11th ICZEGAR ABSTRACTS

International Congress on the Zoogeography and Ecology of Greece and Adjacent Regions

International Congress
on the
Zoogeography, Ecology and Evolution
of
Eastern Mediterranean

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International Congress on the Zoogeography, Ecology and Evolution of Eastern Mediterranean

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PREFACE

Thirty years have already passed since 1979 - the year that the first International Congress on the Zoogeography and Ecology of Greece and the Adjacent Regions (ICZEGAR) was organized by the Hellenic Zoological Society. We owe this to **Prof. Ioannis Matsakis**, the mentor of many Greek ecologists, zoologists and zoogeographers of the 70's and 80's.

During these years, hundreds of scientists have found a hospitable and friendly environment to present their research on different aspects of biodiversity of the Eastern Mediterranean. The congress by itself affected zoogeographical and ecological research in the region, attracting many young scientists, educating them in modern trends by dozens of invited speakers, and establishing closer collaboration among the scientific community of the area.

The Organizing Committee of the 11th ICZEGAR, in collaboration with the Hellenic Zoological Society, decided to enlarge the scientific scope and the spatial range of the congress by giving the subtitle: *"International Congress on the Zoogeography, Ecology and Evolution of Eastern Mediterranean"*. We strongly believe that all aspects of the aforementioned fields of expertise are well covered by lectures, oral presentations and posters' exhibition that will take place during this significant conference.

This volume includes 196 abstracts of 81 oral presentations and 115 posters that were accepted for presentation at the 11th *International Congress on the Zoogeography, Ecology and Evolution of Eastern Mediterranean*. The aim of this book of abstracts is to present current issues, referred to the Eastern Mediterranean region, to the international scientific community. Abstracts are presented in three sections (invited speakers, oral presentation, poster), arranged in alphabetical order. An index of all authors can be found at the end of this volume. The international nature of this congress is well reflected by the participation of 485 authors from 30 countries and 96 research institutes and universities.

The Organizing Committee would like to express its special thanks to the invited speakers for their prompt response to our invitation, namely: *Carvalho G.R.* (University of Bangor, UK), *Fransson T.* (Swedish Museum of Natural History, Sweden), *Harzhauser M.* (Natural History Museum of Vienna, Austria), *Heip C.* (Royal Netherlands Institute of Sea Research and Netherlands Institute of Ecology, The Netherlands), *Laland K.N.* (University of St. Andrews, Scotland), *de Queiroz K.* (Smithsonian Institution, USA), and *Whittaker R.J.* (University of Oxford, UK).

The Organizing Committee

Geographic range limits of species: advances in molecular and genomic approaches.

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One ubiquitous feature of living organisms is their discontinuous distribution, whether they inhabit marine, freshwater or terrestrial realms. Species distributions are further characterised by exhibiting specific patterns of distribution across geographic and local scales within habitats and ecosystems. Most species are confined to discrete locations, with limits to their geographic ranges beyond which they are not found. Such geographic range limits may be stable over long periods, whereas others may shift in response to a multitude of biological and environmental features. Elucidating the nature and dynamics of such geographic patterns remains central to predicting the consequences of environmental change, a key consideration in sustainability and conservation of natural resources. Here, we address three main questions: (1) briefly, what are the primary drivers that impact on the geographic range limits of species? (2) How have recent molecular and genomic advances facilitated our efforts to identify at least some of these key drivers? (3) How can such advances be integrated effectively into future studies? Examples will focus on marine taxa, especially fish, and will include insights from (i) recent work employing single nucleotide polymorphisms (SNPs) and gene expression to explore potential selective responses to environmental variation and patterns of dispersal, and (ii) the use of DNA barcoding to examine range shifts and the incidence of cryptic species. When such approaches are integrated with experimental and long-term observations they can provide robust tools to disentangle the relative roles of environmental and genetic variation in determining species distribution and persistence.

When and where to fuel? A challenge for migratory birds crossing the Sahara desert.

Fransson T.

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Birds require extra energy during migration and long-distance migrants have to use several stopover sites for fuelling throughout their journeys. Large fuel loads increase the flight cost as well as the risk of predation and passerine migrants normally attain small to moderate fuel loads and have been shown to adjust their behaviour to conditions met at different stopover sites. Large numbers of passerine migrants regularly have to cross large ecological barriers, like the Sahara desert, where extensive fuel loads are crucial for a successful crossing. A central question is how inexperienced migrants know when and where to prepare for an oncoming barrier crossing. It has been assumed that this is governed by their endogenous rhythm, but this program alone can hardly guide inexperienced birds during their first migration. It is be-lieved that other external cues must be involved as well and one such spatial cue could be the Earth's magnetic field. Experiments carried out in Sweden show that migratory birds exposed to manipulated geomagnetic fields are able use this information for fuelling decisions.

The Eastern Mediterranean: biogeographic responses to the closure of the Oligocene-Miocene Tethyan Seaway.

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The birth of the Mediterranean Sea was a result of the multiphased closure of the Tethyan Seaway. This process had started already at the Oligocene/Miocene boundary and was completed in the late Early Miocene some 18 Ma ago. Extensive terrestrial exchanges were initiated by the closure of the Tethyan Seaway during the Early Miocene. Proboscideans are among the most prominent African immigrants, which arrived in Eurasia about 19 Ma ago via the "*Gomphotherium* Landbridge". Several distinct waves of continental migrations, however, document that the formation of this landbridge was a multiphase process, and several waves of immigration postdate the first formation of the landbridge. Accordingly, the marine faunas reflect repeated disconnections and reestablishments of migration routes. The total breakdown of faunistic interrelations between marine faunas from India, Pakistan, Oman and Tanzania with those from the Eastern Mediterranean area during the Aquitanian suggests a first biogeographic separation around ~22 Ma, occurring somewhere between Mesopotamia, Arabia, and NW-India. This event predates the development of the *Gomphotherium* Landbridge in the Burdigalian by 4-5 Ma and provides an example for biogeographic separation in the marine realm without formation of a continental barrier. Both "deviations" – the predating of biogeographic differentiation of marine faunas and the delayed exchange of terrestrial faunas due to successive migrations – call for attention in modern phylogenetic analyses when molecular clocks are simply calibrated against geodynamic data without acknowledging a heterochronous response of fossil faunas. The Western Tethys Region had acted as centre of origin and diversity during Oligocene and Early Miocene times. After the closure of the seaway, this centre had shifted to the southeast, heralding the enormous biodiversity of the modern Indo-West Pacific Region. Some originally Western Tethys Region elements managed to follow this shift and formed the Miocene stock for the modern IWPR faunas. Thereafter, the Middle Miocene Climate Transition and the Pliocene to Pleistocene cooling events caused a gradual decline of diversities. These were replenished and maintained from the Eastern Atlantic Region after a complete community collapse caused by the Messinian salinity crisis, and during interglacial cycles henceforth. Therefore, the recolonisation and faunistic enrichment of the impoverished Mediterranean-Atlantic Region from the Indo-West Pacific Region was successfully blocked for more than 15 Ma. The success of anthropogenic-induced Lessepsian migrants since 1869 may thus also be a result of the unbalanced composition of the faunas in the Mediterranean Sea.

Marine Biodiversity and Ecosystem Functioning: a European Perspective.

Heip C.
Royal Netherlands Institute of Sea Research and Netherlands Institute of Ecology

Marine Biodiversity is better known in Europe than in any other area of the world. Still, there are major questions on the rate and even the direction of change and on its implications for conservation and proper management of marine resources. Moreover, the relationship between marine biodiversity and functioning of marine ecosystems is not well understood and the valorization of ecosystem services is therefore inadequate. In general, the literature on the subject shows a huge knowledge gap with terrestrial systems and an assimilation and transfer of concepts and paradigms from terrestrial to marine systems that is not really justified. A general framework for developing the knowledge on the relationship between biodiversity and ecosystem functioning requires knowledge on species communities and interactions, distribution, abundance and behavior. Geographical information and knowledge of temporal dynamics of key species are essential. The task to cover description of biodiversity (genes, species and ecosystems) of tens of thousands of kilometers of coast and hundreds of thousands of square kilometers of open seas and oceans in Europe is daunting. Still, describing patterns of marine biodiversity at the appropriate scales of time (decades) and space (up to thousands of kilometers) is necessary if adequate management and regulation of exploitation are the target. More than 40 % of the EU territory is marine and under water. European legislation within the forthcoming Marine Strategy must be developed and efforts to support legislation are urgently needed. The study of biodiversity will require the establishment of observatories and the coordination of data collection, assimilation and accessibility, among others. Several EU initiatives, including the ESFRI project Life Watch, are presently preparing the creation of such networks. In order to be successful a coordinated effort of Europe's marine scientists is necessary.

The niche-construction perspective in evolutionary biology.

Laland K.N.

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Organisms play active roles in evolution through choosing and constructing their environments, and thereby modifying how natural selection operates. Modern evolutionary theory frequently downplays these activities, treating them as products, but not causes, of evolution. In contrast, I argue that niche construction is an important evolutionary process in its own right and illustrate the argument using empirical examples and simulations from theoretical analyses. From this viewpoint, evolution is based on networks of causation and feedback in which organisms drive environmental change and organism-modified environments subsequently select organisms.

Current Trends in Systematics.

de Queiroz K.
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Systematics provides a critical context for diverse biological studies, including those of zoogeography and ecology. During the past 25 years, systematics has experienced a period of rapid conceptual and methodological growth, including several important developments. The estimation of phylogenetic branching sequences has progressed from simple numerical methods based on unrealistic assumptions to sophisticated probabilistic methods based on increasingly realistic evolutionary models. The estimation of divergence times from molecular data has progressed from methods based on the unrealistic assumption of a strict molecular clock to methods that allow rates of evolution to vary among lineages, as is commonly implied by the data. The estimation of diverse population parameters has progressed through the incorporation of phylogenetic approaches into population genetics, in particular, the development of methods that embrace the distinction between species trees and gene trees. After a period of confusion associated with the proliferation of alternative species concepts, a unified concept of species is emerging around the element common to the alternative concepts and the reinterpretation of differences among those concepts as lines of evidence concerning the separation of lineages rather than necessary properties of species. In the realm of nomenclature, phylogenetic methods have been proposed that associate names directly with clades, thus granting greater importance to the associations of names with clades (groups) rather than taxonomic ranks. Finally, there has been a tremendous proliferation of methods for analyzing diverse biological phenomena, including those of zoogeography and ecology, in a phylogenetic context.

Scale and the dynamics of island biotas: a (mostly) macroecological perspective.

Whittaker R.J.
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The dominant paradigm of the last 40 years in island biogeography has been the dynamic equilibrium model put forward by Robert H. MacArthur and Edward O. Wilson. This simple macroecological model describes ecological dynamics with reference to the three fundamental biogeographical processes – speciation, (im)migration and extinction – accounting for the persistence of the model as a conceptual framework even though it often fails to satisfy empirical testing. In this presentation I argue that the applicability of these simple models varies as a function of both the spatial scale of the island system and the temporal scale of its dynamics. I illustrate these points with reference both to near-shore systems of fast 'ecological' dynamics, such as the Krakatau Islands, and remote systems of slow 'evolutionary' dynamics, such as the Macaronesian Islands. By incorporating the long-term dynamics of island environments into a new general dynamic model for oceanic islands, Whittaker, Triantis and Ladle have recently shown how several new sets of predictions can be generated from this macroecological approach – predictions concerning both numbers of endemics and the phylogenies of island lineages. I will conclude this presentation by reviewing the results derived from tests of these predictions to date.

Reproductive Biology of *Capoeta tinca* Inhabiting Kayaboğazı Dam Lake (North-West Anatolia, Turkey).

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This study investigates the reproduction biology of *Capoeta tinca* population in Kayaboğazı Dam Lake in the region of Northwest Anatolia in Turkey (Kütahya). The investigation was carried out between March and December 2003. During the study, breeding and sexual maturation properties of *Capoeta tinca* were studied. The sexual maturity position for both sexes were II age. The spawning period was from begining of May to the end of June. The minimum fishing size was found as 214 mm in terms of fork length. According to age, the reproduction period was changing between different populations depending on ecological condations in Turkey's areas.

Structure of tenebrionid assemblages on islands of the Aegean archipelago.

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The aim of this study is to investigate changes in the structure of tenebrionid assemblages among different habitat types on 12 islands of the central Aegean Archipelago and to determine the main ecological and geographical factors that explain them. A number of pitfall traps were placed in several stations within the dominant habitat types (maquis, phrygana, forests, dunes and meadows) of each island. In this study, among the 7 months during which the project was carried out, only the results from June will be presented. Species richness and abundances of tenebrionids were compared using ANOVA. The changes in the structure of the assemblages were measured using ordination techniques. Species richness and abundances as well as structure differed among the various habitats in each island, and the factors that explain the differences were vegetation structure and type of soil. The dunes had the most distinctive species. At the same time, less pronounced differences were observed among the same habitat type in different islands, especially along an east-west gradient.

Implementation of the European water framework directive for the ecological assessment of a permanent river (isl. of Crete, Greece) with the use of benthic macroinvertabrates.

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In 23 October 2000, the European Commission adopted the Water Framework Directive (2000/60/EU). One of the principal environmental objectives of the WFD is to achieve at least “good ecological status” for all European surface water types until the end of 2015. In order to meet this requirement, all member states are mandated to assess their ecological quality, through the usage of biological parameters, serving as pollution indicators. In Greece, the standardisation of the addressed methodology for assessing the ecological status of inland waters, is still in preliminary stage. Likewise in Crete the implementation of WFD, faces some additional difficulties resulting from the high spatial differences in morphologic, climatic, and hydrographic features of the island. The study of river Mouselas represents our second attempt to meet the requirements of the WFD for permanent streams in Crete. Two sampling sites were selected for the purposes of the present study. One at the upstream, serving as an undisturbed by human activity reference station, and one downstream, representing the impaired part of the stream. Benthic macroinvertebrate fauna was assessed seasonally, for one year. The ASTERICS software (produced by AQEM project) was utilized to assess the ecological quality of the stream. According to our results, which are in accordance with the results already achieved by the study of our first permanent stream, some biotic indices and metrics, among the hundreds included into the software, showed a better correspondence to the actual ecological conditions of the streams.

Seasonal population fluctuation of Orthoptera in grassland areas at Athens International Airport.

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During 2007 and 2008 an insect sampling survey took place in two areas with low vegetation at Athens International Airport, in order to study the seasonal population fluctuation of the Orthoptera species present. The most abundant species both at the east and the west side of the airport's perimeter were *Calliptamus barbarus barbarus, Dociostaurus maroccanus, Pezotettix giornae, Decticus albifrons* and *Platycleis affinis affinis*. At the west side perimeter area, high population density was found also for the species *Tettigonia viridissima*. At the east side of Athens International Airport perimeter, *Calliptamus barbarus barbarus* appeared from April to October, while at the west side from May to September. *Dociostaurus maroccanus* was present from April until the beginning of July at both sides of the airport perimeter. *Pezotettix giornae* appeared at the east side from the end of April until November, while at the west side from May to October in 2007 and by the end of April to November for the year 2008. *Decticus albifrons* was present at the east perimeter from the end of March until May, while at the west perimeter from April to mid-June. *Platycleis affinis affinis* appeared from April to June at the east side in 2007, and from April to May in 2008, while at the west side from March to June in 2007, and from March until the beginning of August in 2008. *Tettigonia viridissima* occured only at the west perimeter from the end of March until the end of May in 2007 and from March to beginning of June in 2008.

Spatial demarcation of a contact zone between two highly divergent mtDNA lineages of the brown hare *Lepus europaeus* in Northeastern Greece.

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The European brown hare of the Balkan Peninsula comprises two divergent phylogenetic clades with discrete geographical distribution. In order to localize their contact zone we studied hare samples collected in areas where the two mitochondrial DNA (mtDNA) lineages occur in sympatry. Specimens from throughout northeastern Greece were assayed for lineage assignment and phylogenetic inference by sequencing a part of the mtDNA control region while their genetic profile was further elucidated through the use of 10 microsatellite loci. Bayesian analyses and simulated genotypes were used to detect individuals of hybrid origin. Based on this analytical framework we were able to define the spatial distribution pattern of the two highly divergent groups and to identify the genetic barriers present in the area of their co-existence, which allowed precise localization of their contact zone. The results showed that the two mtDNA clades tend to occupy different habitats, a fact that could be attributed to differences in their ecology and/or behaviour. Microsatellite data analysis enabled identification of hares which were probably the offspring of hybridization events between individuals of the two divergent groups over many generations. The information provided by the two types of molecular markers yielded consistent results regarding the position of the contact zone. The results of the present study add interpretive power to the diversity patterns observed today in the Balkans and highlight aspects of the species biology that need further assessment.

Biological georgraphy of the European seas: results from the MacroBen database.

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The hypothesis tested is whether biogeographical / managerial divisions across the European seas can be validated by the use of soft-bottom macrobenthic community data or not. For this purpose five faunal groups were used: all macrobenthic fauna polychaetes, moluscs, crustaceans, echinoderms, sinpuncula and all the last 5 groups combined. The following criteria were used in order to test the discrimination power of the above groups: (1) proximity, which refers to the expected closer faunal resemblance of adjacent areas relative to more distant ones; (2) randomness, which is a measure of the degree to which the inventories of various sectors can be considered as a random sample of the inventory of the next largest province in the hierarchy of georgraphic scale; and (3) differentiation, which is a measure of the uniqueness of the pattern. Results show that the only group which fulfill all the criteria are polychaetes and the only marine division system supported by the analyses is the one proposed by Longhurst (1998). The interactions between the planktonic and benthic domains, acting over evolutionary time scales, can be associated with the macrobenthic multivariate pattern. Biodiversity MDS reveals that the polychaetes produce a unique pattern when all systems are under consideration. Biogeographic patterns suggest a vicariance model to have advantages over the founder-dispersal model one.

Population genetic structure and conservation implications of green turtle *(Chelonia mydas)* in the eastern Mediterranean using mitochondrial and nuclear DNA.

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The herbivorous green turtle is distributed in tropical and subtropical waters and nests on beaches of five continents. Major nesting sites of *C. mydas* in the Mediterranean are in Turkey and Cyprus. Turkish and Cyprus beaches comprise approximately 99% of the nesting sites of *C. mydas* in Mediterranean. Despite the importance of the Turkish and Cyprus beaches for nesting of *C. mydas,* there has not been any detailed population and conservation genetic studies carried out. Therefore, we have aimed to determine the genetic structure of the *C. mydas* populations in the six nesting beaches along the Turkish Mediterranean cost and one in the Northern Cyprus using sequencing of the control region of the mitochondrial DNA (mtDNA) *(n*= 225) and six microsatellite loci *(n*= 424). A total of six mtDNA haplotypes determined and three of them were identified for the first time. Only one mtDNA haplotype named CM-A13 were predominant and found in 216 hatchlings from different nesting beaches. On the other hand, microsatellite data analysis showed a strong genetic structuring among individuals from different nesting beaches studied. Results indicate that mtDNA divergence was low for identification of genetic differentiation and female natal phylopatry, but mikrosatellite data revealed genetic structuring among the individuals from the nesting beaches studied, hence showed males are phylopatric. Overall results are indicating that green turtle populations nesting in the eastern Mediterranean have suffered bottleneck or colonization event.

Breast muscle loss during migration over large ecological barriers in a small passerine (Garden warbler *Sylvia borin)* during spring migration.

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During long-distance flights, birds except from fat catabolize also protein, which results in structural or functional loss as protein is stored in organs. In this study we investigated breast muscle size in relation to body mass in Garden Warblers *Sylvia borin* before and after crossing the Sahara desert and the Mediterranean Sea in autumn and spring migration, respectively. Breast muscle size was measured by molding the shape of the muscles from birds alive. Samples were collected on the Greek island of Antikythira during spring after the barrier crossing and on Crete during autumn, where Garden Warblers prepare for barrier crossing on their southward migration. Breast muscle size on Antikythira was significantly smaller than the equivalent size measured on Crete. In spring the breast muscle size was correlated with body mass while in autumn no such correlation was evident. The positive correlation between breast muscle and body mass can be regarded as adaptive as decreasing body mass requires less mechanical power. During extended flights, when fat reserves are not enough, the use of protein can also be a lifeline to reach the destination. The lack of any association during autumn implies that the increase of breast muscle, as a preparation for the migratory journey, takes place before the last stopover.

Why are there so many species and high densities of raptorial birds in Dadia National Park, Thrace, Greece?

Catsadorakis G.
WWF Greece

The potential reasons underlying the high diversity and abundance of raptorial birds in DNP are explored with emphasis on influences at larger temporal or spatial scales. Published and unpublished data are synthesized with evidence from a regional-historical analysis of biogeography, climate, geology, topography, location and human history and their effects interpreted at successively larger scales and relative to neighbouring ecosystems, habitat patches and ecological zones. In terms of food resources, the DNP's unique features are unusual reptile densities and the century-old availability of carcasses in the wider area; in macro-spatial terms these are the proximity to the River Evros floodplain and the Evros Delta ecosystem as well as its location in a transition zone between hilly and wooded country of intense relief and low-lying, flat and tree-less plains and croplands and on a major migration route for raptors. In terms of nesting habitats, unique in the region are the presence of extensive mature pine woodland combined with a network of rocky outcrops and two large cliffs as well as a fine-grained landscape structure. From an energetic cost aspect, highly important are the favourable flight conditions owed to the areas' topography and in terms of landscape structure, the heterogenous landscape mosaic, resulting to short distances between nesting and feeding patches. The extremely low human population density in the wider area is used to explain low disturbance and preservation of the mature forests which are attributed to the geographic location and the topography of DNP particularities in a regional scale.

The effect of shellfish aquaculture on benthic community structure of Maliakos gulf.

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The impact of shellfish aquaculture on the benthic environment was investigated seasonally at a mussel farm *(Mytilus galloprovincialis* L.) of Maliakos Gulf, between October 2007 and July 2008. Two stations were sampled. The first was located at the centre of the mussel farm and the second at a distance of 500 m from the mussel farm center, referred as farm and control site, respectively. At each sampling station, sediment samples were collected for organic carbon, organic matter and benthic community parameters analysis. Sediment at the farm site was mainly composed of clay (57.08%), while at the control site was mostly silty clay (99.44%). Statistical analysis showed no significant differences between organic matter (range 11.11-12.13%) and organic carbon (range 2.41-4.18%) for all sampling stations and seasons. Furthermore, significant differences showed between species evenness ($p<0.05$) and Shannon-Wiener index ($p<0.05$) among sampling stations and seasons. Cluster analysis based on Bray-Curtis similarity index indicated the presence of two major Groups at the farm site and three major groups at the control site with 70% and 69% similarity, respectively. Gastropods *Turritella communis* and *Turritella* sp. was the most dominant species at both sites. Furthermore, *Bittium reticulatum* and *Leiocapitellides analis* was found at the farm site and was almost absent at the control sites. The opposite was observed with *Apseudes latreilli* and Cymothoidae. In all cases the farming of mussels had little effect on benthic communities compared with effects of finfish aquaculture.

Advances in spider taxonomy in Greece: does the number of species linearly increase with progress of taxonomic insights?

Chatzaki M.

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When God created spiders, it seems that he was really inspired! Within 109 families, 3,733 genera and 40,700 species a spectacular diversity of morphologies, ecological trends and ethological characteristics are included, so that these creatures may dominate in almost every terrestrial ecosystem. Like many other invertebrate groups the order suffers from severe specialists decline and from the new trends of modern biology that want taxonomy to be the “poor relative” in the big family of scientists. Hence a great part of this rich fauna is yet to be discovered especially in areas of high rates of biodiversity. The contribution of new scientists to the better species richness estimation on a regional level goes without saying. Material collected from new areas gives the first source to experts contributing to the knowledge of the species diversity of various organismal groups. Evidence also is provided from new techniques currently under intense progress, e.g. molecular systematics and population genetics. However the idea that this kind of studies does actually just increase the absolute number of species on a regional catalogue is not accurate. Data collected from previous work of the author is used to show that in moderately or poorly studied areas such as Greece, the actual number of species may hardly change although the total value of revising species groups, genera or families remains invaluable in solidifying species catalogues and making them reliable and available for all sorts of other studies in biogeography or ecology entailing the evolutionary history of organisms.

Preliminary results of polychaetes composition and distribution between two rocky sites in the northern part of Crete.

