studies have been carried out in 18 *Nigella* taxa collected from Turkey, Syria, the Turkish Republic of the Northern Cyprus and Greece. Among them, seeds of 8 taxa belonging to 10 populations have been germinated and their chromosomes have been studied. Chromosome numbers for some species of the genus have been determined firstly according to the IPCN records. These are *N. oxypetala, N. elata, N. nigellastrum, N. segetalis* and *N. arvensis* var. *tauricola.* One of the interesting results obtained from this study is chromosome number and relation of the *N. elata* and *N. damascena* which are closely related species. The first species has 7, 12 and 18 chromosomes belong to seeds of the same population. The studies of the species which have been collected from different populations have been underway for making a detailed accurate decision. The studies on the chromosome of the *Nigella* taxa are ongoing for contribution to the evolutionary history and cytogeograpy of the genus.

Keywords: Chromosome, Cytotaxonomy, Monograph, *Nigella*, taxonomy.

CONSERVATION OF BIODIVERSITY IN HOT-SPOTS OF GLACIAL RELICT PLANTS IN BULGARIA

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In 2009 a two-year project, entitled "Conservation of biodiversity in hot-spots of glacial relict plants in Bulgaria" was funded by the European Economic Area Financial Mechanism 2004-2009. The project is coordinated by the Institute of Botany, Bulgarian Academy of Sciences and involves 5 partner research organizations from Bulgaria and Norway. It is focused on the elaboration of sound information basis for protection and sustainable management of mountain glacial relict plants in Bulgaria.

A significant number of mountain plants, many of which listed in the national Biodiversity Act as protected, is remnant of glaciation periods and they possess high sensitivity towards climate warming and human impact by reasons of geographic isolation and lack of potential for further migration to sites with more favorable conditions. Most of their habitats are listed in Annex I of the Habitats Directive (92/43/EEC). The foreseen activities will be carried out at selected sites in the highest mountains of Bulgaria.

The following main questions will be addressed: (1) what is the impact of the different threats on glacial relict plants in Bulgaria and (2) how geographical isolation and fragmentation influences the plant survival potential and habitats stability.

The poster presents details about the project activities, organization and expected results. The approach is based on representative sites and indicator species. The main activities are related to recovering the historical dynamics of vegetation in relation to climate change and the evaluation of the present state and structure of populations and habitats of selected glacial relict plants under the influence of current climatic changes and other threat factors. Measures for effective conservation of these species will be proposed. Dissemination of the results to the target groups is envisaged.

Keywords biodiversity, Bulgaria, climate change, glacial relict plants, plant conservation.

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