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Two locations, one in Alykes (central part of northern Crete) and another in Elounda (eastern part of northern Crete), extending to the depth of 25m, with hard substrate, have been sampled annually over two successive years (2007-08). The two locations differ in the level of wave exposition: the Alykes receive much higher water energy levels than Elounda and the sea bed slope in Elounda was twice more steep than in Alykes. Five sampling depths (1, 5, 10, 15, 20m) and five replicates in each depth were taken by means of a suction device after scraping a 25x25cm surface by using a rectangle plexiglas frame attached to the substratum on one side, and with a net of 50μm mesh size net mounted on its other side. Abiotic parameters such as temperature light intensity and current acceleration were measured by installed loggers (1h time intervals). All samples sorted into five major taxonomic groups (polychaetes, mollusks, crustaceans, echinoderms and varia). However this study focused only in polychaetes. Thirty two families have been identified from 200 samples and so far five families have been identified down to species level. The results show differences between the two sites not only in the species composition but also in the species distribution among the sites and depths. No significant differences have been recorded between two sampling years.

Evidence for a Eastern Mediterranean reservoir of genetic variability in the grooved carpet-shell clam *(Ruditapes decussatus)* and other marine species.

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The grooved carpet-shell clam is an infaunal bivalve mollusc that lives in sandy bottoms along the coasts of the Mediterranean Sea and the Eastern Atlantic. We have studied the DNA sequence polymorphism of the mitochondrial COI gene, and length polymorphisms and RFLP in six introns, in eleven populations sampled from the whole species range. Sequence polymorphism of mitochondrial DNA showed two clades with a divergence of 2%. One clade was present in all populations, while the second clade was present in only two eastern Mediterranean populations. Intron markers showed 2-4 alleles. The most common alleles of each locus were present in all the populations. All markers showed significant genetic differentiation among populations. Three introns exhibited high Fst values (0.209-0.299), which in two cases were due to a high genetic differentiation between the Atlantic and the Mediterranean. Significant Fst (0.026-0.212) values were also recorded for the Mediterranean populations at all the intron markers, which in four cases were best explained by genetic differentiation between the western and eastern basins. Some alleles at the two loci that most contributed to genetic differentiation appeared in intermediate frequencies in the eastern Mediterranean populations, but were absent from all the rest. All these results suggest the existence of a phylogenetic break in the eastern Mediterranean populations of the grooved carpet-shell clam. This and other similar studies point to the eastern Mediterranean and the Black Sea as important reservoirs of genetic variability of marine Mediterranean species.

Temporal and spatial genetic diversity of the edible decapod crustacean *Nephrops norvegicus* (Linnaeus, 1758).

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Nephrops norvegicus (L.) is a highly important fishery species, justifying the recent interest as a new candidate for aquaculture production. VNTRs were used as a molecular genetic marker in order to investigate the genetic stock of Norway lobster populations in Northern Hellas. Four populations from Pagasitikos Gulf (PG 2005, 2006, 2007, and 2008), two from Toronaeos Gulf (TG 2006 and 2007) and one from North Evoikos Gulf (NEG 2005) were sampled; 519 individuals were genotyped in total. Allele frequencies were computed using six polymorphic microsatellite loci. Only a few loci conformed to Hardy-Weinberg expectations, hence there was little evidence for genetic structuring temporally. Norway lobster populations exhibited a significant heterozygote deficiency (F_{IS} = 0.204), slightly higher than those reported in previous genetic studies. The analysis of allelic frequencies revealed high levels of genetic polymorphism, maybe due to the technique used, although molecular variance within the studied populations was significantly higher (85%) than among them (15%). Values of Nei's genetic distance demonstrated this genetic diversity between populations spatially. The presence of genetic substructuring of the species, probably due to the existence of subpopulations, was also confirmed by the mean value of the standardized variance in allelic frequencies (R_{ST} =0,148). However, the estimated average value of gene flow between populations was high enough (N_m =1,441) to imply near-panmixia among them. Furthermore, a significant increase of the N_e estimates in PG 2008 compared to the previous year's ones, was notable.

Preliminary results of the concentrations of heavy metals in the sea cucumber *Holothuria tubulosa* and its surrounding sediment in Pagasitikos gulf.

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The aim of the present study was to determine the concentrations of heavy metals (Cd, Cu, Cr, Ni, Fe, Pb & Zn) in the holothuroid *Holothuria tubulosa* and its surrounding sediment from the upper sublittoral zone in Pagasitikos gulf. Samplings were carried out by SCUBA diving from 2 locations, on a monthly basis. From each site, 6 individuals and a sample from the surrounding sediment were collected. Each individual was dissected in order to acquire the body wall, haemal system and to separate the gut from its contents. Atomic Absorption was used to determine the concentrations of the heavy metals in the different body compartments, the alimentary content and the surrounding sediment. The correlation between the different concentrations was investigated along with other data available from other studies in the surface sediments of Pagasitikos gulf, in order to evaluate the potential use of the species as a bioindicator.

Molecular DNA Variation in *Hyla savignyi* at Various Breeding Sites in Northern Israel.

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A genetic study was carried out on tree frog *(Hyla savignyi)* larvae from habitats of different locations and altitudes in northern Israel. Cytochrome *b* and 12S were amplified for sequencing and used for the assessment of genetic variation by RAPD-PCR. The nucleotide sequences of the DNA fragments were determined from a 255 bp clone of cytochrome *b* and a 320 bp of 12S. The cytochrome *b* fragment varied at several nucleotide positions among *H. savignyi* populations of various breeding sites. Among populations, there was a high genetic identity, 98.4-100%, as revealed by nine sequences of each location that were analyzed by Arlequin software. According to this analysis, the Dir-Hanna Pond population had the lowest identity, compared to other populations, and Matityahu Pond was a close second. All other populations had a highly similar cytochrome *b* gene. The 12S gene sequence varied among breeding site populations, according to ten nucleotide positions. The phylogenetic trees that were constructed from the 12S sequences demonstrated that Fara Pond, the most northwestern breeding site, differed the most from the other populations, with Leshem, Jauda and Elrom Ponds following, respectively. There were 5-14 identical bands, according to the OPA-16 primer, and 7-14 identical bands according to the OPA-18 primer. When comparisons were made between paired populations using the primer OPA-16, there were 0-7 common bands, and when using primer OPA-18, there were 0–8. Some populations had a very low similarity, compared to other populations, e.g., populations from Leshem and Jauda Ponds (with the OPA-16 primer).

Evidence of niche segregation among summer active collembolan species.

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It has been suggested that the solution of the “enigma of soil animal species diversity” is that niche similarity of soil animals is only apparent and that a closer look will reveal differences that allow an effective segregation, at least in a multidimensional niche space. The aim of this work was to test this hypothesis by looking at similarities or differences in the species occurrence in time and space, as well as in the food preferences of each species. The study is limited to the warm-dry period. 12 pitfall traps were set in an abandoned olive grove at monthly intervals. The ground cover around each trap was recorded, as well as the distances to the nearest shrub and tree trunk and whether the trap was located in a concavity or a convexity. Sub-samples of the specimens were selected at random to investigate their food preference. The spatio-temporal preferences of the species were investigated by means of partial Canonical Correspondence Analysis. The preferences for the food items recorded were compared between different species by means of non-parametric tests. One species could clearly avoid the rest by reaching its maximum abundance during the driest period. Limited segregation in space occurs, however it seems not to be environmentally dependent, at least in the meter-scale that was considered in this study. The species that face the highest spatio-temporal overlap are the better segregated ones with respect to food preferences.

The ecological requirements and threats of the Greek SPAs trigger species.

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The definition of the ecological requirements and threats of the avifauna is essential in order to assign compatible activities and conservation measures in a protected area. Moreover, the overall objective of the EC Habitats Directive (43/92/EEC) is to achieve and maintain Favourable Conservation Status for all habitats and species of Community interest. Therefore, in order to make more efficient the management of the Greek SPAs and achieve Favourable Conservation Status, the trigger species ecological requirements and threats were determined. The methodology comprised of the determination of the Greek trigger species list, the reviewing of the literature and the categorization of habitats and threats. The BirdLife International categories of habitats and threats that are mentioned in the Monitoring Important Bird Areas guidelines were used. After that, an appropriate datasheet was created and filled in for each species. The outcomes of this procedure were imported in a database that has been designed for this purpose. The results indicate that the major threats for the trigger species are agricultural intensification and pesticides, human disturbance and natural system modifications (e.g. water management). However, some groups of species like raptors have more specific threats such as poisoned baits or human persecution.

The phylogeography of *Scolopendra cingulata* (Chilopoda, Scolopendridae) in Greece.

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The genus *Scolopendra* (Chilopoda, Scolopendridae) is distributed in the tropical regions as well as the Mediterranean area and Central Europe. As far as Greece is concerned five species have already been described, namely *S. cingulata* and four species belonging to the *canidens* complex *(S. canidens, S. clavipes, S. cretica* and *S. dalmatica)*. In many cases it is hard to distinguish the species belonging to the canidens complex using morphological characters. In this work our aim is to explore the phylogeographic pattern of *S. cingulata* in Greece, using molecular tools. A total of 43 insular and mainland populations were included in the study. In order to reconstruct the evolution of the species in the specific area sequence data was produced for 3 mtDNA loci and phylogenetic trees were inferred based on the produced sequence data. The results of the phylogenetic analysis supported the presence of at least two separate clades for the Greek region, one accommodating populations from the eastern Aegean islands, northeastern Greece and southern Cyclades and one hosting populations from the northern Cyclades islands and the remaining ones from continental Greece. There is a strong indication that what is currently considered as *S. cingulata* could actually be composed of more than one taxonomic groups. With the completion of our data set and the inclusion of the remaining *Scolopendra* species of the Aegean, we expect to obtain a more clear perspective on the phylogenetic relationships of *S. cingulata* with its con generic species and reconstruct the evolution of the “true” *S. cingulata* in the study area.

A Checklist of Birds of Greece.

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The Hellenic Rarities Committee

Several lists of the birds of Greece can be found on books or internet sites. The only reliable one today is in maintained by the Hellenic Rarities Committee hosting on internet page of Hellenic Ornithological Society. The need of one official and updated list of birds of Greece is obvious. Here we present an official list with all species and subspecies of birds having recorded in Greece and its waters with their seasonal status. We follow the most recent and widely recognised taxonomic changes. The list present all 442 species with 4 of them have no recent records and 2 of them being recently introduced and stabilized.

Presence of multiple mtDNA lineages of wren in Greece.

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Europe harbors two divergent (2.5%) lineages of wren mtDNA. One lineage is widespread across Europe, the other is restricted to the Caucasus. Although Caucasian forest is isolated from European forest by grasslands to the north and the Black Sea to the west, a strip of forest extends from the Caucasus to Greece along the southern shore of the Black Sea. This habitat corridor creates the possibility for secondary contact which is further supported by the presence of two subspecies of wren in Greece. *T. t. troglodytes* occupies continental Greece and *T. t. cypriotis* breeds on the southernmost islands from Crete to Rodos. The status of populations on Lesvos and Samos is uncertain as they appear intermediate. To test for presence of the Caucasian lineage in Greece we sampled 52 wrens in Europe, Caucasus, Rhodopes, Crete, and Lesvos and sequenced mtDNA ND2 gene. Eight of 9 Rhodope wrens carried European mtDNA. One wren from Rhodopes and all three from Lesvos carried Caucasian mtDNA. Two haplotypes identified among four wrens from Crete were sisters and closely related (0.1%) to the European clade. Pairwise Fst values were not significant for Europe-continental Greece and Caucasus-Lesvos comparisons but were significant in all others. AMOVA strongly supported division of our sampling localities into three groups (Europe/continental Greece, Caucasus/Lesvos, and Crete) which explained 92.36% of variation in our data. Therefore, we found three distinct mtDNA lineages in Greece and identified Rhodopes as a contact zone between Caucasian and European lineages.

Population genetic structure of Eleonora's Falcon *(Falco eleonorae)* in its breeding range based on microsatellite data.

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Eleonora's falcon *(Falco eleonorae)* is a migratory raptor of high conservation concern which breeds on islands in the Mediterranean Sea and Eastern Atlantic, with a vast proportion (more than 80% of global population) breeding in Greece. Population genetic variation among 21 colonies of Eleonora's Falcon in Greece, Croatia, Tunisia, Sardinia as well as the Balearic and Canary Islands was investigated using microsatellite markers. In total 652 individuals were genotyped at 12 microsatellite loci which were previously identified in Peregrine Falcon *(Falco peregrinus)* and Gyrfalcon *(Falco rusticolus),* 8 of which proved to be polymorphic in Eleonora's Falcon. The genetic structure was assessed by F-statistics and Bayesian Inference. Although no clearly defined genetic population structure was detected among 15 breeding colonies in Greece, low but statistically significant population differentiation was observed among different geographic regions of the species' global breeding population range. The results of the present study together with those of the LIFE Nature project "Conservation measures for *Falco eleonorae* in Greece" have important implications for the conservation of Eleonora's Falcon in Greece as well as throughout its breeding range.

Spatial distribution models for the Lesser Kestrel *Falco naumanni* in central Greece.

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Integration of statistical models with powerful tools such as Geographical Information Systems (GIS) and Remote Sensing (RS) allows researchers to investigate the relationships between environmental attributes and species over extensive temporal and spatial scales, using data that could not be collected only by field work and monitoring The lesser kestrel, Falco naumanni, is a globally threatened bird species that, in Europe, is mainly restricted to the Mediterranean Basin. The aim of the present study is to identify environmental attributes related with lesser kestrel occurrence and to build spatial distribution models for the species. The study area is located in Central Greece. It consists of agricultural land dominated by cotton and cereal fields, open hilly areas with grasslands and is surrounded by mountains. During the breeding seasons of 2005 and 2006 the distribution of lesser kestrel colonies was mapped. Habitat data were derived by satellite image processing. Predictive models were developed using Generalized Additive Model (GAM) and Random Forest (RF) classifiers with the species presence/absence data and environmental information derived by RF and GIS. All statistical analyses were performed using the R-statistical environment. There are 86 lesser kestrel colonies within the study area. Seven land use classes were extracted from the image analysis; including irrigated and non-irrigated fields, scrubland, grassland, forest, water cover and urban areas. Both GAM and RF showed that lesser kestrels mainly selected areas with non-irrigated fields. Prediction performance of the models was high. Dry cereal cultivations are the main habitat of lesser kestrels in Central Greece. Such agricultural areas, which support rare species, are considered as 'high-nature-value farming systems' and are of great importance for the preservation of biodiversity in Europe.

Geographic variation of mating behaviour and reproductive biology in the simultaneously hermaphroditic land snail *Cornu aspersum.*

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Cornu aspersum (former *Helix aspersa)* is a simultaneously hermaphroditic and obligatory outcrossing terrestrial gastropod. The diversity of its behavioral reproductive traits provides indirect evidence for the operation of sexual selection in this species. Furthermore *Cornu aspersum* is a species with broad geographic distribution and hence its populations occupy a variety of different habitats which in Greece are found along an environmental gradient from the North of Epirus to the most southern islands of the country. We have studied mating behavioural traits (mating propensity, mate and mating numbers, copulation duration, duration of intermating intervals and period between mating and oviposition,) and reproductive traits (fecundity, hatching success and offspring survival) in several populations of *Helix aspersa* from the island of Crete and in one population from Epirus. Observations and measurements were performed on adult snails of unknown mating history collected from the field and allowed to mate freely in laboratory conditions. Our results indicate that climatic variation could potentially generate variation in mating and reproductive success, in the intensity of sexual selection and the type of traits selected. Furthermore differences among populations could be interpreted as local adaptations but might also be caused by phenotypic plasticity. Phenotypic variances in reproductive and/or mating success define the boundaries within which sexual selection can act.

An altitudinal study of the malacofauna on two mountains of Crete (Greece).

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High mountains and intense relief characterize Greece, making the country one of the most mountainous regions of Europe. Although molluscs have been studied in Greece for the last two centuries there are very few papers dealing with the ecology of land snails in greek mountains. The aim of this work is to study altitudinal diversification and phenology of land snails. We focused our study on two mountains of Crete; Dikti mt., on the eastern part, with its highest peak Spathi reaching 2148m and Lefka Ori mt., on the western part, with its highest peak Pachnes reaching 2453m. We collected land snails on the northern part of each mountain, at four sites of different altitude, namely 400m, 800m, 1200m and 1600m -1800m a.s.l. From August 2008 to June 2009 land snails were collected every month from all sites. At the highest sites snails were collected only when it was not covered with snow. After the identification of all species we looked into the effect of the altitude to the number and composition of species in each site. The total number of species and the number of species per altitude does not differ significantly between the two mountains. Nevertheless, the number of species reduces as we move higher on both mountains.

Seasonal variation of foraging activity and habitat use by bats of Crete.

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The seasonal variation of climate and food abundance is a major challenge for bats of the temperate regions. All species “allocate” the most demanding stages of their annual cycle in the warm period, while during winter they spent a considerable amount of time in daily torpor, or long-lasting hibernation. Although the use of torpor is supposed to vary with respect to latitude, only a few studies have documented this hypothesis. The foraging habitat preferences of bat species vary with respect to their ecomorphology and the food availability in each habitat type. The feeding ecology of several bat species has been studied extensively in mainland Europe and the USA, but knowledge on island populations is generally lacking. In this study we performed broadband acoustic surveys in olive groves, oak forests, shrublands, villages and rivers, in order to assess the presence and activity levels of each bat species, during summer and winter. The most abundant bat species were *Pipistrellus kuhlii, P. hanaki, Hypsugo savii* and *Tadarida teniotis*. Total bat activity was significantly reduced during winter, but this trend was not followed by all species, or in every habitat type. The highest species richness and total activity was recorded in rivers and forests, but habitat preferences varied between species. The newly discovered *Pipistrellus hanaki*, a species endemic to Libya and Crete, depends largely on *Quercus* forests with old trees and thus, this habitat type deserves special management. Rivers are also of crucial importance for foraging bats and they should be protected accordingly.

Comparison of the spatial composition of the sandy midlittoral community in the organically polluted area of Alykes Kitrous (Thermaikos Gulf), between 1976 and 2003.

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This study aims at describing the spatial composition of the community of the sandy midlittoral substratum, as well as to investigate the effects of the pollution of Thermaikos Gulf on its composition. For this reason, in July 1976 and July 2003, double faunal samples were taken along one transect extended from the upper to the lower midlittoral zone at Alykes Kitrous beach, Pieria. At each sampling position, the sediment was collected with a 50 cm^2 core sampler, placed down to 30 cm depth at 2 cm intervals. In 1976, the characteristic community of *Donacilla cornea* and *Ophelia bicornis* was present, with *Eurydice affinis, Scolelepis squamata, Saccocirrus papillocerus,* and *Pisione remota* having high abundances. On the contrary, in 2003 this community appeared disorganized with the abundances of *Donacilla cornea, Eurydice affinis, Scolelepis squamata* and *Saccocirrus papillocerus* being approximately one order of magnitude lower, and *Ophelia bicornis* and *Pisione remota* absent from the community. Furthermore, the quantitative and qualitative composition as well as the vertical distribution of meiofauna, were significantly different between 1976 and 2003. Changes in the diversity of the whole community as well as changes in the vertical distribution of the species within the sediment are given and discussed in relation to the ongoing pollution in Thermaikos Gulf.

Habitat Features and Conservation Status of Mountain Trout, *Salmo trutta macrostigma* (Duméril 1858), in Mediterranean Freshwater Systems of Turkey.

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Mountain trout, *Salmo trutta macrostigma* (Duméril 1858), is a native and economically important fish occurring in many parts of Anatolia, but as isolated populations. This subspecies is important in sportive fishing and locally also in folk medicine. By 80s habitat degeneration due to agriculture, tourism and industrial activities resulted in declines in local populations. Despite official legislations, principally due to habitat destruction and overfishing severe declines in local stocks are increasingly reported throughout the country. To assess the populations, samples were collected periodically during several excursions between 2003 and 2008 from main rivers and streams flowing into Mediterranean Sea between Fethiye (Muğla) and Erdemli (Mersin). Used methods included electroshock, angling and net sampling. As population size and habitat areas were too small for sampling in most stations, presence-absence data were recorded via observation only and population analysis couldn't be made. On habitat features, observatory notes and instrumental measurements were also taken for each sampling stations. According to the study, together with illegal angling, direct and indirect effects of rainbow trout farming, water scarcity, urbanization, pollution hydroelectric power stations and irrigational structures were determined as the adverse factors affecting the habitats and populations of this subspecies. Globally categorized as DD by IUCN, this subspecies is determined by ourselves to be listed as EN B1b (i,ii,iv,v)+2b(i,ii,iv,v) for the study area.

The new Red List of the Threatened Birds of Greece.

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The IUCN Red List of Threatened Species is widely recognized as the most comprehensive, objective global approach for evaluating the conservation status of plant and animal species. The methodology for the classification of the species is based on the evaluation of each taxon against a range of quantitative criteria. Meeting any of these criteria qualifies a taxon for listing at a certain level of threat (Critically Endangered, Endangered, Vulnerable). For a national assessment there is a second step that comprises the application of the regional criteria in order to downgrade or upgrade, if necessary, the initial category. Hellenic Ornithological Society completed the assessment of the Greek avifauna applying the IUCN methodology. The project was implemented in collaboration with the Hellenic Zoological Society in the context of updating the Red Data Book for the Greek Fauna. In total, 121 bird species were assessed and 62 of them were classified as threatened. Out of these, those under threat are mainly birds of prey and wetland birds. Most of the species were classified as Vulnerable while 10% of the assessed species were classified as Data Deficient. 15 species have worse conservation status (e.g. Egyptian Vulture) than the one they had in the previous assessment (1992). On the contrary, species like the Dalmatian Pelican and the Pygmy Cormorant have improved their conservation status due to the conservation actions implemented in the last years. Consequently, the elaboration of the Red List is in itself a valuable tool to identify the threatened species and point to the appropriate conservation actions planning.

Distribution, habitat and morphological variability of the land snail *Cornu aspersum* Müller, 1774 in Tunisia.

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The Mediterranean land mollusk *Cornu aspersum* presents a conspicuous shell polymorphism, especially in North Africa leading to the recognition of several endemic forms like *C. a. aspersa* and *C. a. maxima* which have been recognized as subspecies on the basis of molecular markers and quantitative characters. The subspecies *aspersa* is an anthropochorous form present in many countries having a Mediterranean temperate climate, where it can establish as a pest for orange groves (California, Australia). Around the Mediterranean basin and in North Africa, populations of *C. a. aspersa* are well represented and structured in two distinct spatial entities located on both sides of Kabylia (Algeria). The aims of this study are: (i) to define the spatial distribution and the potential biota of *C. a. aspersa* on the Tunisian territory and to look for the relationships between spatial and environmental components; (ii) to distinguish between historical events and selection in shaping the spatial variation of distal genitalia and shell shape, in a phylogeographical context. 185 stations were prospected in Tunisia species was collected only in 46 sites. This land snail appears with a high variation in abundance only in the Northern part of Tunisia until the station of Maktar (lat. 36°85') but it was surprisingly absent from agrosystems located in North-eastern Tunisia. The study of spatial variation of biometric features (shell and distal genitalia measurements) carried on 287 individuals and analyzed by means of multivariate analyses, showed a significant biometrical variation. The later was observed on the basis of shell shape and the length of two genital organs and was spatially structured. Neutral but especially selective pressures seem to have modeled the geographical patterns of species distribution and biometrical variation but some unexpected results remain to be explained.

Estimating population density and abundance of the protected seahorse species *Hippocampus hippocampus* and H. guttulatus in northeastern Korinthiakos Gulf.

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Important populations of the Mediterranean seahorse species *(Hippocampus hippocampus* and *H. guttulatus)* thrive in a site of northeastern Korinthiakos Gulf (Central Greece). Seahorses have excellent camouflage capabilities, remaining virtually immobile, changing color to match their background, and having skin filaments to blend better with their habitats. Hence their detection in visual surveys with strip transects is uncertain. To make an unbiased estimation of seahorse population density and abundance, detectability has to be properly accounted for. To achieve that, a mark-recapture distance sampling methodology with SCUBA diving was developed and applied in a study area of 34.5 hectares. Twenty-eight line transects were surveyed under a stratified sampling scheme by two independent observers (point independence configuration). The estimate of average seahorse detection probability, in transects of 4 m half-width, was 0.41. *H. guttulatus* was ~4 times more abundant than *H. hippocampus*; average population density (in individuals per hectare) was 11.3 (95% CI: 5.2–24.7) for the former and 42.9 (95% CI: 25.8–71.3) for the latter species. The estimated abundance in the study area was 391 individuals (95% CI: 180–850) for *H. hippocampus* and 1478 individuals (95% CI: 890–2455) for *H. guttulatus*. The applied double observed mark-recapture distance sampling approach with SCUBA diving is proposed as an efficient and unbiased methodology for population density and abundance estimations of seahorses and other cryptic benthic species.

Anthropogenic pressure on the habitat of African Chameleon in Greece and proposed conservation measures.

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This study aims at presenting anthropogenic pressure on the habitat of the African chameleon in Greece and to propose specific conservation measures in order to ensure the future survival of the population. The habitat of the African chameleon in Greece is situated in the south coast of Gialova lagoon, in the southwest Peloponnese. Since 1945 Gialova lagoon and its surrounding area has undergone great alterations, mainly transforming maquis vegetation to arable land and constructing in the early 60s a major drainage system in an attempt to dry out the lagoon for cultivation. Modification on the natural habitat has led to the isolation of the population of the African chameleon on a restricted piece of land of only 65 ha. In the last 12 years the site has experienced an increase of tourism development adding an extra pressure on this relatively small area. Recent studies have shown that the population has experienced a delay in reproductive timing, a smaller clutch size and a shift in nest distribution since 1997. These factors were related to human disturbance and the results indicate that the reproductive ecology of the population is influenced by the interplay of habitat characteristics and disturbance levels. Human presence in the area negatively affects the population in several ways by limiting the natural habitat converting it to arable land, constructing a Canteen and attracting visitors in the centre of the nesting area, increasing mortality, deteriorating the habitat quality by frequent vehicle trespassing, decreasing food abundance. A visitor's management plan is under way by HOS together with proposed conservation measures on controlling human activities, restricting access to sensitive nesting areas and preserving the natural habitat in order to ensure the viability of the population.

Differential species richness and co-occurrence patterns of ground spider communities (Araneae: Gnaphosidae) in Eastern Mediterranean maquis.

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Spiders are a megadiverse order exhibiting high diversities in every type of terrestrial habitat, and therefore play an important role in the structure of communities and food webs, both as number of individuals and as energy consumers. These features make them ideal models in community analyses. The main objective of this study was to detect and describe the differences in species richness and co-occurrence patterns of ground spiders (Gnaphosidae) in five areas in the Eastern Mediterranean (Attiki, Samos, Naxos, Crete, Cyprus) with similar vegetation structure (dominant species: *Juniperus phoenicea, Pistacia lentiscus)* and substrate (limestone). Samples were collected bimonthly from May 2006 to May 2008, using pitfall traps. Our results show that species richness was highest in the communities of Attiki and Crete, which both displayed a pattern characteristic of continents. The high values of proportion of cumulative *α* diversity in Naxos and Cyprus is probably the result of lower species richness and the longer phenologies of representative species. The high temporal *β* diversity in all communities, except Naxos, is the result of well established communities adapted to rapidly changing ecological conditions in the Eastern Mediterranean region. Null model analyses revealed that co-occurrence patterns were random (Crete, Samos), aggregated (Naxos), weakly aggregated (Cyprus) or weakly segregated (Attiki). Abundance-based models results support a mainly stochastic, rather than deterministic, explanation for spider species abundances and assembly.

Phylogeography of Greek endemic *Trachelipus* species (Isopoda, Oniscidea).

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The genus *Trachelipus* comprises of relatively stenoecious animals living in habitats generally threatened by human activities, such as humid forest sites and riparian habitats. It includes some 50 species distributed around the Palearctic, with 8 species recorded from Greece, 4 endemic to the country. The distribution of species is discontinuous due to the increasing fragmentation of its habitats and the expansion of agricultural land and dry woodland. Projected climatic change will restrict further gene flow between *Trachelipus* populations, as dry habitats are expected to expand in Greece. Species–level taxonomy has been based on a few morphological characters, mainly the secondary sexual characters of males, exhibiting significant variation, and is controversial. Very high intraspecific genetic divergence among several populations has been documented. In this study we attempt a phylogeographic analysis of a number of populations supposedly belonging to two endemic Greek species using two mtDNA markers, aiming to identify geographic structure in the patterns of divergence among populations and to throw some light in the systematics of the species.

After total DNA extraction, we sequenced the two PCR amplified mtDNA gene fragments, namely 16S rRNA and cytochrome oxidase subunit I (COI), and calculated the genetic divergence within and among the populations studied, as well as their phylogenetic relationships. The results of the present study are compared with those from previous studies and the patterns of differentiation are discussed in view of ecological and palaeogeographical evidence.

Changes in the structure of two ground-dwelling arthropod assemblages (Carabidae – Tenebrionidae) along a gradient of vegetation structure from forest to open habitats.

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The present study examined changes in the structure of two ground-dwelling arthropod assemblages (Carabidae – Tenebrionidae) along a gradient of vegetation structure from forest to open habitats in two mountainous areas. The first area included a fir forest, a subalpine meadow and the ecotone between them. The second included another fir forest, an adjacent burned forest and the intermediate ecotone. The first aim of the study was to ascertain the presence of common structural patterns of the assemblages between these two areas. The second aim was to identify the source of the assemblages that were established after the fire. Carabid and Tenebrionid beetles were collected using pitfall traps every two weeks in each season. In both areas, higher abundances and diversities were observed in the open and ecotone habitats in relation to the forest. The burned area and its ecotone included more forest species than the subalpine meadow and its ecotone. The most common carabid in the subalpine area, *Calathus corax,* was common in its ecotone as well. On the other hand, the commonest carabid in the forest, *Aptinus lugubris,* was respectively common in the burned area. Some herbivorous carabids with high flying ability were present both in the burned area and in the subalpine meadow.

Breeding performance and population size of the Cory's shearwater colony on Strofades island complex (Ionian sea, western Greece).

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Strofades Islands consist of two small islets belonging to the National Marine Park of Zakynthos in the Ionian Sea (western Greece). This island complex covers an area of 4 km^2 and is located about 30 n.m. south of Zakynthos and 26 n.m. west of the Peloponnese. The area hosts a significant Cory's Shearwater *(Calonectris diomedea diomedea)* colony, one of the largest in Greece. A seabird study was initiated in 2007 aiming to evaluate the species' status, breeding biology and foraging and population ecology. The total population was estimated on both islets by coastal surveys, namely by counting rafts as well as by assessing the Apparently Occupied Sites (AOS) in 20 circular sampling units of 5.64m radius (100 m^2 each) according to playback experiments. The units were selected at random over suitable nesting habitat by traversing lines along the whole colony. Furthermore, from a sample of 103 nest sites that were monitored during the last two breeding seasons (2007-2008), a success rate of 0.7 chick/ nesting pair/ year was found with most nest failures occurring during the incubation stage. Meanwhile, 30% of hatchling losses were attributed to rat predation. Future research will focus on the assessment of the summer distribution of this migratory pelagic seabird, its foraging activity in space and time, and the evaluation of by-catch mortality in the Ionian Sea.

The breeding ecology of Eleonora's falcon *(Falco eleonorae)*: is it spatial or just special?

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Eleonora's falcon *(Falco eleonorae),* a medium-sized raptor of the hobby group, has long attracted scientists' attention for its unique biology and ecology. Due to the scattered pattern of its breeding areas consisting of islands all over the Mediterranean Sea and the Canary Islands, its global population is under continuous reevaluation. According to the most recent and systematic census in the framework of the Life - Nature 2003 project "Conservation Measures for *Falco eleonorae* in Greece", a total of 15,500 pairs are estimated globally, of which Greece hosts more than 80%. Consequently, the database consisting of 4-year observations from the Greek colonies presents a great challenge for a thorough investigation of the species' ecology. Although previous studies were restricted to a limited number of colonies, our objective is to assess the breeding ecology of the species from all the Greek colonies monitored during the Life project and to identify the underlying factors that influence it. At this first stage of our research emphasis is given on the breeding performance and the spatial characteristics of the regions under question considered playing a key role in it. The results are compared with past findings. Finally the outline of the analyses to follow is also presented.

Population status and conservation of the Cyprus Mouflon *(Ovis gmelini ophion)* 10 years of monitoring.

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The endemic Cyprus mouflon or Agrino has been present in Cyprus for at least 10000 years and is of Asiatic origin brought to the island by man. This sheep currently inhabits a mountainous area of 700 km^2 with its stronghold being Pafos State forest in the SW part of the island. It is the largest terrestrial mammal and a protected species under Cypriot legislation (Law for the Protection of Wild Birds and Game Species) and listed in Annex II/IV of 92/43 Habitats Directive. The Game Fund Service of the Interior Ministry is responsible for its conservation through application of a 1996 Species Management plan that is currently being updated. Actions include population monitoring, radio tracking, health monitoring, habitat (mainly water and food plots) improvements, and protection from poaching. Agrino is threatened mostly by livestock encroachment to its habitat (potential disease transmission and forage competition), poaching, feral dog predation, disturbance, habitat loss and / or deterioration mainly due to road network and incompatible forestry practises. Population dynamics are studied through systematic monitoring that includes an annual fall population count on 20 transects covering the species' range. Lambing ground surveys are also carried out in selected lambing cliffs during the end of April – beginning of May in order to assess annual lambing rates (lambs: 100 adult ewes). Other parameters that are studied are recruitment, adult sex ratios and group size. Fall population estimates for 2007 were 2947 + 686 animals whereas the ratio of adult rams: ewes: lambs were 97:100:31.

Marine alien species of Cyprus.

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Biological invasions in marine habitats represent a recognized global threat with a strong impact on biodiversity and local economies. The Mediterranean Sea is one of the most severely affected regions by biological invasions, fostered by the opening of the Suez Canal, fouling and ballast transportation along shipping lines, aquaculture, and aquarium trade. The aim of this work is to present an updated inventory of the aquatic alien species of Cyprus, based on a thorough compilation of existing information (from scientific and grey literature, technical reports, scientific congresses, academic dissertations, websites, unpublished/personal observations), that will provide a baseline account of the current situation in the island. A total of 125 marine alien species have been reported in Cyprus up to June 2009, of which 78 are considered as established, 32 as casual, and 15 as questionable or cryptogenic. Among the reported alien species, 42 were molluscs, 26 fish, 19 annelids, 15 phytobenthic species, 13 crustaceans, and 10 belonged to other taxonomic groups. The total number of reported marine alien species of Cyprus is lower than that of most of the neighboring countries in the Levantine Sea (Egypt: 212 alien species, Israel: 389 alien species, Lebanon: 262 alien species, south Turkey: 257 alien species), except Syria (119 alien species). Approximately 22% of the established marine alien biota in the Levantine Sea, has been reported as established in Cyprus, indicating that the number of marine alien species in Cyprus will probably increase in the future.

How do different measures of ecological status assessment function in coastal areas: The case study of Mytilene Straits (Island of Lesvos, NE Aegean).

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The commitment of the member states in implementing the Water Framework Directive (2000/60/EC) has triggered the broad development and use of biotic indices for estimating the ecological status in coastal ecosystems, based on benthic macroinvertebrate quality element. Although robustness seems to be a common merit in these indices, this study aims to evaluate their suitability in the ecological attributes at a particular regional scale. Quantitative samples were collected from *Posidonia oceanica* meadows and their sedimentary vicinity, covering the coastal area of Mytilene Straits (NE Aegean Sea) in the framework of an INTERREG IIIA Hellas-Cyprus Project. Sampling was designed according to the major human activities which have been identified in the area (e.g. port, waste treatment station, agriculture runoffs, aquaculture units, touristic areas). The indices AMBI, M-AMBI and BENTIX were compared against other ecological indicators and biodiversity patterns. All sampling stations were classified as "High" status by BENTIX and AMBI, but M-AMBI showed a more degraded state ("Good" and "Moderate"). The M-AMBI differentiation should be attributed to the apparent influence of this index by Shannon diversity, thus confirming its dependence to methodological and ecological factors rather than to anthropogenic disturbance. The classification of species into ecological groups seemed to correspond with a variety of other metrics applied and sufficiently captured the high ecological status in the area. However, the estimation of ecological status in coastal areas along an environmental gradient using macrophytes' biocenosis as a quality element remains a priority issue.

Reproductive biology of *Holothuria tubulosa* (Holothuroidea: Echinodermata) in the Aegean Sea.

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The Atlanto-Mediterranean holothurian *Holothuria tubulosa* Gmellin, 1788 is among the conspicuous benthic invertebrates in the shallow sublittoral zone. It is an edible species, harvested at the Aegean and utilized as fishing bait. Considering the limited information for the species, a one-year survey (June 2007 - July 2008) was carried out focusing on its reproductive cycle at Pagasitikos Gulf (Aegean Sea). Twenty to twe tyfive specimens were collected on monthly or semimonthly basis, using SCUBA diving. Each individual was dissected to remove the gonads and examined macroscopically. The gonads were stored in 10% formaldehyde for histological analysis with haem toxylin – eosin progressive stain. Each individual was assigned at one of the five m turity stages reported for holothurians, i.e. recovery, growing, mature, spawning and post-spawning. A maturity index was also calculated using the percentage contrib. tion of individuals at the various stages. The studied *H. tubulosa* population spawns from August to September. At the end of the autumn, the gonads were totally a sorbed. Recovering ovaries and testes appeared at late winter and growing gonads were prevalent during spring months. The maturity index was correlated with the se sonal variations of temperature, a fact also reported for other studied Mediterranean populations of the same or congeneric species.

Waterfowl and hunting in Greek Wetlands.

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Many Greek wetlands are important for waterfowl in eastern Mediterranean and some of them are famous hunting sites. The aim of this research was to study the waterfowl wintering phaenology and the hunting activity. It was carried out in four wetlands during the hunting seasons 2004-2005 and 2005-2006. Every 10-15 days, the number of all anatidae species and Coot *Fulica atra* was simultaneously surveyed at the study areas. Similarly, the number of hunters was surveyed and a part of them was checked on the birds they shot (number and species). The highest number of waterfowl was recorded in January and the most numerous species was Coot (26.7% of the mean number of all waterfowl) followed by Teal *Anas crecca* (20.6%) and Mallard *Anas platyrhynchos* (16.9%). The majority of Coot was distributed in Messolonghi Lagoon while Teals and Mallards mostly in Evros Delta. The number of hunters (42.3/day) and the harvest (1.5 birds/hunter/day) was related to the number of waterfowl. Evros delta was the most popular hunting site among the hunters (122.2 hunters/day) probably due to the highest harvest (1.9 birds/hunter/day). The most numerous species shot was Teal (34.5% of the birds found in the hunting bags) followed by Coot (25.5%). The former was shot mostly in Evros Delta and Kalloni wetlands and the latter in Messolonghi Lagoon. At least 10 protected species were found in hunting bags and their percentage to the total shot birds was 2.9%. It seems that hunters shoot waterfowl mostly according to its availability.

Malacological Diversity of Central Taurus Mountains (Turkey).

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This work presents results of our malacological excursion in 2008 to Sertavul-Mut area (Central Taurus Mountains, Turkey), the one least studied among regions of Taurus Mountains by malacologists. The study area, covering the heights along the tributaries of Göksu river, is characterized by deep set valleys forming high altitudinal variation and isolating the heights, while surrounding lowlands are arid and flat in topography. In the study, terrestrial and fresh water gastropod taxa and their habitats were identified and the main parameters of water quality - pH, temperature (T), TDS, O_2, saturation, velocity - in water bodies where aquatic species encountered were measured. Despite its isolated pattern and arid nature, species richness and endemism rate were found surprisingly to be rich; with 56 species/subspecies taxa nearly half (n=24, %43) being endemics or new species for science. These are distributed into 23 families and 39 genera, dominant families being Enidae, Orculidae and Clausiliidae. The fauna represents generally the fauna of Taurus Mountains proper, with an inclusion of higher rate of thermophilous elements (eg. Pupilloidean taxa). High level of endemism necessitates conservational importance of this highly degraded area.

Phylogeographic relationships of tenebrionid beetles: a response to the geographic isolation of Cyprus.

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The origin of Cyprus dates back to about 90 million years ago, being part of the complex geological history of the Eastern Mediterranean region. The isolation of the island from Anatolia had a crucial role in forming the present day fauna of Cyprus, and provides an opportunity to explore the effect of isolating events on lineages that have different habitat preferences. We studied the Phylogeographic patterns of darkling beetle lineages, which occur allopatrically in Anatolia but sympatrically in Cyprus and are also differ in habitat preferences. Specimens of two genera *(Ammobius* and *Tentyria*) from Anatolia, Cyprus and some of Aegean islands were sequenced for mitochondrial COI. The mtDNA genealogies showed some differences in the degree of genetic divergence among the lineages. Some morphological characters that are very variable at both inter- and intraspecific level are also analyzed and compared with SEM observations.

Mitochondrial DNA variation of *Testudo* complex in Turkey.

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The wide ranging *Testudo graeca* has been split into as many as 28 taxa based on morphometrical and morphological variations. However, recent molecular studies on this complex have revealed inconsistencies between molecular and morphological groupings. In Turkey, 6 taxa were described based on morphological and morphometrical data. We tied to morphology based names and studied the *ND4* region of (850bp) of mitochondrial DNA on 239 specimens in order to detect mitochondrial DNA variation of this complex across Turkey. Furthermore, 34 sequences (topotypes) were added to our original data set from genbank in order to compare our dataset. A total of 52 haplotypes were found in 239 sequences. The data of aligned haplotypes were analyzed by PAUP 4.0b10 and the evolutionary trees put forward six well supported monophyletic lineages described namely *terrestris, ibera, buxtoni, armeniaca, zarudnyi* and *africa*. Of these lineages, the first four range in Turkey. Morphology based ‘’*anamurensis*’’ and ‘’*antakyensis*’’ shared common haplotypes with ‘’*terrestris*’’ and located in the same clade called *terrestris*. Morphology based perses also shared common haplotypes with *buxtoni* (type locality Iran), thus clustered with *buxtoni* clade.

Sequence divergence might not be an impediment to mtDNA recombination: evidence from the Mediterranean mussel *Mytilus galloprovincialis.*

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Homologous recombination occurs between highly similar DNA sequences and it is widespread in all kingdoms of life. Recombination between non-homologous parts of the genome undermines genome stability. Organisms share an enzymatic apparatus for DNA mismatch repairing, which also has anti-recombinational activity to secure that recombination occurs only between sequences with high similarity. There are two requirements for the mismatch repairing apparatus to allow recombination to occur: sequence identity at the crossover points and high sequence similarity between the exchanged DNA fragments. We present evidence that these two requirements for homologous recombination are not necessary in mitochondrial DNA. Recombination in animal mtDNA, was doubted a few years ago, but is now well established. Our data suggest that recombination is common between highly diverged mtDNA lineages that coexist in the Mediterranean mussel *(Mytilus galloprovincialis).* This observation is in line with experimental results from other organisms according to which the mismatch repairing system might exist in mitochondria but its activity is much weaker than in the nucleus. We suggest that mitochondria need the repairing system to correct errors during mtDNA replication but they do not need the anti-recombinational activity of that system because they are inherited uniparentally.

Can the water quality assessment be based on typo characteristic conditions?

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From the WFD 2000/60 it is known that the assessment of the quality of surface waters can be done by the ecological quality ratio between the observed parameter value and the expected one coming from reference conditions of the same type. Typology is based on two Systems (A,B). System B uses the oblicatory abiotic parameters of System A, but not categorized, but it also comprises optional and othe alternative parameters some of which determine the structure and synthesis of biological communities. Both systems must have the same resolving power. The system A is not applicable in most of the European countries for various reasons and so in the Mediterranean Region, rivers have been divided in five types according to the System B. For these types (except for one, RM3) they have been gathered the reference benthic macroinvertebrate communities in order specific multimetric indices, for each type, to be applied for the estimation of the river water quality. The question is if benthic macroinvertebrate communities really differentiate among these types in reference conditions.

Distribution of some uncommon cephalopod species on the Hellenic continental slope (Eastern Mediterranean).

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The aim of this study is to investigate the distribution of some rather uncommon cephalopod species *(Abralia veranyi, Anchistroteuthis lichtensteini, Bathypolypous sponsalis, Brachioteuthis riisei, Chiroteutis veranyi, Ctenopteryx sicula, Heteroteuthis dispar, Histioteuthis bonnellii, Histioteuthis reversa, Neorossia caroli, Octopoteuthis sicula, Octopus salutii, Onychoteuthis banksii, Pteroctopus tetracirus, Pyroteuthis margaritifera* and *Rossia macrosoma)* inhabiting the Aegean and the eastern Ionian continental slope. Spatial and temporal differences in the species distribution pattern were examined by means of Generalised Additive Model (GAM) approaches, based on data from experimental bottom trawl surveys carried out in the framework of the "International Bottom trawl Survey in the Mediterranean" (MEDITS) carried out between 1994 and 2006. Additional data from different surveys and published records were also considered to complement the expansion of the most rarely caught mid-water decapod species in the study area. Detected longitudinal, latitudinal and depth-related gradients in the species occurrence are discussed in relation to the species ecology and the hydrological features of the Hellenic Seas.

Preliminary results on the study of the reproductive behavior of *Paracentrotus lividus* and *Arbacia lixula* in the Aegean.

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The sea urchins *Paracentrotus lividus* and *Arbacia lixula* are common in the subittoral zone of the Mediterranean coasts. Their grazing activity is well known to have a significant effect on the structure and dynamics of assemblages of species in coastal habitats, including seagrass meadows. The goal of this study was to investigate the reproductive behavior of the two species, along with different aspects of their population dynamics. Sampling was carried out on a monthly basis (December 2008 – December 2009), from two sites in Pagasitikos gulf. Forty individuals from each species were collected from each site with SCUBA diving in a depth range between 0.5 – 5 m. Size distributions were estimated by measuring test diameter without the spines and total wet weight of the individual and the gonads were recorded in order to calculate the gonadosomatic index (GSI). The gonads were stored in 70% ethanol for histological analysis with haematoxylin – eosin progressive stain and the maturity stage was determined microscopically. The reproductive synchrony hypothesis was tested by comparing the spawning period of each urchin.

Learning about populations history using approximate Bayesian computation.

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Approximate Bayesian Computation (ABC) is a recent developed Bayesian technique that can be used to extract information from DNA data. This method has been firstly introduced to Population Genetics in 1999. It relies in two major approximations: the use of a simulated step that substitutes the need for using an explicitly likelihood function; and the summarization of DNA data with a set of summary statistics. This Bayesian approach can be used to estimate several historical demographic parameters from populations using DNA data. A particular ABC method, similar to the one used by Beaumont (2007), was applied to published data of bonobos and chimpanzees (Won and Hey, 2005) that had been studied before using different flavours of MCMC (Won and Hey, 2005; Becquet and Przeworski, 2007 and Hey and Nielsen, 2007). Two data sets of human populations from the Nicobar and Andamanese islands and Central Africa have also been studied, as well as, one data set composed by 6 distinct species of spiny lobsters. The ABC studies confirm the competitiveness of this recently explored Bayesian method when compared to a standard MCMC approach. Its potential role on phylogeography and demography researches is emphasized.

Major histocompatibility complex *(MHC)* variation in the brown hare and comparison with different molecular markers.

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The MHC is a multigene family acting at the interface between the immune system and infectious diseases. Their genes are characterized by outstanding genetic polymorphism, which is thought to be maintained by positive selection. Here we examined genetic diversity of the DQA second exon locus of MHC class II within and among populations of *Lepus europaeus* in different regions of Europe and Anatolia. We aimed to an integrated population genetic analysis of the brown hare *(Lepus europeaus),* correlating MHC results with genetic variability and phylogenetic status already estimated from maternally (mtDNA) and biparentally (allozymes, microsatellites) loci. Overall, the analysis of DQA polymorphism provided evidence that the actual functional MHC polymorphism is the resultant of the action of differential forces at different levels; the fact that the number of alleles detected in each population did not increase with increasing sample size indicated that there is a limit to polymorphism retained, probably determined by the structure and regulatory elements of *Mhc* genes; geographical distance and barriers act on whole exon to generate alleles and differentiate populations at the genetic level; local selection pressures such as pathogen load and environmental conditions linked to epidemics, act to narrow genetic polymorphism to the actual functional polymorphism as inferred by the number of pocket variants; binding pockets respond differentially to selection pressure according to their role in antigen binding. The present investigation stressed the necessity of introducing functional genes in population genetic analyses since coding genes can reflect evolutionary relevant and adaptive processes within and between populations.

The update of the Greek Red Data Book of threatened fauna – summary results and trends.

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Red Data Books are useful tools for the assessment of the extinction risk of taxa at the national level. Assessment is based on internationally accepted and specific criteria relevant to various biological and ecological parameters. The threatened categories refer to the various levels of extinction risk in the wild. The update of the Greek Red Data Book is the result of the cooperation of many scientists from universities, NGOs and other institutions. A total of 166 vertebrate species (45 freshwater fish, 10 marine fish, 6 amphibians, 12 reptiles, 61 birds and 32 mammals) are listed in a threatened category. Of them 21.7% are listed as critically endangered, 30.7% are endangered, and 47.6% are vulnerable. Forty-four species are listed as "near threatened" since they will likely qualify for a threatened category in the near future. The new Red Data Book will also include 301 invertebrate species: Cnidaria (1), Mollusca Bivalvia (1), Mollusca Gastropoda (166), Araneae (30), Isopoda (48), Chilopoda (5), Odonata (4), Orthoptera (2), Lepidoptera (39), Coleoptera (4) and Echinoderma (1). Of these, 44.8% are listed as critically endangered, 20.6% as endangered and 34.6% as vulnerable. The percentage of threatened species has increased since the 1992 Red Data Book but comparisons are not straightforward since, in the meantime, our knowledge has significantly increased and the assessment criteria are different. Nevertheless, species-specific comparisons show in most cases population decrease, habitat fragmentation and deterioration. On the other hand conservation programmes when applied show positive results as is the case of the White Pelican.

The sea turtle population of Rethymno continues to decline: results of 19-year data (1990-2008).

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One of the "major" loggerhead sea turtle *(Caretta caretta)* nesting sites in Greece is the 10.8-km Rethymno beach on the northern coast of Crete. The beach is divided in several sections which differ greatly in physical features and development. Turtle nesting in Rethymno was first noted during an elementary survey of Cretan beaches in 1989. Because of its importance, the site was included in the standardized monitoring programme of ARCHELON and since then it is unfailingly monitored every season. The most severe problems on land were the destruction of nests because of sea water inundation and trampling, as well as disorientation of hatchlings due to light pollution. These problems have been mitigated, as much as possible, by relocation of nests to safer places and shading of nests left *in situ* to avoid light disturbance at night. The annual number of nests over a 19-year period (1990-2008) ranged from 516 to 166 nests, while the nesting density ranged from 47.8 to 15.4 nests/km). Since the late 90's, the annual number of nests exhibits a significant downward trend with an annual rate of about 4%. The decline is attributed to problems both at the terrestrial habitat and also at sea (e.g. incidental catch). The future outlook of this nesting population is examined according to two scenarios. The optimal scenario accepts the success of the mitigation measures and the population is expected to recover in the following years. The worst-case scenario is that this population has already collapsed and it is beyond recovery.

Differential responses of Gall-Inducing Aphids to the Foliose Lichen *Xanthoria parietina* on *Pistacia atlantica* Trees.

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Eggs of gall-inducing aphids are supposed to find protection under the lichen layer covering the lower part of the bark of *Pistacia* trees, but no quantitative data supported this assertion. The aims of this experimental research were to compare gall abundance in branches of *P. atlantica* covered and uncovered with lichen, and to learn what proportion of eggs of fundatrices diapauses on trunks. We selected 30 trees growing in the Northern region of Israel. In winter, two pairs of branches in each tree were randomly selected, marked, measured and isolated from the trunk by paper bands covered with insect glue. One branch in each pair was filed in its whole length with sandpaper to remove the epiphytic foliose lichen *Xanthoria parietina* that covered it. The surface of the lichen on the other branches was measured. In May 2009, we monitored all the galls induced on 3 terminal shoots on the experimental branches, as well as on two other branches randomly chosen in each of the 30 trees, as control. A Nested ANOVA showed that *Smynthurodes* betae West created significantly more galls on control branches than on experimental one, and more on branches covered than uncovered by lichens, indicating a strong proportion of fundatrices hibernating under lichens on branches. The three other aphid species, *Slavum wertheimae, Forda riccobonii* and *Geoica* sp. responded differently, indicating a larger proportion to diapause on trunks, and more inside bark crevasses than under lichen.

Temporal and Spatial genetic diversity of Fallow deer *(Dama dama)* on the island of Rhodes.

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Fallow deer, the flagship of Rhodes island, is the only free-ranging population of fallow deer in Greece and is protected by law. During and following the Second World War, both its population size and distribution range have been decreasing, as a consequence of over-hunting and of big fires that exploded over the island. Although the last years, fallow deer population size seems to be growing and its distribution range expanding to its former range, the population decline of past decades could have resulted in a loss of genetic diversity. Genetic diversity is valuable for species potential to respond to environmental changes, and its assessment is an essential element for efficient management in the conservation of small populations. Here we present, the results of the analysis of 9 microsatellites and address the following questions: a. Are there any changes in the patterns of genetic diversity between present and past populations of fallow deer? b. Is there evidence for spatial genetic structure in the present population? c. Could the captive bred population of fallow deer, in the city of Rhodes, be considered as genetic stock? d. Based on a mitochondrial DNA analysis, Rhodian fallow deer seem to be a genetically distinct population. Does microsatellite analysis support these results?

The current status of the Golden Jackal *(Canis aureus)* in Chalkidiki and Peloponnese, Greece: did the extensive fires of 2006-07 affect the species?

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In Greece *Canis aureus* displays a widespread but discontinuous and fragmented distribution. Chalkidiki and the Peloponnese are two regions, in northern and southern Greece respectively, where the species still holds subpopulations. An ongoing reduction of the jackal population has been reported since the 70s, attributed mainly to habitat and land use changes, as well as to massive legal persecutions. Moreover, both of the surveyed regions suffered extensive fires during the summer periods of 2006 and 2007, which caused great changes to landscape structure. The present study aims to update the information on current distribution and minimum size of the jackal population in Chalkidiki and Peloponnese, and evaluate the impact of fires to the species survival. The survey was carried out from June 2008 to July 2009, using mainly the method of acoustic stimulation, which included broadcasted howls played at night, at specific calling stations, under the best possible conditions. A total of 25 areas of jackal presence were detected in Peloponnese, with southern Peloponnese hosting the most cohesive and numerous population clusters. Ahaia shows the most fragmented cluster pattern, and the jackals have nearly disappeared from Ilia and Argolida prefectures. In Halkidiki, 3 large areas of jackal presence were determined, allotted to the 3 smaller peninsulas of the prefecture. Compared to the most recent research of 2001, a declining trend of the overall population is evident in both regions. Uncontrolled use of poisoned baits; direct executions; and gradual abandonment of husbandry and stock-raising seem to be the major reasons for this decline. Fire did not seem to be a determinative factor, especially in the areas where regeneration of vegetation was rather fast and unhampered.

Spatial and temporal patterns of molecular and phenotypic diversity of populations of Merodon albifrons (Diptera, Syrphidae) from Chios and Lezbos islands.

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Studies of genetic diversity of spatially and temporally fragmented population of hoverfly taxa (Diptera, Syrphidae) will give us an in-depth understanding of microevolutionary processes. To reveal the role of islands in diversification of hoverfly taxa, spatial and temporal patterns of molecular and phenotypic diversity of metapopulations of *Merodon albifrons* (Diptera, Syrphidae) were studied. The genetic and phenotypic intra- and interpopulation diversity of two metapopulations of *M. albifrons* from Chios and Lezbos islands (Greece) each was examined through protein electrophoresis, DNA sequencing and geometric morphometrics. Variation among genetically diverse individuals was studied both within- and among studied populations, and directional (DA) and fluctuating asymmetry (FA) were estimated using landmarks in the framework of geometric morphometric methods. Additionally, comparison of levels of asymmetry estimated in populations from the two islands was done. Finally, linkage between levels of asymmetry (and developmental instability) and genetic heterogeneity was discussed. Acknowledgement: Fieldtrip was financed by the Entomological Society of Helsinki, Finland. This work was supported by the Ministry of Science of Serbia, Grant Number 143006B and the Provincial Secretariat for Science and Technological Development (Maintenance of biodiversity – “Hot spots” on the Balkan and Iberian Peninsula). Lj. F. is supported by a PhD fellowship from Ministry of Science of Serbia.

Molecular phylogeography of the common dormouse, *Muscardinus avellanarius,* in Europe.

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The common dormouse, *Muscardinus avellanarius* is naturally rare in Europe. Recently, natural scarcity has been exacerbated by anthropogenic environmental damages. This specie is now regarded as rare or endangered, attracting conservation related research and active habitat management to assist its survival. Furthermore, obligatory thermophilous species are probably more affected by cold phases than cold-tolerant organisms. The evolutionary history of the common dormouse would therefore show significant differences compared to other species. To better understand the genetic variation and structure of this species, we developed a phylogeographic study based on sequences of 700 base pairs of the mitochondrial DNA cytochrome b gene from 102 specimens collected throughout its palearctic distribution. The obtained dataset was analysed using different phylogenetic reconstruction as well as other methods adapted to phylogeography. The analysis of the mtDNA reveals a number of surprises. The results show two major genetic lineages: the first corresponding to the Western and Italian populations; the second comprising the Balkan and the Northern populations. Furthermore, the analyses tend to propose a scenario of multiple refugia in the Italian peninsula. This pattern of 'refugia within-refugia' has important implications in interpreting the distribution patterns of genetic diversity within the southern peninsulas. The Calabria region and Sicily could be "hot spots" of intraspecific biodiversity of *Muscardinus avellanarius.* These regions would thus deserve attention when deciding Evolutionary Significant Units ("ESU) for conservation of this species.

Yellow-legged Gull Movements Monitoring Programme of the Athens International Airport "Eleftherios Venizelos".

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Collisions of birds with aircrafts have caused extreme costs in loss of human lives and millions of euros of property damage and therefore pose a serious threat to human and air traffic safety at many airports all over the world. The Yellow-legged Gull *(Larus michahellis)* is the most common and wide-spread larid in the Mediterranean and its numbers have dramatically increased over the past decades, causing significant impacts on human interests. Among these impacts, the existing population of Yellow–legged Gulls in Attica and adjacent regions is considered to be a significant risk of bird strikes on aircrafts at Athens International Airport (AIA). For the past two years (2008-2009) Athens International Airport "Eleftherios Venizelos" and the Hellenic Ornithological Society (HOS) have been implementing a monitoring project on Yellow-legged Gulls movements in the region of East Attica. The objectives of this programme are to identify main flight routes and most frequent habitats of the Yellow-legged Gull as well as the interaction of the species with the operation of AIA. HOS systematically surveys the vicinity of the airport, monitors feeding and bathing sites, and undertakes other initiatives. This study reports on the development and preliminary results of the aforementioned monitoring study, in particular regarding routes and habitat use.

Intraspecific genetic variation and phylogeography of the oak gallwasp *Andricus caputmedusae* (Hymenoptera: Cynipidae) from Anatolia.

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Physical barriers and major climatic oscillations of the Pleistocene are of enormous importance for distribution of many animal taxa and shaping their current population genetic structure. Anatolia was one of the main corridors for postglacial colonization of Europe and it is characterized by rich biodiversity. In this study, intraspecific genetic variation and phylogeography of an oak gallwasp species, *Andricus caputmedusae,* was investigated using PCR-RFLP method. A 2540 bp mitochondrial DNA region covering ND4, ND4L, tRNAThr, tRNAPro, ND6 and a part of cyt b gene was amplified and the amplicons were digested with eight restriction enzymes including HinfI, ClaI, HindII, MboII, VspI, ApaI, SspI and PstI. A total of 32 haplotypes were determined among 26 populations of *A. caputmedusae*. Analyses showed that a high amount of genetic variation was present in the oak gallwasp populations across Turkey. The average haplotype and nucleotide diversity within populations were 0.4643 and 0.102166, respectively. The average nucleotide diversity among populations was estimated as 0.222603. Results also show that some hotspots and refuge areas are present for *A. caputmedusae*. Haplotypes of *A. caputmedusae* were geographically divided into three phylogenetic assemblages including East Anatolia, Southeastern Taurus and West Anatolia. AMOVA analysis indicated that high levels of genetic variation were attributable to within populations (47.97%) and within groups (38.56%). The timing of the nucleotide divergence along with the geological history of Anatolia suggested that both the Pleistocene fluctuations and some geograhic barriers shaped the current population genetic structure of *A. caputmedusae*.

Post-fledging dispersal and settlement of the Bearded Vulture *(Gypaetus barbatus)* in the island of Crete.

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We investigated the dispersal pattern of 6 young Bearded Vultures in the post-fledging period during 2001-2006 in Crete. Our aim was to investigate their wandering stage and determine the ecological requirements for their settlement. Ultimate goal was to produce a habitat suitability map with priority areas for conservation. Birds' were captured at nest and were monitored through radiotelemetry with the use of VHF and GPS transmitters. Home range and space use data were analysed by the aid of maximum entropy theory and geographical information systems. Young birds abandoned the nest on average at 30 April (range= 5 April –20 May) when about 122 days old. The dispersal flights initiated 102±37 days (range= 50-154) after fledging while settlement took place during September- November. Excluding the natal territory the 75% home range was estimated at 2000 km^2. Juvenile Bearded vultures selected areas of specific landscape, climate and habitat features indicative of inaccessible high-altitude areas. Distance to roads and villages, wind speed, rugged terrain and bare soil proved to be the best predictor variables for their occurrence. Our results confirm that the species is susceptible to disturbance and revealed that juveniles occupy sites where flight and foraging behaviour are facilitated. Moreover, they preferred regions with low adult density presumably in an effort to avoid competition. Food availability possessed a low predictive value for settlement areas, most probably because birds often performed long exploratory trips in search of food before returning to places suitable for roosting and soaring.

Genetic diversity of some *Solea solea* populations along the southern shore of the Mediterranean sea using allozymes and EPIC-PCR markers.

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The characterization of the genetic variability of Mediterranean fish species populations, especially potential candidates for aquaculture, allows a better assessment of the existent genetic resources, a better knowledge of Mediterranean stocks with a rational management of those intended for pisciculture. *Solea solea* is among the most important Soleidae species because of its high economic value. This species was a subject of choice for population genetics studies with various molecular markers. However, these studies were limited to the Atlantic and the north shore of the Mediterranean. We propose in this work to analyze the spatial structure of populations of Solea solea along the southern shore of the Mediterranean in order to estimate the gene flow between populations. Two hundred ninety individuals of this species were collected from the Tunisian and Moroccan coasts. The study of genetic diversity between and within population was made using two types of markers: enzymes and EPIC-PCR. Seven allozymic loci and four intronic loci were polymorphic. The results yielded for both types of markers were congruent. A departure from of panmixia for all populations was highlighted. These analyses do not indicate a clear structure for the Mediterranean populations of *Solea solea.* The transition zone, the Siculo-Tunisian Strait, between eastern and western Mediterranean basins, do not seem to affect the structure of the existing *Solea solea* populations in the Mediterranean sea.

Comparative phylogeography of darkling beetles (Coleoptera: Tenebrionidae) in the central Aegean archipelago.

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This study reports a comparative phylogeographic analysis of multiple co-distributed darkling beetle lineages in the central Aegean archipelago based on both mitochondrial *(cox1, rrnL)* and nuclear (Mp20, 28S) gene markers. Extensive sampling was conducted along a transect spanning from the East coast of the Greek Mainland to the West coast of Turkey and including 28 central Aegean islands. Phylogenies of 16 widespread genera were reconstructed and recently developed DNA-based species delineation methods were applied. Total and within-island nucleotide diversity was calculated and local genetic differentiation was measured using ΦST and hierarchical AMOVA. Molecular dating techniques were employed to test for simultaneous divergence across the mid-Aegean trench. The results show great differences in diversification patterns among taxa, which can be largely related to flying ability and habitat preference. The observed patterns are consistent with: high levels of ongoing gene flow in winged taxa; frequent local extinction and island recolonisation in flightless sand-obligate taxa inhabiting ephemeral coastal areas; very low gene flow and a strong geographical structure largely defined by the palaeogeographic history of the region in flightless geophilous lineages, associated with phrygana and maquis. Most flightless geophilous taxa are deeply subdivided along the mid-Aegean trench with estimated divergence times corresponding to the initial formation of the trench at 12-9 Mya, but with a few notable exceptions. In some genera the currently used species names do not appear to reflect the diversification processes in the archipelago and taxonomic revisions will be required.

Investigating species co-occurrence patterns.

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The use of null models in the study of community assemblage is a well-established technique in community ecology aiming to identify significant patterns that need explanation. In null-model approaches a metric is calculated from the observed data (usually a presence-absence matrix) and is compared with the respective values derived from random matrices constructed from the observed, according to certain criteria. Species co-occurrence (or mutual exclusion) is an important phenomenon, often studied with such methods. Our aim is to explore a number of available community data for significant co-occurrence of species pairs and to compare these results with similar approaches at the whole matrix level. We use COOC, a software working on the output files of the Co-occurrence routine of the well-known community analysis software Ecosim, identifying significantly deviating (co-occurring or segregated) species pairs. We investigate some 250 datasets, choosing the fixed row-fixed column sums and the sequential swapping algorithms for producing random matrices, and we compare our results with those from the C-score index. Significant patterns of co-occurrence or mutual exclusion are present in a minority of cases, whereas most communities assemble in a manner consistent with randomized expectations. There are inconsistencies between the results at the species pair level and those at the whole matrix level, indicative of the inherent complexity and difficulty in evaluating such patterns. We offer a discussion on the respective conceptual and technical issues.

Threatened species depending on dead wood in unmanaged and harvested forests: lessons from bats and beetles.

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We assessed habitat requirements in the endangered barbastelle bat *(Barbastella barbastellus)* and the long-horned beetle *Rosalia longicorn (Rosalia alpina),* both depending on dead wood and occurring in beech forests of central Italy. We examined two neighbouring areas: one was made of unmanaged or lightly managed stands *(U),* the other was subject to commercial harvest *(H).* The species were syntopic in *U. B. barbastellus* was frequent there: the area constituted a main maternity site. We radiotracked bats to their roost trees, mostly snags with loose bark. *R. alpina* were found on 6.1% of 668 suitable trees examined in *U.* Although *R. alpina* used several types of decaying or dead trees, including logs, snags as those preferred by *B. barbastellus* were frequently used: in some cases both species were found to be using the same tree. In *H, B. barbastellus* were less frequent and females were rarer. Few bats roosted there, and those doing so proved flexible, using live trees and even rock crevices. *R. alpina* did not occur in *H* but we recorded a tree in a nearby pasture whose colonization probably resulted from dispersal from other unmanaged areas. We emphasize that the conservation potential of harvested forests for these species should not be overlooked, and that *ad hoc* mitigation strategies could be easily adopted. At least small numbers of dead trees should be retained in logged areas to encourage colonization and to increase landscape connectivity by creating stepping stone corridors. The Abruzzo, Lazio and Molise National Park funded this study.

Use of forest canopy by European red squirrels *(Sciurus vulgaris* L.) in northern Greece.

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Mammalian arboreality is usually exemplified by the behavioral and anatomical specializations of primates, but it appears that other orders may and can perform equally well. In this report, we used arboreal Eurasian red squirrels to test whether non-primate arboreal mammals can utilize adequately the wide range of available arboreal microhabitats. The study was carried out in Panorama (central Macedonia, Greece) in a mixed-conifer forest. We observed a total of 4 adult squirrels from February to May 2009, collecting focal bout data on behavior and habitat use. Squirrels were found at a mean height of 11.6 m, mainly moving in the lower canopy (52.3-53.8%). They made extensive use of tree peripheries (58.6-61.5%) and utilized intermediately rough branches (52.8-71.1%). Finally, they equally used all branch orientations and showed a preference for supports <2cm in diameter (45.9-57.9%). The results show that arboreal squirrels, although they do not possess the suite of characters that epitomize arboreality (i.e. the primate radiation) can exploit the forest canopy in a comparable manner. Such observations help substantiate the evolution of morpho-behavioral complexes within early sciurids, and can help reconsider the ecological context of the emergence of the order Primates sensu largo.

A new zoogeographical rule.

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Over 13 thousands of spring arrival phonological data for 18 bird species were collected on the European territory of the former Soviet Union. The observations on 857 points were conducted in the different years of XX century. Due to statistic analysis the coefficients of variation (C.V.%) of bird spring migration beginning were clarified for each species in all points of observation. As a result, it occurs that the measures of variation are changing in accordance with the geographical latitude: the higher latitudes, the less variation in each species. Along with well-known Allen's, Bergmann's and Gloger's rules this one is the fourth zoogeographical rule considering warm-blooded animals.

Morphometrics and phenetic analysis of the species *Scolopendra cingulata* Latreille, 1829 (Chilopoda: Scolopendridae) in East Mediterranean.

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Scolopendra cingulata Latreille, 1829 is the commonest scolopendromorph species distributed in the Mediterranean area and central Europe. A morphometric study of *S. cingulata* was conducted to discern biological entities and to estimate the morphological relationships among populations from Balkans, Asia Minor-Middle East and Italy. Data of more than five hundreds specimens was examined using a set of 25 quantitative characters. Morphometrics were examined and analysed statistically. In addition, a phenetic analysis of these characters was applied using the Syn-Tax program. Preliminary results showed morphometrically notable differences between and within populations. Most characters such as body length, cephalic width, cephalic length, 21st tergite width and 21st sternite length revealed significant differences between sexes towards higher mean values in females. In males and females from Turkey and Middle East the mean length of 21st tergite median sature was longer than that from Balkans and Italy. Moreover, both Balkan and Anatolian populations showed higher mean values of antennal articles and spurs of 21st prefemur than the Italian. In a shorter geographical scale, when data from mainland and insular Greece was compared statistical test showed significant differences towards higher mean value of spurs on maxillipede trochanteroprefemoral process and higher mean length of 21st tergite median suture on populations from Dodekanisa. However, no significant geographical pattern was detected from major clades produced by the phenetic analysis. Based on certain morphometric differences among the three major geographical regions (Asia Minor-Middle East, Balkans, Italy), we suggest that *Scolopendra cingulata* introduded into central and east Mediterranean from more eastern regions.

Age-specific use of an artificial feeding site by Eurasian Black Vulture *(Aegypius monachus)* in Dadia-Lefkimi-Soufli National Park.

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A supplementary feeding program has been implemented in the Dadia-Lefkimi-Soufli National Park for more than 20 years as a management measure for the conservation of the Black Vulture population, which is the unique breeding population in Greece and the Balkans. Age–specific variation on the use of the feeding site was studied in order to investigate the seasonal dependence of this population from the artificial food. We studied a sample of the maximum 57 marked Black Vultures with patagial tags for the period 2004-2008. A total of 387 monitoring days was devoted to record weekly the marked birds at the feeding site after the food disposal. Seasonal use of the feeding site was evaluated by one-way ANOVA using percentage of occurrence of different ages per year. During the studied period, a mean of 12,58±8,260 marked individuals was count per monitoring day and the maximum number per age class was 9 juveniles, 15 immature and 18 adults. The maximum annual numbers of marked birds has been recorded at the feeding site during autumn. Juveniles were present during three seasons - autumn to spring - with the higher percentages in winter. Immature occurrence showed a different pattern within the years from a similar annual pattern to a seasonal annual one although spring was always higher. Adults appeared to use the feeding place more intensively in summer and autumn. The species' age occurrence seems to be depended on seasonal natural food availability, breeding activities and erratic movements of the non-breeding individuals.

What makes a late anchovy larva?

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Hatching, yolk sac absorption and metamorphosis have long been considered as significant developmental transitions in the early life history of fish, at which ecological interactions take a new course. No other developmental milestone has been recognized so far as being important for population level processes. However, this contradicts empirical studies that indicate that, when a significant positive correlation between ichthyoplankton abundance and subsequent recruitment to the adult population exists, this involves the 'late larval' rather than the egg and early larval stages. In this study we provide evidence, based on field collected data and a literature survey, that the stage of notochord flexion (NF) (characterized by the upward flexion of the urostyle, the development of the hypurals and first appearance of caudal fin rays) might be an important event in the early life history of engraulids associated with changes in capabilities and requirements of the developing organism. An analysis of morphometric characters in anchovy *(Engraulis encrasicolus)* larvae collected from the Aegean Sea indicated a significant change in multivariate allometry at NF, with a marked increase in allometric growth of tail width and eye diameter. First appearance of swim-bladders, the inflation of which is considered to trigger the onset of vertical migration and subsequent schooling behavior, occurs at NF. This is further supported by a length-specific analysis of spatial patchiness (Lloyd's patchiness index) based on data from broad-scale ichthyoplankton surveys in the Aegean Sea; after the onset of NF (i.e., >6mm preserved length) anchovy larvae exhibited higher patchiness during the day- than during the night-time. The literature survey further supported these field observations indicating that the NF in European anchovy is associated with the start of nychthymeral migrations, the increase in otolith growth, the change in prey selectivity and an increased ability to evade plankton nets. The NF (development of the tail) might be an important developmental milestone in engraulids (and possibly other fish families) that has generally been overlooked.

Thermal ecology of the lizard *Podarcis cretensis:* thermoregulatory strategies adopted by 5 populations and the contribution of ecological parameters.

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Thermoregulation is an active process by which ectotherms maintain their body temperature close to a target range at which their performance tends to be optimal. Lizards regulate their body temperatures mainly by behavioral means. The extent of thermoregulation is influenced by the thermal heterogeneity of their habitat, as well as the presence of predators and competitors and the availability of food and retreat sites. The aim of this study was to define and compare the thermoregulatory strategies adopted by five populations of the recently described lizard species *Podarcis cretensis* (Squamata: Lacertidae), endemic to Crete and satellite islands, during two seasons (spring and summer 2007). For this purpose, we collected field body temperatures of active lizards, along with the available operative temperatures and used a laboratory thermal gradient to estimate each population's selected temperature range. Based on these data, we calculated indexes of precision, accuracy and effectiveness of thermoregulation, along with the index of the habitat's thermal quality. According to the results, all populations proved to be active thermoregulators and achieved higher accuracy and effectiveness of thermoregulation during summer, while their thermal preferences did not vary significantly. *P. cretensis* seems to adjust its thermoregulatory strategy according to the conditions prevailing: In habitats where thermal restrictions are increased, it thermoregulates effectively despite the associated costs, while in mild environments and if other ecological restrictions are increased, it adopts a rather conservative thermoregulatory strategy. In all cases, it seems that the type of habitat has an impact on the species' thermoregulatory strategy.

Molecular studies on *Merodon* hoverflies (Diptera, Syrphidae) of Islands Lesvos and Chios, Greece.

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Larvae of *Merodon* hoverflies (Insecta, Diptera: Syrphidae) develop in underground parts of bulb plants (e.g. Liliaceae, Amaryllidaeceae). The islands of Lesvos and Chios, 3rd and 5th largest Greek Islands comprise ample and diverse undisturbed habitats and rich geophytes flora thus facilitating life history studies of this insect taxon. Our longtime faunistical studies on *Merodon* spp. hoverflies occurrence on the Lesvos and Chios Islands included several collecting methods and repeated visits to all habitat types, and revealed a high taxonomic diversity of the hoverfly taxon on the islands. The mitochondrial cytochrome c oxidase sub-unit I (COI) gene has been used extensively in phylogenetic studies due to the ease of primer design and its range of phylogenetic signal allowing the discrimination at the species level and the identification of cryptic species. We test if COI barcodes show sufficient genetic divergences thus being valuable for identification of *Merodon* taxa of Lesvos and Chios. We compare and discuss the faunal compositions of genus *Merodon* and of the islands and present available results of COI haplotype diversity screenings and phylogeography for chosen populations of the *Merodon* species common to both islands, and evaluate the utility of COI barcodes in discovering morphologically cryptic species of the genus. We were particularly interested to elucidate whether island size was reflected in the observed levels genetic diversity of the species' of this taxon.

Distribution and secondary contacts of amphibians in Greece and Eastern Europe – similarities and differences of phylogeographic patterns in green toads *(Bufo viridis* subgroup) and tree frogs *(Hyla arborea* group).

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The Eastern Mediterranean contains several important biogeographic sub-regions and major Pleistocene refugia. Greece is a meeting zone of faunal elements of Asia Minor and of Balkan Peninsular origin. Within two ongoing projects, we analyze mitochondrial sequences from green toads *(Bufo viridis* subgroup; mtDNA D-loop) and tree frogs *(Hyla arborea* group; mtDNA Cytochrome *b*) in a phylogeographic framework in order to delimit their ranges and contact regions in the Eastern Mediterranean and Eastern Europe. We focus on the current state of investigation on the Greek mainland and some Aegean islands. In both species groups, western Greece, Crete and some western Aegean islands are colonized by mitochondrial lineages that also occur on the western Balkan Peninsula and stretch into Central *(Bufo v. viridis)* or even Western Europe (Hyla arborea), while eastern Macedonia, Thrace and the eastern Aegean islands are phylogenetically close to clades of Asia Minor origin *(B. variabilis, H. orientalis).* In Greece, the *Bufo variabilis* lineage progressed westwards and reached the Peloponnesus in the south and Albania in the north. Thus, mitochondrial haplotype groups of green toads *(viridis and variabilis)* on the Greek mainland show geographic overlap in the Macedonian and western provinces and thus demonstrate secondary contacts with possible hybridization. Our data are not sufficient yet to reveal potential contacts of tree frog lineages in northeastern Greece and the Aegean islands. To the north of Greece, the Carpathians represent a major barrier for tree frogs: west of this mountain range occurs exclusively the *H. arborea* haplotype group, to the east of the Carpathian Arc solely that of *H. orientalis,* which also inhabits the entire rest of the Eastern European Hyla range. Similarly, on the territories of Bulgaria and Romania, the Carpathians form the border between *Bufo viridis* in the west and *B. variabilis* in the east. However, in contrast to *Hyla*, the lineage of West-Carpathian origin *(B. viridis)* also spread eastwards into a large range comprising the Ukraine and western Russia (i.e. north of the Black Sea), which is flanked at its eastern and western edges by two apparent northwards progressions of the *variabilis* lineage. Namely, one colonization northeast of the

Caucasus from where *variabilis* reached northern Central Asia and a second advance between the Carpathians and the Black Sea, where it is present in Byelorussia, the western Ukraine and the Baltic Republics, and also colonized most of the Baltic Sea distribution range. In both, tree frogs and green toads, besides Greece in the south, eastern and western lineages have a second opportunity to meet north of the Carpathians in northeastern Europe. We have preliminary evidence for contact and possible hybridization of tree frog lineages in northeastern Poland, and we have narrowed down the geographic distance between both haplotype groups of green toads in Romania and northeastern Poland. Thus, southeastern European tree frogs and green toads exhibit apparently common refugia (Balkan Peninsula, Asia Minor) from where they took similar Postglacial colonization routes to the north, west and east of the Carpathian Arc, leaving potential for secondary contacts south and north of this mountain range.

Distribution and Abundance of the Chaetognath Species in the Cilician Basin (Eastern Mediterranean).

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Species composition, abundance and distribution of chaetognaths in coastal and pelagic waters of Cilician Basin (Eastern Mediterranean) was investigated at 28 sampling stations in November 2005, March 2006, July 2006 and January 2007 based on samples obtained by vertical hauls with a Hansen Net (0.30 mm mesh size) A total of thirteen species was found: *Flaccisagitta enflata, Mesosagitta minima, Serratosagitta serratodentata, Serratodentata sp., Sagitta bipunctata, Ferosagitta galerita, Parasagitta tenuis, Pseudosagitta lyra, Krohnitta subtilis, Flaccisagitta hexaptera, , Mesosagitta decipiens, Mesosagitta* sp. and *Spadella* sp. *Flaccisagitta enflata* occurred at all sampling stations in all sampling periods. Total chaetognath abundance in coastal stations was found higher than pelagic stations. Highest mean chaetognath abundance was observed in March 2006 (14.819 m^{-1}), while lowest values occured in November 2005 (5.904 m^{-1}). Differences in abundance among the months were statistically significant ($p< 0.01$).

Effects of elevation and habitat type on arthropod community structure (Carabidae – Tenebrionidae) in two mountainous areas from Southern Greece.

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This study assessed changes in diversity and assemblage composition in soil insect communities (Coleoptera: Carabidae and Tenebrionidae) along altitudinal gradients. The importance of altitude in shaping these communities and their diversity was examined at different habitat types including maquis, forests, subalpine and alpine areas, in order to separate the effects of habitat type and elevation. The study was carried out at two mountains in the Peloponnese in an altitudinal range between 800 – 2200m. Carabid and Tenebrionid beetles were collected using pitfall traps, at 7 consecutive monthly intervals. Elevation and habitat type are the most important factors influencing insect communities; however the trophic habits of species seem to play an important role. Distinctive differences in diversity and abundance were observed between altitudes and habitat types. Similarities among assemblages in different biotopes were generally low, especially between closed and open habitats, the latter showing higher abundance and diversity.

Depth distribution and abundance variations of 11 demersal species in the southern Aegean Sea.

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In the present study the depth distribution of 11 demersal species *(Mullus surmuletus, Mullus barbatus, Diplodus annularis, Eledone moschata, Loligo vulgaris, Octopus vulgaris, Pagellus erythrinus, Spicara flexuosa, Spicara smaris, Sepia officinalis* and *Boops boops)* was studied. We used an abundance index (Kg/Km^2) from 11 years (1996-2006) of experimental bottom trawling in a pre-defined network of 60 stations at depths ranging from 20 to 800 m in the southern Aegean Sea. The non-zero values of the index were modeled using Generalized Additive Models in the R programming environment. Except from the haul depth, the year was also used as a predictor variable of the index in order to account for temporal variations in abundance. The resulting models explained 8-38% of the total variation in abundance. Depth was statistically significant for almost all species at the 99% significance level (for *Diplodus annularis* it was significant at the 90% level) as a descriptor of abundance, whereas the temporal variation was in most cases insignificant (with the exception of *Loligo vulgaris).* For most species the abundance declined as depth increased in a linear *(Diplodus annularis, Loligo vulgaris, Mullus barbatus, Mullus surmuletus)* or more complex pattern *(Boops boops, Octopus vulgaris, Spicara flexuosa, Spicara smaris).* Even more complex patterns of bathymetric distribution were observed for *Eledone moschata, Pagellus erythrinus* and *Sepia officinalis.* The findings of the present study confirm those of similar studies in the Mediterranean and can be used for the rational management of these stocks.

An evolutionary comparison of Greek gobies and their parasites.

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Greek waters and the eastern Mediterranean in general, are a centre of goby endemism. The phylogenetic relationships within the goby taxa are still under discussion. Since morphological and embryological knowledge points to the need of revising their systematics, we want to add new approaches to the analysis, namely molecular phylogeny and parasitology. Monogenean flatworm species are widespread on body and gills of European Gobiidae, but no data are available for the eastern Mediterranean gobies. We collected parasites of gobies from a wide habitat range including marine, brackish and freshwater systems, mostly (but not exclusively) from western Greece. Morphological (mainly based on the opistohaptor) and molecular phylogenetic analyses (using ITS rDNA) of those parasites provide information on their diversity and speciation patterns, and this was compared with species described from other regions of Europe. Furthermore, we can use the flatworms as a tool to study their hosts' evolution and learn about the history of connectivity and separation among goby species. By constructing a molecular goby phylogeny (based on mitochondrial rDNA), we are able to compare the evolution of host and parasite and trace events of co-evolution or parasite transmission. Though the focus will be on Monogenea, another abundant ectoparasitic taxon on gobies (Copepoda) will be briefly discussed in relation to diseases affecting wild goby populations in the region.

Phylogeography of the striped red mullet *(Mullus surmuletus* L.) inferred from microsatellite markers.

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The red striped mullet *(Mullus surmuletus)* is a species of considerable economic importance in fisheries. It is naturally distributed from the north-west coast of Africa and the Atlantic Ocean to the Black and the Mediterranean Seas. Using an enrichment protocol, a set of microsatellitecontaining sequences was isolated and novel pairs of primers were designed and assessed on a *M. surmuletus* population, as well as on four other species of the Mullidae family *(M. barbatus, Upeneus moluccensis, Pseudupeneus prayensis, Mulloidichthys martinicus).* Furthermore, twentyone *M. surmuletus* populations sampled from the North Sea to the Syrian coast were genotyped using a multiplex of 6 microsatellite loci. Analyses strongly suggested the quasi-absence of genetic structure among the populations of *M. surmuletus* from the Atlantic Ocean and the Mediterranean Sea. Assignment analyses provided evidence of three statistically differentiated genotype clusters ($p<0.05$) in every *M. surmuletus* population. Extensive gene flow and/or a recent population expansion could explain the observed population patterns.

The impact of wind farms on raptors: A case study in the island of Crete.

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The impact of a wind energy project on upland raptors was assessed in Crete during 2007-2008. The study was the first if its kind in Greece since it investigated the wind farm's post-construction effects on the avifauna. Overall birds were monitored over 300 hours producing a total of 592 bird sightings. 2094 individuals of 21 species were recorded with the Bearded Vulture *(Gypaetus barbatus),* the Griffon Vulture *(Gyps fulvus)* and the Golden Eagle *(Aquila chrysaetos*) being the most significant. Griffons used the wind farm daily and proved to be most susceptible to collisions with turbines. They showed signs of habituation with 20% of their flights being avoidance, though the existence of livestock in the surrounding as well as within the park proved fatal for three individuals. Direct observations and telemetry showed that vultures affected came from as far as 30 km away, while general linear models indicated that weather conditions (mainly cloudless and wind speed) were crucial for bird wind turbines interactions. A collision risk model and a population viability analysis predicted respectively a mortality rate of three griffons per year due to the wind farm and a rather stable population provided that other mortality causes (mainly poisoning) remain trivial. One feasible technique to alleviate the problem would be the safe site selection and land planning and the proper set out of turbines.

Ecological Tragedy of Dried Lakes in Western Turkey: The Avlan Lake Example.

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Discharging the waters of Avlan Lake by artifical tunnels, all the fish and bird fauna were lost in 1978. After drying of the lake native endemic fishes found in the lake *(Scardinius elmaliensis, Pseudophoxinus meandri, Aphanius anatoliae anatoliae)* became extinct from the area. The lake are was transformed into agricultural land and a motorway was constructed crossing the former lake area. Shortly after, due to shortage of water a decrease in productivity of the crops and desiccations in cedar forests in the basin began. But by 2004, with efforts of locals and NGOs filling was started without any significant success. In this study, further examples to the dramatical history of wetlands from Western Anatolia with the ecological and socio-economical aspects were also reviewed.

A food web consisting of alien species.

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The palm species *Phoenix canariensis* is one popular species of palms in Greece, as it is used as ornamental. The last four years the greek populations are parasitizing by the red palm weevil *Rhynchophorus ferrugineus* (Coleoptera: Curculionidae). Both organisms, plant and insect, are introduced by man in our country. The cretan population of *Phoenix canariensis* is an important one and it suffers more intensively than the others from the beetle attacks. At the same time another enemy of the palms species it was introduced, the moth species *Paysandisia archon* (Lepidoptera: Castniidae). This species was found recently, to parasitize small specimens of *Phoenix canariensis* in the garden of TEI Crete, Herakleion. If we add the uncertified presence of *Oryctes rhinoceros,* which is very similar to *O. nasicornis* (Coleoptera: Dynastidae), we can remark a food web of alien species introduced in Crete island. The polyphagous moth population in Crete, is small, another paradox, as the opposite is true for the beetle population, which according to the literature is also generalist on palms and other monocots, but in Crete is almost exclusively monophagous. As the ornamental trees of *Phoenix canariensis* don't form a compact culture or a forest, the question is if this phenomenon of transport of a food web is a common one and if it is possible to continue to exist the next decade. Of course the ability of these insect species to cover the distances between the scattered *Phoenix canariensis* was necessary for this phenomenon, but the disappearance of some patches may be will change the situation.

Diet of the Rook *(Corvus frugilegus)* in urban and rural areas during the breeding season.

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There have been several confirmed breeding records of Rook *(Corvus frugilegus)* in parts of northern and central Greece since the middle 1990's. Although the quality and the quantity of the food are closely related to the choice of the breeding site and the breeding success, up to now there were not enough data about the rookeries in Greece. The aim of this study is to describe the diet of the Rook during the breeding season in two different habitats (urban and rural). The diet of the Rook was studied by the analysis of pellets. In April 2004, pellets were collected from two rookeries in Macedonia. The first rookery was in urban area (at the center of Thessaloniki) and the second was in rural area (near to Niseli Imathias). Differences were found in the diet of the Rook between the two sites. The Rooks in the rural site were feeding mostly on an animal diet and in a lesser extent on a plant diet, in contrast with those in the urban site. Although the percentage of Aves in pellets (12.0%) was higher in urban environment, no Mammalia were found in this sample. The percentage of Mammalia in the rural sample was 10.7% and the Aves were 3.6%. As far as plant food is concerned, the commonest were Wheat *(Triticum sativum)* seeds.

Occurrence, Biodiversity and Abundance of Orthoptera in grassland areas at Athens International Airport.

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For two consequent years (2007-2008) an insect sampling survey took place in two areas with low vegetation at Athens International Airport, in order to study the Orthoptera species that inhabit there. In 2007 and 2008 at the east side of the airport's perimeter, 19 and 18 Orthoptera species found respectively. These species belonged to the families Acrididae, Tettigoniidae, Gryllidae and Pyrgomorphidae. According to the dominance and frequency criteria for the year 2007, most important species were *Calliptamus barbarus barbarus, Dociostaurus maroccanus, Pezotettix giornae, Chorthippus* sp., *Oedipoda miniata, Decticus albifrons* and *Platycleis affinis affinis.* In 2008, most important species found to be the same as in 2007, except *Oedipoda miniata* and *Platycleis affinis affinis* that were insignificant. At the west side of the airport, for the same period (2007-2008), 20 and 17 Orthoptera species found respectively belonged to the same above mentioned families. According to the dominance and frequency criteria, most important species in 2007 found to be the same as at the east side of the airport, plus *Tettigonia viridissima* and *Arachnocephalus vestitus.* During 2008, the most important species were the same as in 2007 except *Chorthippus* sp. and *Oedipoda miniata* that were insignificant. Species diversity and abundance were higher in 2007 at the west perimeter side of the airport, while in 2008 the opposite occurred. In 2007, both biodiversity and abundance were higher compared to 2008. The Jaccard similarity index for the two areas was higher in 2007 compared to 2008.

Temporal variability of zoobenthos inhabiting the photophilic algae community in Thermaikos Gulf (Eastern Mediterranean).

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Ecological studies of zoobenthos have been mainly conducted on soft bottoms, with very few data referring to rocky shores. In the Aegean the available information concerns the midlittoral and lower sublittoral zones; the only data from the shallow sublittoral are limited to port communities or to specific taxonomic groups. Therefore, a three-year study was conducted to assess the spatial dispersion and temporal variability of zoobenthos inhabiting hard substratum communities in Thermaikos Gulf, a eutrophic shallow-water embayment in the NW Aegean. Seasonal samples were collected at six stations (August 2001 – January 2004) using a quadrate sampler (400cm^2), at 3-5 m depth. Overall, 40,802 individuals were collected, classified to 181 species. Polychaeta was the most speciose group followed by mollusks and crustaceans; the later dominated in abundance. Two facies of the photophilic algae community were detected: beds of the anemone *Anemonia viridis* interspersed with various macroalgae, and beds of the mussel *Mytilus galloprovincialis.* These facies were spatially separated by multivariate analyses, and followed an annual temporal pattern. The loss of seasonality and the fact that many of the recorded species have been related with organic pollution indicates the low ecological quality of the area. The applicability of two biotic indices, i.e. AMBI and BENTIX, originally proposed for soft substratum, was also tested. AMBI ranged from 1.45 to 2.36 and BENTIX from 2.86 to 3.46 and classified all stations as slightly or moderately polluted, respectively. Taking into account the limited information on hard bottom further research seems necessary to clarify the biotic patterns.

Spatial and temporal distribution of zooplankton groups in the Amvrakikos Gulf.

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Amvrakikos Gulf is a large and enclosed gulf situated in the western Greece, having characteristics of a deep lagoon, since receives the discharges of the rivers Arachthos and Louros. The area has great economical (eg. fisheries, aquaculture) and ecological interest (eg. some parts being protected under the Ramsar Convention). Although there are numerous studies on the biotic and abiotic elements of this ecosystem, there is lack of recent information about the spatial and temporal distribution of zooplankton. Monthly samplings conducted in 3 stations, using a vertically towed planktonic net in 5 m intervals, between September 2008 and May 2009. The mean abundance of the total zooplankton ranged between 40.1 and 116.7 ind. L^{-1}. Copepoda was the dominant group (68.7-92.3 %), followed by bivalve mollusc's larvae, appendicularia, cladocera, larvae of polychaeta and echinoderma, and chaetognatha. There were no differences in the horizontal distribution of the zooplankton community. The integrated (0-30m) abundance distribution of total zooplankton and copepoda showed a decrease from September to May, while the maximum values for the above groups were recorded in late winter to early spring. Temperature, dissolved oxygen, pH and salinity influenced the seasonal abundance variation of certain zooplankton groups. In the vertical axis, the maximum abundance for most of the groups was recorded in the surface 0-10 m layer, while the intense reduction of the dissolved oxygen (especially in the stratification period) was responsible for the vertical decrease of abundance. The study will be extended until August 2009 to reach final conclusions.

Case study on toxicity of crude extract of Cyanobacteria for embryos and larvae of fish.

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For decades, aquatic organisms suffer from intoxications, caused by cyanobacterial toxins. Cyanobacterial blooms are a common phenomenon in eutrophicated water bodies. Microcystin LR is the most common cyanotoxin associated with mortality of aquatic organisms. Microcystin-LR is a potent inhibitor of phosphatase 1 and 2A. Fish, standing at the top of the aquatic food chain, are likely to be most affected by exposure to toxic cyanobacteria. Also, young life stages of fish are known to be sensitive to microcystins. The main effects of exposure to MCs in early life stages of fish are interferences with developmental processes and organ functions. Fish mortalities, associated with microcystins, have been observed in eutrophicated waters, all over the world. The aim of our study was to study the effects of crude extracts of cyanobacteria, obtained from Lake Pamvotis, on embryos and larvae of *Danio rerio* (zebrafish). Crude extracts of cyanobacteria were obtained from lake Pamvotis in August 2008 and analysed for Microcystin-LR with HPLC. Eggs of zebrafish (n=40 per treatment), were treated with cyanobacterial extracts, containing different concentrations of microcystins (0,0325μg/l, 0,065μg/l, 0,325μg/l, 0,65μg/l, 65μg/l). At distinct phases of development, suitable endpoints were recorded (developmental stage, malformations, mortality, growth). After termination of exposure at an age of 6 days, larvae were kept in toxicfree aquaria to monitor further development. At the age of 21 days, survival rate, body length, weight and malformed larvae (%) were determined. According, to our results, all the specimens of zebrafish treated with cyanobacterial extracts, showed embryonal mortality, decreased hatching rate, increased numbers of malformed and dead larvae and a decrease in average total length and in average mass. Abnormalities including pericardial edema, small head, curved body and tail were observed.

Spatial-temporal evaluation of the water quality based on physicochemical and biological parameters in an irrigatory system in central Greece.

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A one-year survey on the water quality characteristics of the irrigatory system in central Greece is described in this paper. The region of sampling covers a wide range of channels and ditches with a total length of 400 km. Bimonthly sampling was carried in 12 sites to monitor changes caused by the seasonal hydrological cycle. Physicochemical parameters: temperature, acidity, dissolved oxygen, electrical conductivity, total hardness, as well as nutrients and major ionic components: nitrate (NO_3^-), nitrite (NO_2^-), ammonium (NH_4^+), orthophosphate (PO_4^{3-}), sulphates (SO_4^{2-}), chloride concentration (Cl^-) were determined and their concentration levels were related to the influence from urban, agricultural and industrial activities. The water quality was also approach by a number of biotic indices for the macroinvertebrates, and fishes. Sampling, preservation and analytical protocols were conducted by standard methods for surface waters. Dissolved oxygen in the water, ranged between 0, 60 and 9 mg l^{-1}, pH values ranged between 5, 70 and 9 and total hardness values ranged between 91 and 4.416 mg $CaCO_3$ l^{-1}. The water quality was poor at many sites with high values of conductivity (range 435 -11.700 μs/cm), ammonia (range 0-11 mg l^{-1}) and orthophosphate (range 0, 01 -22, 60 mg l^{-1}). In some cases high values of nitrates (up to 50 mg l^{-1}), sulphates (up to 100 mg l^{-1}) and chloride (up to 50 mg l^{-1}) were measured. Results showed that point (industrial effluents) and non point sources (agricultural runoff) are the main contributors to organic and nutrient parameters.

Are migratory birds in the eastern Mediterranean affected by the distance of sea crossing in spring?

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Published data on bird migration over the eastern Mediterranean are rare, and this is especially evident for spring migration. In this study we compare data on body mass and wing length in six passerine species (Garden warbler *Sylvia borin,* Golden Oriole *Oriolus oriolus,* Icterine Warbler *Hippolais icterina,* Wood Warbler *Phylloscopus sibilatrix,* Sedge Warbler *Acrocephalus schoenobaenus* and Spotted Flycatcher *Muscicapa striata)* trapped on two Greek islands (Strofadia and Antikythira) during spring 2009. The mean body masses found on Strofadia were in several cases extremely low and differ significantly from values found on Antikythira for all species, except for Spotted Flycatcher where no significant difference was found. In contrast, the mean wing length did not differ between the two study sites. The lower body masses on Strofadia compared to Antikythira are most certainly caused by the longer distance to fly from North Africa. The lack of difference in the Spotted Flycatcher is probably caused by a different migration strategy. In contrast to the rest of the species in this study the Spotted Flycatcher is the only species that regularly seems to stop and fuel in the Sahara desert during migration.

Taxonomy and Ecogeography of the amphibians and reptiles of Smolikas Mountain (northern Greece).

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Smolikas (2637 m altitude), the second highest mountain in Greece after Olympus, is characterised by diverse habitats such as pine and beech forests, grassland, rocky areas and shrubland along with rivers, ponds and an alpine lake. Our study took place during 2007-2009. The study was based on daytime line transcect counts and night drives as well as, collection of dead specimens. The results of this study showed that the herpetofauna of mountain Smolikas consists of 10 amphibian species (3 Caudata and 7 Anura) and 17 reptile species (1 Chelonia, 9 Sauria and 7 Ophidia). Here, we present new distribution data for some species, distribution of species in different types of habitats and also new data about the altitudinal distribution of newts in Greece and probably the occurrence of a new lizard taxon. Additionally, comments are made on the status of threatened species.

Diversity if passerine birds in the high altitude meadows of northern Pindos national park.

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This is a first attempt of producing systematically collected data from monitoring species that live in high altitude meadows in several neighbouring mountains like Snowfinch, Alpine accentor, Rock Thrush, Alpine Cough, Yellowhammer etc, which are priority species for conservation and maybe severly affected by climate change. Transect lines and pointcount methods were used in 4 mountains of the Northern Pindos National Park: Smolikas mt, Tymphi mt, Vasilitsa mt and Mitsikeli mt. The species: Wheatear, Black Redstart and Linnet were the commonest species in the meadows. On the contrary, Water Pipit, Woodlark and Hortolan Bunting had the lowest relative abundance. On the priority species, Yellowhammer was one of the commonest birds and was observed in three mountains. Snowfinch and Alpine Accentor were both seen in Smolikas and Tymfi mountains and had intermediate densities. At last, suggestions are made on the future monitoring of the area.

The Slender–billed Curlew quest in Greece.

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The Slenderbilled Curlew *(Numenius tenuirostris),* with very few recent records globally, is listed as Critically Endangered by IUCN. In 2008 the relaunch of the international working group for the species marked a new coordinated effort to search for the bird and hopefully take conservation actions according to the international action plan. Greece is a very important country on the migration route of the species with more than one hundred records and the conservation efforts here have started since the late 1980s with two projects implemented so far. Joining this ultimate international effort the Hellenic Ornithological Society (HOS) established the Hellenic Slender-billed Curlew Working Group. All the records in Greece were re-evaluated by the Hellenic Rarities Committee (HRC) and the Scientific Committee of HOS. The data were processed by the group and used to create maps, timecharts and together with visual and audio material were distributed in hardcopies and/or were available in electronic format for download among the Greek birdwatching community as a toolkit for the quest. The first season of the project (spring 2009) did not produce any records of the species but motivated many birdwatchers and created hope for the next periods.

Assessing the impact on birds of prey of seven established wind farms in Thrace.

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A large part of Evros and Rodopi regions has been declared as a Wind Priority Area (WPA). 50% of the WPA is covered by seven Natura 2000 sites, four of which constitute SPA and two of them National Parks. The current number of wind farms (WFs) in the area (9 WF totalling 163 wind turbines (WTs) is expected to increase drastically in order to fulfil the objective of 480 typical WTs (930 MWe) set by the Greek Ministry of Environment. In June 2008 post-construction monitoring at 7 of the 9 WFs was initiated, aimed at assessing their possible impacts on birds of prey. The main objectives were to estimate a) bird utilization rates; b) collision risk; c) collision mortality and d) influence of biases which affect the ability to detect avian mortality. Bird use surveys and carcass searches were carried out, as well as trials to determine observer detection and scavenger removal rates. Preliminary results indicate the presence of species such as *Aegypius monachus, Gyps fulvus, Neophron percnopterus, Ciconia nigra* and *Aquila chrysaetos.* Evidence of four collided *Gyps fulvus,* one *Hieraaetus pennatus,* an *Aythya nyroca,* an *Alectoris chukar* and several passerines and bats was found. The preliminary observer detection rate was 0.653 ± 0.1889 (n = 45). Scavengers remove 75% of small and medium carcasses as well as parts of large carcasses (n = 16) within 14 days. The observers' detection ability seems to influence mortality estimations. Scavenger removal rates imply that carcass searches have to be done in shorter time intervals.

Zooplankton in Lake Amvrakia: species composition and abundance variation.

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Lake Amvrakia is situated in western Greece. The isolation of this aquatic ecosystem from the other lakes of the region, along with its unique conditions (lake of sulfuric type), has resulted to the presence of endemic species of microflora. However, little information exists on the zooplankton species composition and dynamics for this lake. A two-year survey (September 2006 - August 2008) in 3 sampling stations, revealed 33 invertebrate species (23 rotifers, 5 cladocerans, 4 copepods and one mollusk larva). The mean abundance of the total zooplankton ranged between 20.9 and 110.7 ind. L-1, with copepods and the larvae of *Dreissena polymorpha* constituting the most abundant groups. *Eudiaptomus drieschi* prevailed among the copepods, while *Conochilus unicornis* and *Kellicotia longispina* were numerically, the most important among rotifers and *Bosmina longirostris* and *Diaphanosoma orghidani* among the cladocerans. There were no differences in the horizontal distribution of the zooplankton community. The seasonal distribution of abundance followed a pattern according to which there was an increase in spring that climaxes during summer and a reduction in autumn, while the minimum values were recorded in the winter. A seasonal succession in the cladocera community was also recorded. In the vertical axis, the maximum abundance of the community was recorded from the surface to 20 m layer (lower range of thermocline) and was decreased with depth. The composition of zooplankton species in Lake Amvrakia appears to differ considerably from the other lakes of western Greece, possibly due to the particular character of this ecosystem.

North East Greece as biodiversity hotspot for spiders.

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The East-Macedonian-Thracian belt of wetlands situated in North East Greece provides a large habitat diversity that entails high species richness. The Nestos Delta - part of the wetland belt - is situated in East Macedonia, covering about 250 km² and is the geographical focus of this study. The aim of the present study is to analyze the biogeographical status of the ground spiders of the Nestos Delta and compare it with other biogeographical zones of the Balkan Peninsula. Spiders were collected by pitfall trapping and hand sampling within three periods: July - October 2002; April - June 2004; April - July 2008 (pitfalls) and August/September 2002, May/June 2004, June 2007 (hand sampling). Altogether, 61 sites were installed on typical Delta habitat types (coastal - inland dunes, salt meadows, pastures, meadows, reed and floodplain forests). Altogether, 307 species from 33 families were found, classified into 20 zoogeographical categories and grouped into four complexes. The chorological analysis shows that the study area is a reflection of a transition zone of the three biogeographical elements which affect the Greek fauna apart from the local endemics, namely the European, the Mediterranean and the Ponto-Anatolian. Our data indicate that the still unexplored part of northern Greece presents a distinct biogeographical territory even within the framework of the country. The considerable species richness and the biogeographical patterns of spiders indicate the importance of the Nestos region – presumably as surrogate for North East Greece - as biodiversity hotspot for spiders.

Conjoint analysis: a preliminary approach for snails processed products.

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The main aim of the present study was to determine the price and qualitative characteristics of a hypothetical snail processed food product. The developed food product of our research was hypothetical by adopting traditional and international (France, United Kingdom, Indonesia, China, USA, etc) method of snail's foods preparation and consumers preferences. It was assumed that the survey's product can be "broken down" into different component attributes like way of cooking, taste (spicy or not), price, weight etc. A Conjoint Analysis (CA) survey was made of 267 consumers all over Cyprus (Nicosia, Larnaca, Limassol, Pafos, Ammochostos) to determine the importance of each characteristic to their consumption. The CA was applied three times: in total sample, in responders that eats snails and only in these that are willing to bye a snail processed food product. The results show the 83.1% of 267 responders have test snails, 64.7% of them eat very often snails and only an 18% are willing to buy a snail processed food product. Also, results indicate the most important factor in determining consumers preferences was level of taste. For all consumers level of taste accounted for approximately 28% of the difference in preferences scores following "weight" (24.58%), "way of cooking" (21.05%) and "price" (13.75%). The results ware not differentiates significant when CA was applied in the other parts of sample. The low preferences score for "price" shows that it was not the factor that determines the consumers preferences.

Habitat preferences of non targeted demersal fish in the Aegean Sea as inferred from experimental bottom trawl surveys.

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Fish-habitat associations were examined for twentyfive noncommercial demersal species in the Aegean Sea (eastern Mediterranean) using Generalized Additive Modeling techniques. Fishery related abundance indices, derived from experimental bottom trawl surveys, were linked to various environmental and spatiotemporal variables: area, season, depth, substrate characteristics (sand and organic carbon content), temperature, and salinity. Depth was the most influential factor for all species examined. Eleven species showed a clear negative correlation with depth, while the remaining species were more abundant in a restricted range of depths, either on the continental shelf or just within the upper continental slope. Fish species were associated with specific substratum characteristics, especially dry weight percentage of sand in the sediments, which was an important predictor of relative abundance for twenty three species. Seasonal patterns in the relative abundance of most species were observed, related in most cases to the seasonal ikely nttiation of temperature and salinity gradients. During the period of water stratification (summer and autumn) the influence of temperature or salinity on fish abundance was always greater than during the period of vertical mixing (winter). Identification of species-specific habitat preferences is the key of ecosystem based management, since it can serve as a surrogate for species distributions, whenever detailed data are not available, as is the case for most of the non-targeted, discarded or poorly known species.

Questioning the effectiveness of a minimum landing size on Mediterranean swordfish and suggesting possible alternatives with implications on the population and the fishery.

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Adoption of a minimum landing size (MLS: 120cm lower jaw fork length) on Mediterranean swordfish was in action till recently (2006). Data from the Greek swordfish longline fishery between 1998 and 2005 confirmed the inadequacy of this technical measure for a series of reasons: (1) average size of catches kept plummeting throughout the years, (2) undersized fish discarding was rarely practiced, (3) official landings size distributions were biased due to non-reported undersized catches, (4) plausible survival rate of released specimens was estimated to be less than 30%, (5) although Mediterranean swordfish mature at a smaller size (Length at first maturity =123 cm for males; 150 cm for females), the applied MLS was similar to that enforced on the Atlantic populations. Gonadosomatic indices as well as heavily biased Sex Ratios at Size indicated that the spawning season peak was from May to July. Higher concentrations of juvenile swordfish were observed closer to the coastline and around wintertime. As an alternative to the ineffective MLS regulation we suggest the introduction of a combined seasonal and spatial closure for the swordfish longline fishery, as already in action for the trawler and purse seine fleets. Seasonal ban during winter and within a 6 miles coastal zone will reduce fishing pressure on the immature portion of the population, while seasonal closure during the spawning season will allow the mature specimens to spawn. Introduction of Vessel Monitoring System on all commercial boats will discourage illegal fishing practices and facilitate control by the authorities.

The expansion of some marine bird species to the territory of continental part of Ukraine.

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During the last decades some bird species, which were typical mostly for the Black sea and the Sea of Azov region been spread on the major part of the territory of Ukraine. It was facilitated by creation of cascade of storage reservoirs on Dnieper and other rivers. There also can be mentioned sufficient forage reserve in the form of system of fish-farming ponds and other reservoirs, "non-hunting" status, eutrophication of the ponds and some other natural reasons, which caused the settling of these bird species. The most familiar examples of such birds are Cormorant *(Phalacrocorax carbo),* Yellow-legged Gull *(Larus cachinnans),* and Mute Swan *(Cygnus olor).* At that for the populations of Cormorant and Mute Swan it is known, that southern, eastern and central regions of the Ukraine are inhabited by come from Black sea and the sea of Azov region, like in western regions the live the birds, who settled there from the Baltic basin upstream the rivers, which flow on the territory of Poland, Lithuania and Belorussia. The same picture is characteristic for Yellow-legged Gull, but on the whole territory of Ukraine live the birds of Black sea population, in western regions it also occurs other closely related species – Herring Gull *(Larus argentatus),* which is also a settler from Baltic. As to the question about the border between Baltic and Black sea populations of Mute Swan and Cormorant, the exact answer can be given for sure only molecular-genetic investigations.

Further data on the distribution and habitat of the endemic Cyprus mouse, *Mus cypriacus* (Mammalia, Rodentia, Muridae).

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In the context of a study on the Cyprus micromammalian fauna, two geographically distant and ecologically different areas were investigated. The first of these areas lies on Mt. Troodos (N 34°53'05,3'', E 32°51'20,4'', h = 1015 m), in abandoned fields near the forest edge, and the second is situated in the Famagusta area (N 35°03'53,1'', E 33°58'15,2'', h = 44 m), in farmland with sparse shrub vegetation. Among other species, the endemic Cyprus Mouse, *Mus cypriacus,* was collected in both of these areas, where it was found to occur in abundance. So far, it is known that the species seems to be absent from areas with strong anthropogenic pressure such as the overexploited agricultural fields, human dwellings and farms in the Mesaoria plain (which includes our second study area) where the House Mouse, *Mus musculus domesticus,* is almost exclusively dominant. As far as the altitudinal distribution range of *Mus cypriacus* is concerned, it has been reported mainly on Troodos mountain and the adjacent regions, on altitudes between 300-900 m. Since the taxonomic distinction between the two *Mus* species in our material was not always safe, on the basis of traditional morphological characters, we conducted mtDNA and geometric morphometric analyses. Our results suggest that *Mus cypriacus* inhabits a wider range of biotopes, as it was collected not only in more natural areas but also in areas with strong anthropogenic pressure, such as farms and abandoned agricultural fields. Moreover, we revealed that the species has a more expanded altitudinal and horizontal geographical range, given that it was found from 44 m (Paralimni, Mesaoria plain) to 1015 m (Kato Platres, Mt Troodos).

Genetic Variation among Various Populations of Spadefoot Toads *(Pelobates syriacus,* Boettger, 1869) at Breeding Sites in Northern Israel.

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A genetic study was carried out on spadefoot toads *(Pelobates syriacus)* from habitats of various locations and altitudes in northern Israel. Cytochrome *b* and 12S were amplified by PCR for the analysis of genetic variation based on five DNA polymorphisms and for RAPD-PCR. The nucleotide sequences of the mitochondrial DNA fragments were determined from a 460 bp clone of cytochrome *b* and a 380 bp of 12S. No genetic variation was found among the populations with regard to 12S. According to the analysis of five sequences using Arlequin software, there was a high gene identity among the populations (98.7-99.6-%). Both populations, Elrom Pond breeding site, at the highest altitude and Fara Pond, at the lowest, had the lowest identities as compared to the other populations. The DNA variation among *P. syriacus* populations from various breeding sites, according to band sharing (BS), when using the OPA-4 primer, was 0.92 – 1.00. Similarity was low between the population of Elrom Pond and the populations of Kash Pond, Raihania Pond and Sasa Pond (0.92 BS), as well as between the population of Fara Pond at the lowest altitude, and the populations of Kash Pond , Raihania Pond and Sasa Pond (0.92 BS). Similar results were obtained when comparing the results obtained using primer OPA-3. The lowest similarity was found between populations of the highest altitude (Elrom Pond) and lowest altitude (Fara Pond), relative to the other ponds (Kash Pond, Raihania Pond and Sasa Pond) with a BS of 0.93.

Molecular DNA Variation in *Rana ridibunda* from Various Breeding Sites in Northern Israel.

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A genetic study was carried out on marsh frog *(Rana ridibunda)* larvae from habitats of different locations and altitudes in northern Israel. The genes, *12S* and *16S,* were amplified for sequencing and for the assessment of genetic variation by RAPD-PCR. The nucleotide sequences of the DNA fragments were determined from a 367 bp clone of *12S* and a 525 bp of *16S.* The *12S* fragment varied at nucleotide position 331 among populations of various breeding sites, and the 16S sequences differed among populations at the nucleotide positions, 4 and 230. The analysis of these 12S sequences with Arlequin software demonstrated a high genetic identity among the five populations (99.7-100%). The *16S* gene sequence varied slightly among the populations, with a high genetic identity of 99.6 – 100%. The DNA variation among *R. ridibunda* populations from various breeding sites was also assessed by RAPD-PCR using two primers; OPA-4, OPA-7. There were 5-10 bands when OPA-4 was used and 7-12 bands with OPA-7. When comparisons were made between paired populations, band sharing varied between 0.5–0.8 in PCRs with the primer OPA-4 and between 0.7–1.0, when using primer OPA-7. The lowest similarity between different breeding sites was found between Navoraya Spring and Wasset Pond, and the highest similarity between Navoraya Spring and Lehavot Pond, when primer OPA-4 was employed. When using the primer OPA-7, the lowest similarity between populations of different breeding sites was between Lehavot Pond and Wasset Pond and the highest similarity was between Lehavot Pond and Navoraya Spring.

Functional Diversity and Species Turnover along an Environmental Gradient in a Coastal Ecosystem: the Importance of Rare Species and Species Specific Traits.

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Functional and beta diversity approaches in marine ecosystems have received considerably less research effort when compared with the terrestrial realm. The present study aims to address patterns of benthic functional diversity and species turnover rate along a disturbance gradient transect in a coastal ecosystem with aquaculture activity located in a semi-enclosed bay (Gera Bay, Lesvos Island, NE Aegean). Several beta diversity indices as well as functional ones, based on species incidence, abundance and functional traits data of benthic macrofauna inventory were calculated. Analysis of beta diversity revealed a gradual increase of species turnover with increasing environmental stress especially during particular seasons of the year (autumn and summer). From the various indices used, the quanlitative βgl index and the quantitative estimators (i.e. those including species abundance and the effect of unseen shared species via simulations) of beta diversity have been proven to efficiently distinguish community shifts along the environmental gradient. Functional diversity presented a strong linear decrease with increasing environmental stress and was strongly related to the taxonomic relatedness among species. Our findings imply that species turnover rate is inversely correlated to species richness along the environmental gradient, thus suggesting that the stabilizing role of biodiversity can modify effects of environmental variation even in small spatial scales. The low functional redundancy of benthic communities along the disturbance gradient has been attributed to the reduction of rare species (i.e. those with a narrow geographical distribution and sensitivity to niche fragmentation) populations along this gradient.

Molecular and phenotypic diversity of islands populations of *Eristalis tenax* (Diptera: Syrphidae).

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Studies of species inhabiting islands are of a special interest in systematics and evolutionary and conservation biology. This study gives insights into the genetic and phenotypic diversity of a widespread hoverfly species, *Eristalis tenax* (Diptera: Syrphidae). Quantification of the genetic and phenotypic variability of populations originating from Chios and Lezbos (Greece) islands was done using allozyme markers, DNA sequencing and wing geometric morphometrics. Sex dimorphism using wing geometrics was also studied. Additionally, our goal was to study developmental instability by quantifying different components of asymmetry of wing traits, particularly in terms of fluctuating asymmetry (FA). We examined both variation among individuals and within-individual asymmetry (FA) between body sides and compared the multivariate patterns of landmark covariation. Finally, interpopulation differentiation was quantified and comparison of phenotypic and molecular structure of populations from Chios and Lezbos were done.

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Invertebrate discards from small and medium scale fisheries at Thermaikos Gulf (N. Aegean Sea, Eastern Mediterranean): Preliminary results.

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Every year, a significant percentage of the fishing catch is discarded. This discarded catch usually consists of various invertebrates (over 50%, both in quantitative or qualitative terms); nevertheless, the relevant information is very limited, especially considering the Mediterranean Sea. Considering all the above, this study aims to provide data about the invertebrate fauna discarded at Thermaikos Gulf, from small and medium scale fisheries, focusing to the qualitative assessment its composition. Sampling took place seasonally, between October 2005 and April 2006 by bottom trawl for medium-scale fisheries, and October 2007 to May 2008 with trammel fish net for small-scale fisheries. Overall, 65 invertebrate species (from 120 species in total) were identified as discards by medium-scale fisheries and 99 (from 160 species in total) by small scale fisheries, respectively. Most of the invertebrates discarded belonged to Mollusca (36,9% medium scale – 25% small scale), Arthropoda (16,9% medium scale – 16% small scale) and Echinodermata (15,4% medium scale – 11% small scale), followed by Cnidaria, Porifera and Annelida; the later three taxa had very low percentages, for both fisheries. 34 species were discarded by both gears; some of these species were commercial (target species or by-catch) or had potentially commercial value (e.x. bioactivity of some sponges). Accordingly, a well-organized and continuous monitoring of discarding by all active fisheries in the Thermaikos Gulf seems necessary, as it can contribute to the assessment of the impact of fisheries to the marine environment, as well as to the sustainable management of natural resources.

Comparative dietary analysis of the squids *Alloteuthis subulata* and *Alloteuthis media* at Thermaikos Gulf (North Aegean-Greece).

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The loliginid squids of the genus *Alloteuthis* comprise three nominal species. Two of these *A. subulata* (Lamark, 1798) and *A. media* (Linnaeus, 1758) are distributed in the Mediterranean, being very common in the Aegean. Considering the limited information on the diet of these species, at least regarding the eastern Mediterranean populations, a one year study was carried out aiming to the comparative dietary assessment of these squids in Thermaikos Gulf. Overall, 82 individuals were collected by bottom trawl (October 2005 to April 2006); 42 of them belonged to *A. media* and 40 to *A. subulata.* Standard biometric measurements (total weight, mantle length) were performed. The stomach of each specimen was weighed and its content was analyzed to determine the squid's diet. Sex was identified macroscopically. The female/male ratio deviated from unity for both species; over females at *A. subulata* and over males at *A. media.* Regarding prey identification, crustaceans were by far the most frequent, followed by fishes. The number of empty stomachs was similar for both species. The use of ANOVA showed that prey composition differed according to sex only for A. subulata ($p<0.05$), whose females preferably consumed crustaceans. The dietary content also differed between the females of both species ($p<0.05$), as the proportion of crustaceans was increased at the stomach of *A. subulata.* These data, although preliminary, are possibly indicative of competitive interactions between species and sexes, conforming to the results of similar studies conducted to other Mediterranean loliginid populations.

Grey Patridge's reintroduction in high suitability environments of Caserta District (South Italy).

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In Campania the Grey partridge populations are deceased in the last decade in consequence of the anthropization, of the excessive hunting pressure, and of the agricultural transformations. Some years ago was realized a project for the grey partridge reintroduction in Salerno district, experimenting some techniques constituting a reintroduction model for this species effective on the whole Italian Apennines. In this work we applied the same reintroduction model in the Caserta district. The most important aspects considered were: environmental suitability of the area, imprinting of the young breeding, social behaviour, feeding, minimum dimension of the populations, adaptation, predatory pressure, biomedical aspects. Before the spring the animals (50 males and 50 females) were monitored throughout the acclimatizing period in some special acclimatizing cages proportional to animal number. The animals were released gradually and in three weeks the release of the grey partridges was completed. Some were radiotracked for a best localization in the monitoring phase. At the early spring we monitored the area weekly and we observed that some pairs settled continuously on the area. In particular we monitored six pairs at least, four of these radiotracked. In April we began the monitoring for to localize the possible breeding events, observing breeding signs and their songs.

Camera-trapping as an assessment tool for mammalian fauna presence in Pindos mountain range, Greece.

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Camera traps have been increasingly used in surveys for assessing the presence and distribution of an area's fauna. It is considered to be one of the most effective non invasive methods for mammal inventory in all environmental conditions, despite the high initial costs. The method was used in a project for the estimation of the impact by the construction and use of Egnatia Highway on the bear and wolf populations in Pindos mountain range, NW Greece. In the survey, 10 automatic infrared RECONYX™ cameras were used in 41 different locations accumulating a total of 1,358 camera days or 32,592 camera-trapping hours, thus providing 1,458 photos of mammal taxa within the surveyed area. Twelve (12) different mammal species were identified with most common being *Vulpes vulpes* (33%), *Lepus europaeus* (23.9%) and *Ursus arctos* (21.8%). In addition to that, twenty four (24) different individual bears were identified. Camera-trapping was proven an important non-invasive tool for fauna assessment and refinement of conservation measures in relation to the highway mitigation measures.

Molecular evaluation of the subspecific status of *Rhinolophus ferrumequinum creticus* (Mammalia: Chiroptera) on Crete.

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The greater horseshoe bat, *Rhinolophus ferrumequinum,* is one of the most widespread bat species of the Palearctic region, occurring from SW England and NW Africa to Japan. Six subspecies have been described from Europe, Africa and Asia, with *R. f. creticus* being endemic to Crete. The distinct taxonomic status of the latter subspecies was proposed on the basis of differences in cranial and external measurements, as well as in the coloration of the pelage and it was accepted by various researchers. In this study, we tested the genetic differentiation of the Cretan populations of the species from the mainland (Greek and Turkish) and Cypriot ones using partial mitochondrial DNA (control region and cytochrome b). The analyses of these two loci showed minimum variation between Crete and the adjacent areas. These results are discussed in relation to the cline variation of several metric characters documented in the west Palearctic.

Reproductive biology of the freshwater fishes in Balkans and Turkey.

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Reproduction is an important part of the life history of fish, also widely used for conservation and management. Information on reproductive biology of freshwater fishes is limited when compared to their marine counterparts (see e.g. FishBase *(www.fishbase.org).* Thus, we compiled data from the published literature for 79 fish stocks, belonging to 49 species from 4 Balkan countries (Bulgaria, Romania, Serbia-Montenegro and Greece) and Turkey. The following main data were collected: (a) minimum and maximum reported length (L_{min}, L_{max}, cm), (b) size (L_m, cm) and age (t_m, year) at first maturity, (c) maximum gonadosomatic index (GSI_{max}), (d) seasonal variation of GSI, (e) absolute (AF) and relative (RF) fecundity. Most of the data refer to cyprinids, accounting for the 74.7% of the fish stocks, and representing 18 genera. The majority of the fish stocks (68 out of 72; 94.4%) were long-day breeders, spawning mainly from March to July, while the rest (4; 5.6%) were short-day breeders, spawning from January to February. The duration of the spawning season (based on the GSI) varied from 1 to 6 months, with the majority of them (42.8 %) exhibiting a spawning season of two months. For 29 out of the 56 stocks, the mean AF ranged from 52.8 to 1,197,847 eggs. Finally, the maximum AF was found to be strongly related to maximum total length ($r^2 = 0.81$, n=19).

Behavioural premating isolation patterns in the land snail *Albinaria.*

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Reproductive isolation, a strong condition for speciation, may be related to genetic, morphological and ecological differentiation, and can be expressed through premating or postmating barriers. The land snail genus *Albinaria* (Pulmonata, Clausiliidae) exhibits high genetic and morphological differentiation that does not seem to correlate with ecological specialization. Usually, populations are allopatric but there are cases of sympatry/parapatry where intermediate specimems were found. The genus is hermaphrodite, a property that implies weak role for sexual selection. Of basic interest for speciation processes is whether there are premating isolating barriers in this genus, and their possible relation to the observed shell and genetic differentiation. A related key question is if the above mechanisms are being reinforced in contact zones between diversified populations. We conducted mate choice experiments between interspecific and intraspecific populations found in sympatry and allopatry, recording premating behaviour (mating attempts, successful copulations, copulation duration, mating activity). The unbiased isolation index I_{PSI}, based on mate frequencies, suggested that there are weak premating barriers, especially between conspecific different morphs. In combination with the intense observed activity (copulations and courtships) in the contact zones, the hypothesis of reinforcement of behavioural barriers in these sites seems unlikely. Nevertheless, some of the examined behavioural parameters, such as the copulation duration, which was found shorter between interspecific mates, but not between conspecifics, suggested that there might be isolating forces acting. Further investigation of the reproduction, genetics and ecology of the genus, could reveal postmating isolation mechanisms, such as differences in sperm transfer and/or in hybrid viability/sterility.

Preliminary results on the altitudinal differentiation of the small mammal fauna of Crete.

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Despite the fact that the small mammal fauna of Crete is well known, we are not familiar with the ecology of these species. In this work we present the composition and phenology of the small mammal fauna in two mountains of Crete, Dikti and Lefka Ori, as a function of the altitude. Four stations were selected at each mountain at 400m, 800m, 1200m and 1600m (1800 on mt Lefka Ori). Monthly samplings, from August 2008 to July 2009, 100 at each station, were carried out and the captured animals were measured, marked and finally released. To sum up, the small mammal diversity we recorded was greater in western Crete (Lefka Ori) than in the eastern (Dikti). Regarding the altitude, species richness decreases with the elevation on both mountains but not at the same rhythm. *Apodemus sylvaticus* appears as the most adaptive species as it has been trapped in all stations. *Acomys minous* was found only in the 400m stations at both mountains. *Mus domesticus* was found in the two lower altitude stations on both mountains but in smaller numbers than the other rodents. *A. mystacinus* may be found at the entire range (except 1800m on Lefka Ori) but appears to require high quality habitats. Individuals of *Crocidura suaveolens* were trapped sporadically on the two lower altitudes of both mountains. Till now no individuals of *C. zimmermanni* have been trapped even though its presence has been documented for the stations with the highest altitudes on both Mts.

Further data on the distribution limits of the Greek endemic vole subspecies *Microtus (Terricola) thomasi atticus* (Mammalia, Rodentia, Arvicolinae) based on mtDNA analysis.

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Previous studies revealed that Greek populations of Thomas' vole are highly polymorphic with distinct morphotypes, karyotypes and allozymic forms that do not seem to follow any specific geographical distribution pattern. Yet populations restricted to Ag. Stefanos (Attiki pref.) and Evvoia island showed a higher genetic differentiation and were grouped in a distinct monophyletic clade *("atticus");* subsequently we proposed that they constitute a distinct subspecies, *M. (T.) thomasi atticus.* In the present study new populations were examined in order to define the distribution limits of this subspecies. Voles were collected from several locations of Attiki and Voiotia prefs. The animals were captured alive, brought in the laboratory and their internal organs were removed. Genomic DNA was extracted from liver tissue and part of the D-loop control region was PCR-amplified. The resulting sequences were aligned together with previously published ones from Greek *M. (T.) thomasi* populations, in order to test their taxonomical profile. Phylogenetic analyses were contacted and a phylogenetic tree was constructed, including present and previously collected Greek populations of Thomas' voles. All the populations analyzed in the present study belong to the phylogenetic clade of *M.(T.) thomasi atticus,* which remains highly differentiated in comparison to all other Greek *thomasi* populations. Thus the proposed subspecies' distribution is further expanded in Attiki and Voiotia prefs. and includes new localities east, north and west of Ag. Stefanos, namely Marathonas, Oropos, Avlona, Fili and Skourta. Moreover, a high degree of differentiation was also revealed among the populations clustered in the *"atticus"* clade.

Biodiveristy of land snails in man-made ecosystems of north-eastern Aegean islands and of western Greece.

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Agricultural ecosystems in the Mediterranean have often been shown to support high levels of biodiversity. The aim of this work was to record the species of land snails found in different types of man-made habitats and compare them to those found in their neighbouring natural habitats. Our study area included three islands of the NorthEast Aegean (Lesvos, Chios, Samos), as well as the greater area of Arta in Western Greece. In each case, the most characteristic agricultural ecosystems of the area were selected and were studied in comparison to the most prevalent natural ecosystems. Therefore, snails were collected from olive groves, phrygana and pine forests in Lesvos. Orange groves were studied in Chios, vineyards in Samos, maquis and pine forests in both islands. In Arta, collections were carried out in phrygana, olive and orange groves, as well as in kiwi groves, a relatively recent cultivation in the area. Our results suggest that generally fewer species are found in the agricultural ecosystems compared to the natural ones. Nevertheless, there are some species found only in the man-made habitats. In all cases, the malacofauna of the agricultural habitats is a subset of the total malacofauna of the greater area and includes either synanthropic species, or species widely spread in the west Palearctic or the Mediterranean.

Long-Term Changes in Zooplankton Composition of Lake Eğirdir (Turkey).

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Second largest freshwater lake in Turkey, Lake Eğirdir, survived no significant change by means of native flora, fauna and water quality till the end of 80s. However, mesotrophic character of the lake displayed even by the end of 90s is being replaced by eutrophic character. In this review, changes recorded in zooplankton communities in the lake were presented to demonstrate long term changes of the lake. Before 80s, no systematic study on zooplankton communities is recorded. But afterwards, systematic recordings enabled monitoring of changes in zooplankton. In 1990s, copepods *Diaptomus* and *Cyclops* were dominant zooplankton in general with seasonal outbreaks of *Diaphanosoma* in summers, while rotifers were scarce. The first signicant change is the increase of rotifers by density and species richness in community by 90s with the increase of trophic level. Shortly after the introduction of *Atherina boyeri* in 2003, the most dominant zooplankton and among the largest filtering copepods, *Eudiaptomus vulgaris,* disapppared from the lake. Nowadays, the zooplankton population is composed largely by individuals smaller than 300 µm and larger cladocerans became significantly rare, while dominant taxa are *Cydorus* spp, *Alona* spp, *Bosmina longirostris, Macrotrix laticornis,* veliger larvae of *Dreissena polymorpha* and rotifers (mainly *Polyartra vulgaris, Syncaeta pectinata, Trichocerca* spp., *Keratella cochlearis* and *Lepadella ovalis).* In the great changes recorded in zooplankton fauna of the lake, increase in introduced planktivorous fish species and trophic levels is determined to be most affective.

Water Mites (Hydrachnida: Acari) Fauna of Turkey.

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The water mites (Hydrachnidia or Hydrachnida) constitute the most important group of the Arachnida in freshwater systems. They are represented by 24 families (out of over 50 worldwide) and they have 278 species (out of 6000 known species worldwide) in Turkey. Up to now, over 420 genera and about 6,000 species have been described. But the number of species is expected to exceed 1000 in total considering the newly discovered species with relatively few workers in the field. The species composition mostly resembles to that of Russia, Europe and Iran respectively. In this study, the known water mite fauna of Turkey hitherto are evaluated under family groups. Regional species richness of the taxonomic groups and their taxonomic positions are discussed. Photographs and distributional maps to each group are also given.

Timing and Phenology of eight Sylvidae species during Spring Migration over an eastern mediterranean island, Antikythira - Greece.

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Spring migration is far less studied that the equivalent southward journey. The existing knowledge about spring migration over Eastern Mediterranean is even more limited. This study deals with the timing and phenology, during spring, of eight Sylvidae species over a small Greek island, Antikythira, based on data from three consecutive years (from 2007 till 2009). Possible trends of wing length and body mass in relation to passage date were investigated. We found that in all species, median passage date differed significantly between the years. In six out of eight species (Great Reed Warbler *Acrocephalus arundinaceus,* Sedge Warbler *Acrocephalus schoenobaenus,* Icterine Warbler *Hippolais icterina*, Wood Warbler *Phylloscopus sibilatrix,* Willow Warbler *Phylloscopus trochilus* and Garden Warbler *Sylvia borin)* we found significant negative correlations between wing length and date of passage. Regarding body mass, controlled for body size by correlation to wing length, three species (Sedge Warbler, Icterine Warbler, and Garden Warbler), showed significant positive correlation with passage date. Concerning Blackcaps *Sylvia atricapilla* we found, among females, significant positive and negative correlations with wing length and body mass respectively. Regarding Common Whitethroats *Sylvia communis,* among males wing length was positively correlated with passage date. No sex and age related significance was found for both Blackcap and Common Whitethroat, apart from the difference in the wing length between adult males and first year females of Common Whitethroats.

Protected species and habitat types of the sublittoral zone of Gyaros island, Aegean Sea.

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Under the scope of declaring the island of Gyaros a Marine Reserve, a preliminary underwater survey was conducted in order to identify and record the presence of marine habitat types and species protected by National Laws and International Conventions. 16 transects perpendicular to the shore were visually censused at depths between 0-30m. The survey was conducted by volunteer scuba divers - members of the Hellenic Association of Recreational Divers "Tethys", with the support of the Hellenic Office of Greenpeace NGO. Extended underwater prairies of *Posidonia oceanica* (Natura priority habitat type 1120) were recorded at all transects and depths surveyed. Among them, reefs (Natura habitat type 1170 - Biocenosis of sublittoral algae and Coralligenous) and sandbanks (Natura habitat type 1110) were also present at various depths. Large densities of the bivalve mollusk *Pinna nobilis* were observed at 90% of the transects surveyed, while at different sites, sponges *Axinella* spp., sea urchins *Centrostephanus longispinus*, trumpet tritons *Charonia tritonis* and the parrotfish *Sparisoma cretense* were occasionally recorded and photographed. We should note that the invasive green algae *Caulerpa racemosa* had covered large areas at all depths and among all habitat types. In general, the variety of habitat types, the presence of *Posidonia oceanica* beds in good condition (EU priority habitat) and the abundance of protected species indicate Gyaros island's high potential to effectively act as a Marine Reserve.

Monitoring bird communities at the Wetlands of Lemnos island, North Aegean.

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A monitoring program for the birds of the SPA site of wetlands Hortarolimni and Aliki of Lemnos island was implemented by Hellenic Ornithological Society (HOS) in collaboration with Municipality of Moudros during 2008. The aim of this project was to create the baseline data on avian population though a systematic monitoring. Different methodological approaches for several avian groups, such as counts from fixed view points surrounding the wetlands (for wintering and breeding waterbirds), systematic road transects covering all the area (for raptors), point counts during early morning (for passerines), nocturnal point counts (for the Stone Curlew) various methods (view points, systematic control of the villages, habitat use counting etc) for the Lesser Kestrel were established. The wetlands of Lemnos island are the most important wintering sites for waterbirds in the Aegean with more than 7.000 ducks counted in the winter. Significant breeding populations of the Ruddy Shelduck (20-28 breeding pairs), Shelduck (62–75 pairs), Avoset (118 pairs), Black-winged Stilt (40–60 pairs), Mallard (55–75 pairs) and Coot (40–60 pairs) were found. From the twenty raptorial species observed, eleven of them were breeding. Crested Lark, Corn Bunting, Black-headed Bunting and Olivaceous Warbler were the commonest species from the totally 48 species counted during point counts. A significant high and dense population of Stone Curlew (160–190 pairs) and the largest island population of Lesser Kestrel (minimum 80 pairs) were estimated. The results of the monitoring provide strong evidence that the wetlands of Lemnos are of high national significance and give additional information on the avian biogeography of the Aegean.

Biogeographic elements of the ground and darkling beetle fauna (Coleoptera: Carabidae, Tenebrionidae) of eastern Mediterranean maquis.

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Although a huge research effort has been made for the last decades on the ecology and biogeography of the east Mediterranean, the majority of the original scientific papers produced, deal mostly with the dominant vegetation formations of the area (phrygana or similar arid ecosystems). Very few studies consider forest or maquis formations, while even fewer concern epigeal faunas in lowland Mediterranean maquis with *Juniperus* and *Pistacia* species. Principal aim of the present study is to explore the ground and darkling beetle fauna (Carabidae and Tenebrionidae) in eastern Mediterranean juniper maquis, to define the biogeographic elements of this fauna and explore the origins of these taxa in relation to palaeogeographic events in the area. The study was conducted in five areas of East Mediterranean, four of which are located in Greece (Crete, Naxos is., Attiki, Samos is.) and one on Cyprus, with pitfall trapping as sampling method. Maquis faunas of ground and darkling beetles are considerable poorer in terms of diversity and abundance in relation to the nearby phryganic ecosystems. The analysis of faunal elements in both families, show considerable similarities with respective analyses in phryganic ecosystems of the area. On the contrary, the degree of endemism, the distributional patterns and the routes of dispersal in the two families seem to differ greatly in the East Mediterranean area. Tenebrionidae are characterized by much higher diversification levels than Carabidae (20-40% endemic tenebrionids, 10-15% endemic ground beetles). The chorotype analyses in both families show also considerable different patterns of formation and establishing of these faunas in the same area.

Resolved phylogenetic relations and evidence for incomplete genetic isolation among four species of the land snail *Albinaria* on the Kefalonia island.

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Examination of the association between reproductive isolation and genetic divergence is essential for elucidating the mechanisms causing speciation. Several land snails have been used as model organisms for such studies. One of them is the rockdwelling genus *Albinaria* since it comprises a variety of biological characteristics that allow plausible evolutionary hypotheses to be tested. The genus exhibits high genetic and morphological differentiation that do not correlate with ecological specialization. Furthermore, the degree of behavioral premating isolation among species or populations of the genus is not related to their genetic differentiation. On the island of Kefalonia occur four *Albinaria* species: *A. adrianae, A. jonica, A. senilis* and *A. contaminata.* The first two are endemic there. Usually their populations are allopatric but there are cases of sympaty where intermediate specimems were found. Previous efforts to resolve their phylogenetic relations, based on allozyme and morphological variation, produced dubious and contradictory results. Moreover, our experiments suggest only a modest degree of behavioral premating isolation among these species. We analyzed several allopatric and sympatric populations of these four species using two mitochondrial genes, i.e. 16S rRNA and COI. We estimated the levels of genetic differentiation within and among populations and species. Phylogenetic analysis of both genes resulted in similar and quite robust topologies. However, we had strong evidence for possible gene flow in certain, yet limited, cases. The combination of that information along with behavioral and ecological isolation studies, could give new insights in the speciation processes acting in land snails.

Farmland bird communities as focal species: The case of the Kopaida region.

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According to EU procedures for the registration of plant protection products, potential risk for the avian community is identified, apart toxicity, on the basis also of a theoretical exposure via the use of **'focal species'**. For birds a 'focal species' is a real species that actually occurs in the crop when the pesticide is being used and is considered to be representative of all other species from the feeding guild that may occur in the crop at that time. The aim of this study was to propose a list of focal bird species in selected cotton, cereal, maize and alfalfa fields in Kopaida plain. The method used for bird recording was "line transect". Investigated parameters included the qualitative composition of the bird community encountered in those crop types, the frequency of occurrence, dominance and abundance of species present. Finally, these species were assigned to foraging guilds, diet guilds and size classes. As for the results from these data, a list of focal bird species per crop, time period and forage guild is proposed. Swallow, house sparrow, corn bunting, skylark, meadow pipit in field and house sparrow, corn bunting, cetti's warbler, great reed warbler for the hedgerows were usually proposed as focal species. Their use in a refine risk assessment for plant protection products is discussed further.

Length-weight relationships of five fishes caught by different gears in the Argolikos Gulf (C. Aegean).

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Length-weight relationships by sex were calculated from a total of 1789 individuals coming from five fish species caught in the Argolikos Gulf (C. Aegean). These fishes *(Boops boops, Mercuccius merluccius, Pagellus erythrinus, Mullus barbatus* and *Pagellus acarne)* were collected, accordingly the species, using a trawl net (22 mm cod end), trammel nets (14->36 mm), gill nets (14-34 mm), long lines (no 14-16) and a beach seine (12 mm cod end). Data were collected, within the framework of the project "Study of the sustainability of fisheries of the Argolikos Gulf", (EP.AL, Meter 4.4.), in the period from April to August 2008. The value of the slope b ranged from 2.22 for *Boops boops* females caught by gill nets to 4.42 for *Mullus barbatus* males caught by a trawler. The results indicated further that the length-weight relationships were highly correlated ($r>0.90$, $P<0.001$), in all cases. Generally, a negative allometry was estimated for *Pagellus acarne* and *Mercuccius merluccius* and positive allometry for *Mullus barbatus,* caught by all the gears (t test, $P>0.05$). Analysis of covariance (ANCOVA, $P>0.05$) showed that exist statistically significant differences, among the slopes for the various gears, in both sexes of *Boops boops, Pagellus erythrinus, Mullus barbatus* and *Pagellus acarne* males. The above differences could be attributed to the small size caught by the beach seine or the large one caught by the trawler. The obtained results could be used for the fisheries management of the Argolikos Gulf.

Phylogenetic relationships of Greek rabbit populations.

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The genus *Oryctolagus* (Lagomorpha; Leporidae) differentiated in the Iberian Peninsula ca 3.5 MYA where two genealogic lines have been documented. It has been limited to the peninsula till humans started translocating populations. Because of this activity as many as 7 local populations have been described as distinct subspecies, including *O. c. cnossius* on Dia island, north of Crete. The prevailing view is that there only two subspecies truly exist, corresponding to the respective genealogic lineages: the nominal subspecies distributed in Northern Spain and southern France (or Clade B in the relevant publications) and *O. c. algirus* distributed in southern Spain and N Africa. This is supported by several studies which show minimal diversity among wild populations or breeds throughout the world. It is interesting to note that all populations out of the Iberian Peninsula show relationships with Clade B of the relevant publications. Here we compared mtDNA sequences of rabbits in Greek islands (including for the first time animals from the type locality of *O. c. cnossius)* in order to see 1) if there is any differentiation of the Greek populations with the pattern described for other areas out of the Iberian peninsula and 2) if there is any differentiation among the Greek islands populations. For this, we compared 35 samples of Greek rabbits and included in the analyses published sequences of 123 more specimens from localities around the world. The Greek rabbits appear in two distinct clades with no geographical structure. Both clades appear related to “Clade B” of the Iberian populations, in agreement with the pattern described for other non-Iberian populations. Combining these two facts we propose that Greek populations resulted from at least two distinct “waves” of human mediated introductions.

Molecular phylogeny in Greek mole populations (Mammalia, Soricomorpha, Talpidae) based on the 16SrRNA mtDNA gene.

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Our knowledge on the geographical distribution of the genus *Talpa* in Greece has been quite insufficient until the appearance of a recent work, which gave some information about the phylogeography of the genus in this area. In the present work we present a further contribution to the study on the zoogeography and the phylogenetic affinities of the studied *Talpa* species, based on one mtDNA gene sequence analysis in 13 Greek populations. From the results' elaboration we confirmed the existence of the species *T. europaea* and *T. stankovici* in Greece and their allopatric distribution. Specimens from North Greece were assigned to *T. europaea* while those from Central and West Greece and Peloponnisos were classified as *T. stankovici.* Furthermore, *T. stankovici* populations are clustered into two affinity groups, that of Central and West Greece and that of Peloponnisos. The results agree with the bibliographically proposed scenario that the reason for this genetic divergence is probably the geographica insulation of Peloponnisos during the Pliocene. The genetic divergence revealed suggests that Peloponissos populations could probably constitute a subspecies of *T. stankovici.*

Preliminary study on the feeding ecology of squacco heron *(Ardeola ralloides),* little bittern *(Ixobrychus minutus)* and black-crowned night heron *(Nycticorax nycticorax)* at the wetland of Agras-Bryta-Nisi, Northern Greece.

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This project took place at the protected area of Agras-Bryta-Nisi wetland, North Greece. Its purpose was the investigation of herons' feeding ecology *(Ardeola ralloides, Ixobrychus minutus* and *Nycticorax nycticorax).* Fieldwork's protocol demanded two surveys per month, from May until August 2008. In each survey, herons were observed from predefined positions with wetland's panoramic view during morning or afternoon. In each observation, the use of a specific habitat, as well as foraging method, pecking frequency, success and prey captured by herons were recorded. Prey length was compared to that of each herons' beak. The herons appeared in particular habitats of the wetland. *Nycticorax nycticorax* was detected on riparian vegetation. *Ardeola ralloides* was tracked foraging in reeds while *Ixobrychus minutus* in reeds and on aquatic vegetation. Two feeding methods were observed by *Ardeola ralloides* and *Ixobrychus mnutus:* 'stand-and-wait' and 'walking slowly'. The average success of the feeding attempts for *Ardeola ralloides* and *Ixobrychus minutus* was very high, reaching 87% for *Ardeolla* and 92% for *Ixobrychus*. The time between two consecutive captures was shorter for *Ixobrychus minutus* than *Ardeola ralloides* which mainly preferred fish than other prey types. *Ixobrychus minutus* most of the times captured prey (fish or other types) equal or half of its beak's size. The preliminary results showed that the three heron species resemble in prey capture techniques and differ in captured prey size. In addition, observing the feeding behavior of herons could be a useful tool for environmental education apart of its conservation value. More surveys are required to identify the value of the wetland as foraging ground for herons, particularly in relation to prey availability.

Overview of waterbird monitoring in Cyprus from 2007 to 2009.

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Knowledge of the size and distribution of waterbird populations is necessary when planning for wetland and species conservation. Despite the relatively small size of Cyprus, island-wide estimates of waterbird populations do not exist and knowledge of their distribution ranges is incomplete. During the period July 2007 to June 2009, we conducted monthly waterbird counts at twenty-seven wetlands throughout the island. A total of 90 waterbird species were recorded with a peak of 9955 birds counted in January 2008. Most birds are winter visitors, with internationally important numbers of Greater Flamingo (2765 birds), Demoiselle Crane (174 birds), Eurasian Thick-knee (158 birds), and Common Shelduck (794 birds) recorded at two sites, Larnaca and Akrotiri Wetlands, which hosted the highest numbers and species of birds. At least fifteen waterbird species nested in Cyprus in spring 2007, 2008 and 2009. Four species had important breeding populations: the Kentish Plover (80-130 pairs), Black-winged Stilt (100-150 pairs), Spur-winged Lapwing (50-60 pairs) and Ferruginous Duck (up to 10 pairs). Most wetlands supported passage migrants during autumn and spring. Conservation issues which negatively impact these wetlands include unpredictable water flow due to frequent droughts, unsustainable water usage, expansion of Larnaca airport situated within Larnaca Wetlands, military exercises and dense commmunication aerials at Akrotiri Peninsula, and human encroachment leading to increased disturbance at most sites.

Lead shot ingestion by waterfowl in Greek wetlands.

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Ingestion of spent lead (Pb) gunshot by waterfowl causes lead poisoning, a serious waterfowl mortality factor worldwide, but relative studies from eastern Mediterranean are scarce. In this study, we investigated the presence of lead shot in 547 gizzards of 18 species belonging to the families Anatidae and Rallidae, shot in 8 Greek wetlands during 2004 to 2008. Lead shots were found in the 10.6% of the total sample including all studied areas except Kerkini Lake (n=30) and Kotychi Lagoon (n=6), the only areas where hunting is forbidden. Lead shots were found in the gizzard of 12 species of which the most susceptible were Pintail *Anas acuta* (26.7% of the total sample, n=30), White-fronted Goose *Anser albifrons* (18.2%, n=22), Mallard *Anas platyrhynchos* (16.2%, n=99), Wigeon *Anas penelope* (11.5%, n=78), Teal *Anas crecca* (7.2%, n=166), Gadwall *Anas strepera* (5.6%, n=36) and Shoveler *Anas clypeata* (5.4%, n=37). We also found lead shots in the gizzard of protected or non quarry species such as Mute swan *Cygnus olor* (n=5), Ferruginous Duck *Aythya nyroca* (n=4) and Smew *Mergus albellus* (n=3). The bigger percentage of gizzards containing lead shot derived from Evros Delta (14.7%, n=156), the most popular hunting place for waterfowl hunters in Greece, followed by samples from Axios-Aliakmon Delta (13.5%, n=37), Messolonghi Lagoon (11.1%, n=171), Vistonida Lake (7.9%, n=114), Kalloni wetlands (7.1%, n=14) and Spercheios Delta (5.3%, n=19). The ban of lead shot and its replacement with a non-toxic alternative is the most effective way to remove the risk of lead poisoning to waterfowl from ammunition globally.

A review of recoveries of ringed waterfowl in Greece.

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Ringing is the most widespread technique to follow the migratory routes and other movements of birds. Through the recaptures and/or recoveries of ringed birds important scientific data, such as geographical distribution, age, philopatry, migration speed, moult etc. can be revealed. Up to 2009 there are 262 recoveries in Greece of 18 Anatidae species, stored in the DataBase of the Hellenic Bird Ringing Centre. The majority (256) involved birds that had been ringed abroad and recovered in Greece mostly shot during the winter months (200). Most of the birds recovered in Greece had been ringed prior to 1980s in 20 countries. The majority were ringed in the former USSR, followed by a small number that had been ringed in The Netherlands and Great Britain. The species most often recovered were Pintail *Anas acuta* (81 recoveries), Teal *Anas crecca* (47) and Mallard *Anas platyrhynchos* (38). Pintail, Mallard, Shelduck *Tadorna tadorna* and Mute Swan *Cygnus olor* had been ringed mostly in eastern Europe while Teal, Garganey *Anas querquedula* and Tufted Duck *Aythya fuligula* in both, western and eastern Europe. The oldest bird recovered is a Pochard *Aythya ferina* at least 33 years old, whereas another Pochard which traveled from Novosibirsk, Russia to Prespa holds the record of the longest-distance waterfowl recovery (at least 4400 km). The knowledge of the origin and the migratory routes of waterfowl in Greece could be an important contribution to the conservation of these wide ranging species.

Endemism in Relict Gastropod Fauna of Kırkgöz springs (Turkey).

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Kirkgöz springs, situated in Western Taurus Mountains basin, is a karstic spring system composed of interconnected spring ponds of different sizes and reaching 3 m. in depth. This small spring system having rich aquatic vegetation possess a rich fauna perhaps well studied only in a few groups like fish and gastropodsi latter showing a substantial stenoendemism with *Theodoxus altenai, B. pseudemmericia, Pyrgorientalia zilchi, Islamia bunarbasa, I. anatolicus, Graecoanatolia pamphylica, Stagnicola tekecus* and *Gyraulus pamphylicus* are endemics. Of the 8 endemics dominated by prosobranch taxa, 5 are strictly endemic while there are only 3 non-endemic gastropods and this suggests an ancient origin of the lake and its malacofauna. In this study, faunal endemism and zoogeography of the endemic taxa in the spring system were evaluated. Also conservational issues related to present threats created by urbanization were also discussed.

Diversity of fossil and recent Mollusks of Rhodes Island (Aegean Sea, Greece).

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A Plio-Pleistocene marine molluscan fauna has been studied in Rhodes (S. Aegean, Greece) focusing to the assessment of biodiversity and to its comparative analysis with recent records. Samples of fossil mollusks have been collected at six sites along the roadcut of the coastal road at Kallithea located at the NE Rhode, during October 2009. Five of them (St1-St.5) comprise the same fosiliferous layer but in a distance of 200 m. The last (St.6) superimpose St.1 and St.2 sites about 8 m higher. Overall 67 species have been identified, belonging to three classes: 40 Bivalvia, 25 Gastropoda and 2 Scaphopoda. Most of these species exist in the present molluscan fauna of the Southeast Mediterranean Sea. Nevertheless, the gastropod *Xenophora crispa* is a new record for the Plio-Pleistocene of eastern Mediterranean fauna, while three other species, namely *Buccinum corneum, Charonia tritonis variegata, Chlamys (Manupecten) pesfelis,* are new records for the Plio-Pleistocene of the study area. The recent mollusca fauna of Rhodes comprises 165 species, which compared with the Pleistocene records showed a rather low similarity (Jaccard similarity coefficient = 0.1). Cluster and multidimensional scaling ordination revealed the discrimination of St.1 at 17% similarity level; the rest of the sites were grouped together at about 45% similarity level. Considerable similarities were expected between the faunas from 1,2,3,4 and 5 sites, due to the same sedimentation horizon. In fact, the similarities were found much lower than the expected, and this may due to different sedimentary environments along the 200 m profile, since the study area includes sediments deposited in the vicinity of the Plio-Pleistocene Palaeocoast.

Morphological comparison and new distribution map of two *Eutagenia* (Coleoptera, Tenebrionidae, Pimeliinae, Stenosini) species on Aegean Islands and in Western Anatolia.

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In this study, the species *Eutagenia smyrnensis* (Solier, 1838) and *E. minutissima* Pic, 1903, exhibiting distribution on the Aegean Islands and in Western Anatolia, have been revised morphologically. The external morphological characteristics that distinguish two species from each other have been reinforced by SEM scanning. The genital organs of males have been examined under light microscope and they have been detected to be the most important characteristics that distinguish species. Determined to prefer different habitats using molecular tools (Papadopoulou et al., 2008 & 2009), these two species have also been supported morphologically.

Woodpecker distribution in the National Park of Northern Pindos: Historical and new data.

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A key element for ecological forest management is the maintenance of biodiversity in the presence of "industrial" use of forests. Loss of natural forest habitats can affect the composition and abundance of bird communities, particularly, of cavity-nesting birds, the presence of which depend largely on dead or dying trees (snags) suitable for cavity excavation. Woodpeckers are highly dependent on snags for nesting, roosting and feeding. Aim of the present study is to compile historical and new data collected through the development of a monitoring program in order to determine the status and develop distribution maps of woodpecker species in the National Park of Northern Pindos. Based on bibliography, eight species of woodpeckers have been recorded in the area of Northern Pindos Mountain Range. These are the black woodpecker *(Dryocopus martius)*, the great spotted woodpecker *(Dendrocopos major),* the middle spotted woodpecker *(Dendrocopos medius),* the grey-headed woodpecker *(Picus canus),* the green woodpecker *(Picus viridis),* the white-backed woodpecker *(Dendrocopos leucotos),* the lesser-spotted woodpecker *(Dendrocopos minor)* and the wryneck *(Junx torquilla).* However, no older or recent evidence confirm occurrence of all these species in the area. The survey was conducted in the National Park of Northern Pindos during the spring and summer of 2008 and data on the presence of all species of woodpeckers observed in the area were collected. Five species breed in the study area: the black woodpecker, the great spotted woodpecker, the lesser-spotted woodpecker, the middle spotted woodpecker and the green woodpecker. For the grey-headed woodpecker and the white-backed woodpecker there is only once evidence for the presence over the last 10 years, while the wryneck has been recorded in the past without recent observations. Woodpeckers are considered as "keystone species" in forest biodiversity, providing nesting and roosting holes for other wildlife species. A reduction in large snags, important components in temperate and boreal forest ecosystems, and tree size in forest stands could reduce populations of woodpeckers, as these species are highly dependent upon snags.

The phylogeny of the endemic land snail genus of Greece *Codringtonia* (Gastropoda, Pulmonata) based on mtDNA sequence data.

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The rock-dwelling land snail genus *Codringtonia* (Kobelt 1898) is actually endemic to Greece and has an extremely restricted and mosaic distribution. The majority of *Codringtonia* species (six out of eight species) can only be found in certain areas of Peloponnese (southern mainland Greece); a single species is found in some areas of Epirus (north-western Greece) and in the nearby Albanian territory and one more in Sterea Ellada (south - central mainland Greece). Regarding its insular distribution it is only present in the island of Kerkira (western Greece). Due to its highly confined and patchy distribution the genus is to be registered both in the Red Data Book of Greece and in the IUCN Red List as critically endangered. In this work, using mtDNA sequence data, the phylogenetic relationships of the *Codringtonia* species are reconstructed, and are compared with the current classical taxonomy of the genus. Furthermore, evolutionary hypotheses accounting for the puzzling distribution of the genus are evaluated within the derived phylogenetic context.

Distribution and biological characteristics of *Squalus blainvillei* in the Aegean sea and Levantine.

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During the period 2005-2008, a total number of 441 longnose spurdogs ranging from 321 to 997 mm in total length and from 181 to 3079 g in weight were sampled from the bottom trawl and bottom longline catches in the Eastern Mediterranean Sea. The bottom trawl hauls were carried out in depths between 125 and 475 m in the Aegean Sea, while the longline sets were between 350 and 480 m in the Levantine Basin. Females outnumbered males in both areas and the overall sex ratio was 1:0.75. The length-weight relationships were determined and basic morphometric measurements were analysed for each area and sex. Gonadosomatic Index (GSI) ranged from 0.04 to 2.5 in males and from 0.09 to 18.6 in females, while Hepatosomatic Index (HSI) ranged from 2.9 to 39.2 and from 2.1 to 27.6 in males and females respectively. Statistically significant differences were found between males and females in mean GSI and HSI values. The minimum total length of mature females was 403 mm and 425 mm in mature males. The length at 50% maturity was estimated for both males and females. In 43 gravid females, a total of 136 embryos ranging in total length from 44 to 177 mm were found. A positive relationship was recorded between maternal length and litter size.

The phylogenetic position of amphibious groups (Tylidae, Ligiidae) within Isopoda.

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According to current taxonomy, the crustacean order Isopoda consists of 10 suborders, 9 of which include marine/freshwater and 1 (Oniscidea) mostly terrestrial species. The family Tylidae includes amphibian species living in the littoral zone and is traditionally classified within Oniscidea, a taxon considered to be unambiguously monophyletic. However, previous phylogenetic studies have proposed several contradicting hypotheses concerning the relations between the Tylidae and the rest of Oniscidea, without reaching to a consensus. In order to contribute towards the resolution of those phylogenetic relationships, we used 18s rDNA sequences from 14 genera of isopods belonging to a broad range of suborders. Our experimental approach included PCR amplification, sequencing and application of phylogenetic analyses using maximum parsimony, maximum likelyhood and Bayesian inference. Only conserved regions of the gene were used in the analysis, resulting in a dataset with 1597 nucleotides. In all methods, Tylidae appeared as a sister-clade of the infraorder Crinochaeta (Oniscidea). We noticed, though, that Ligiida (infraorder Diplochaeta, Oniscidea) appeared (albeit with low bootstrap values) in a clade distant to all other Oniscidea, undermining thus the monophyly of the suborder. In order to test the validity of this result, we split our dataset and conducted separate analyses for terrestrial and for marine/freshwater isopods, each time using representatives of the other subset as outgroup. Our final cladograms support, with significant confidence, the monophyly of Oniscidea and the classification proposed by Erhard (1998) through his studies on morphological characters, placing together the family Tylidae and the taxon Crinochaeta under the name ‘Holoverticata’.

Genetic diversity of *Atherina boyeri* populations based on sequencing analysis of the COI mtDNA gene segment.

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The taxonomic relationships within the genus *Atherina* have been controversial due to the high level of polymorphism that characterizes some of the species, and this is particularly true for *Atherina boyeri.* The aim of the present study is to investigate the genetic differentiation and the phylogenetic relationships mainly of Greek *Atherina boyeri* populations, based on sequencing analysis of the COI mtDNA region. 23 populations of *Atherina boyeri* were collected from 10 lakes/lagoons and 13 marine sites of both the Ionian and the Aegean Sea. A population from lake Iznik in Turkey was also included. Our experimental approach included PCR amplification, sequencing and application of phylogenetic analyses using Maximum Parsimony, Neighbor Joining and Bayesian Inference. The sequencing analysis resulted in a dataset with approximately 500 nucleotides. The phylogenetic trees show that the populations are clustered in two main clades which clearly separate the “lagoon” from the “marine” type populations, confirming previous results based on RFLP analysis. Moreover, there is a distinct discrimination between the lagoon populations collected from the Aegean Sea and those from the Ionian Sea. This study is continued by using more molecular markers and the collection of more populations.

Genetic differentiation among populations of the Worm Snake, *Typhlops vermicularis* (Reptilia, Typhlopidae), from Sterea Ellada and northern Peloponnisos, as inferred by mitochondrial molecular markers.

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During the last decade several studies have used molecular data, especially mitochondrial DNA markers, to explore biogeographical affinities. It has been suggested that the complex geological history of the Balkan Peninsula and the Hellenic area has decisively contributed to the diversification of the terrestrial fauna, due to changes of relief, emergence and disappearance of orographical and hydrographical barriers, such as the Corinthian Gulf. Within reptiles, however, only few phylogeographical studies on snake species are available for this area so far. *Typhlops vermicularis,* a member of the family Typhlopidae, is a poorly studied snake species concerning its taxonomy, ecology and biogeography. In this context we applied molecular methods to study the phylogenetic relationships among worm snake populations from Sterea Ellada and northern Peloponnisos, in order to examine the influence of the Corinthian Gulf geographical barrier on its biogeography. Specimens representing nine populations from Sterea Ellada and northern Peloponnisos were collected. Tissue samples were stored in -80^{o}C and the whole animals were preserved in 95% ethanol. Total DNA was extracted following Holmes and Bonner (1973) and universal primers 12SaL/12SbH and L14724/H15149 (Kocher et al., 1989) were used to amplify segments of the 12S rRNA and cyt b mitochondrial genes, respectively, via Polymerase Chain Reaction. A total of ~800bp was used for the reconstruction of the phylogenetic affinities, under the Maximum Likelihood, Bayesian Inference and Maximum Parsimony methods. Under the light of new data we propose a biogeographical scenario to explain this species geographical distribution in the studied area.

When is the right time to census Red Deer *(Cervus elaphus)* using vantage point counts in a mountainous east Mediterranean habitat?

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The Red Deer population of the Mt Parnitha National Park in SE Greece is the most significant of the country and one of the last. It is also the southernmost Red Deer population of eastern continental Europe (38o). The need for managing the species became a bounden duty when a wildfire (2007) burnt the 2/3 of its' summer habitat, and concern about its possible negative impact on forest regeneration arose. Estimation and monitoring of the population is a priority in order to develop suitable management regimes. In the course of a complete monitoring scheme, the vantage point count method was applied during different periods (spring 2008 and 2009, summer 2008, autumn 2008), in morning and evening (~3h) sessions. The results showed that the method was most effective in the spring (April till early May) following that of the autumn. We also detected that morning sessions during spring and autumn fall short of the evening ones. Evening sighted animal numbers were more than 2 to 3 times greater than the morning ones during the spring and about ¼ more during the autumn. Summer census is the least productive. There was no significant difference between morning and evening numbers during this period. As a conclusion, contrary to usual guidelines for Red Deer census, we propose that the spring evening sessions (following the autumn evening ones) are preferred in order to monitor the species in the mountainous east Mediterranean habitat of Parnitha. This can be especially useful when the available resources are limited.

Seasonal distribution of the Red deer *(Cervus elaphus)* in Mt Parnes (SE Greece) after the extensive fire of 2007.

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The Red Deer population of the Mt Parnitha National Park in SE Greece is the most significant of the country and one of the last. It is also the southernmost Red Deer population of eastern continental Europe (38º). An extensive wildfire (~5.000 ha) on June 2007 burnt half of the National Park's core area. A program for census and monitoring the species took place after the fire. Three different methods were applied in order to estimate the size, structure and seasonal distribution of the population (vantage point counts, roaring census technique and faecal pellet standing crop strip transect counts). We estimated the winter distribution (winter 2007-2008 and 2008-2009) in an area of ~36.000 ha. The majority of the animals was confined in higher elevations during the following summer (600-1400 m), in an area of ~4.450 ha. Red deer used the burnt area for grazing/browsing after the extensive wildfire of summer 2007. In the summer of 2007 a few deer browsed shootings of evergreen shrub and trees. The use of the burnt areas became more intense after the germination of the herbaceous vegetation during the next plant growth seasons. Through the deer mating season of 2007 and 2008 the burnt area was also used as a breeding territory. About 44% of the 2008 summer distribution and ~45% of the 2008 breeding territories were confined into the burnt areas.

On the occurrence of *Alloteuthis subulata* in the Eastern Ionian Sea and its distinction from the sympatric *Alloteuthis media.*

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Despite the efforts made during the last decade, the systematics of the sympatric species *Alloteuthis media* and *Alloteuthis subulata* still remains confused and the distribution of the two species in the Eastern Mediterranean doubtful. The 9 male specimens identified as *Alloteuthis subulata* in July-August 2008, represent the first finding of this species among samples of the "International Bottom Trawl Survey" (MEDITS), which is repeatedly carried out in the eastern Ionian Sea since 1994. Morphometric data and tissue samples for genetic analysis were collected from these specimens, as well as, from male and female specimens assigned to *A. media* from the same and nearby sampling stations. As the longer tale is the most evident characteristic to distinguish at least adult male specimen of the two species, the length of the anterior part of the mantle (from fin's edge to mantle opening) was used as the reference length upon which indices of different body dimensions were calculated. Genetic analyses using mitochondrial DNA cytochrome oxidase I (COI) gene sequences confirmed species allocation for all individuals assigned to *A. subulata,* whereas for *A. media* samples, one female and an unsexed juvenile individual seemed to carry the *A. subulata* COI haplotype. Discriminant analysis of morphometric data suggested that length of arms, tentacles and tentacle clubs, all relatively smaller in *A. subulata,* constitute important variables allowing the distinction of the two species. However the use of a larger sample covering the whole size range for both species and sexes, that will be the subject of both genetic and morphometric analyses, is needed to confirm their value as decisive diagnostic characters.

A first in-depth look into the genetic make-up of the Greek *Artemia* parthenogens.

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The genus *Artemia* has a cosmopolitan distribution and comprises populations that inhabit coastal and inland saline and hypersaline waters. Two distinct life strategies are present in these anostracans (both bisexual species as well as strains of parthenogenetically reproducing females can be detected). In Greece, only parthenogenetic populations are found. Previous studies have focused on the phylogenetic relationships among species and the biogeographic history within the genus *Artemia* by using mitochondrial (16S) and/or nuclear (ITS1) markers. Here we employ the high versatility of microsatellite markers to investigate the genetic make-up of the Greek parthenogens. Seven Greek and three reference parthenogenetic populations (Italy, Israel and Madagascar) were sampled. Twenty individuals per population were genotyped with three polymorphic microsatellite loci. The Cavalli-Sforza's chord measure was employed to compute the pairwise genetic distances between individuals. The genetic relationships of the individuals were calculated and visualized in PHYLIP, TREEVIEW and SPLITSTREE programs using both bifurcating and multifurcating (network) clustering algorithms. A total of six genetically distinct parthenogenetic strains were detected among the seven sampled Greek populations while the presence of another two was unveiled within the reference ones. In most cases, a single strain monopolized each site (with the exception of the Megalon Embolon and Polychnitos sites where three and two strains were detected, respectively). These preliminary results suggest that the monopolization hypothesis might stand in the case of *Artemia* parthenogens in Greece and highlights the importance of the migratory waterbirds as potential dispersers of *Artemia*.

Bird sensitivity map to windfarm development in Crete.

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Bird sensitivity mapping is considered to be one of the best available methods to minimize the risk to birds from improper wind farm sitting. We produced a bird sensitivity map, based on distribution data of some species of predatory birds (Harrier eagle - *Gypaetus barbatus*, vulture - *Gyps fulvus,* and Golden eagle - *Aquila chrysaetos),* which appear to be affected negatively by the non - restricted location of wind farms. It is aimed that such maps will assist in the appropriate designation of wind farms so as to eventually reduce the negative impacts on bird life to the minimum and especially for these three species. Geographical Information Systems (GIS) contribute significantly to a broad range of ecological investigations. They allow the integration of collected biological data into a geographical database and with the use of various analytical tools they produce new information that can be used in informative decision making. This study employs a key capability of GIS, «Multiple criteria Analysis». In this type of analysis, the different criteria employed for determining sensitive areas for the three types of predator birds are presented in the form of maps (Criteria- Maps). These maps are then assigned with a significance factor that relates to the importance of the criterion. A technique called weighted overlay combines then all those layers of data according to the significance of each criterion and a final composite digital map is produced showing the areas prone to windfarm installations. In this study the criteria of sensitivity were assigned after following up reviews of literature and best available information for each species on foraging ranges, collision risk, disturbance distances and feeding areas, to develop 'sensitivity criteria' and Special Protection Areas - SPAs of Crete.

A comparison of phylogeographical and genetic variation patterns among populations of *Porcellio flavomarginatus* and *P. werneri* (Crustacea: Oniscidea) from Aegean islands.

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The terrestrial isopod species *Porcellio flavomarginatus* (Lucas, 1853) is an endemic species of southern insular Greece and is found in typical Mediterranean habitats, such as phrygana and bare rocks, strictly of limestone composition, whereas *P. werneri* (Strouhal, 1929) lives in similar habitats but only in a few central Aegean islands. *P. flavomarginatus* shows great morphological diversity, so several forms have been described in the past as different species. In this work we examine the genetic variability among insular populations of these species in an attempt to find congruence between their patterns of geographic variation and the palaeogeography of the region. We analyzed several populations from each species originating from different Aegean islands, using the COI, 16S rDNA mitochondrial and the 28S rDNA nuclear markers. The resulting patterns of genetic diversity and the phylogenetic relationships among populations show that *P. flavomarginatus* is constituted by three distinct clades, one on northern Kyklades, one on Dodekanisa and one on Crete and Amorgos, with values of genetic divergence indicative of different species. The presence of the Cretan clade on Amorgos possibly reveals secondary dispersal (anthropochorous?) given also that this island is the only one where this species can be found sympatric with *P. werneri.* Further results are evaluated in view of the known palaeogeography of the central and southern Aegean region.

Are intra- or inter- specific interactions more important? A biocontrol point of view.

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One of the key issues investigated in ecology are the effects of intraspecific versus the effects of interspecific competition. Predicting the outcomes of competition is important from a theoretical ecological standpoint as well as from an applied biological control point of view. In cases of biological control when pest supression is a requirement, it is important to determine whether intraspecific or interspecific forces can help produce the desired reduction in pest levels. In laboratory experiments our model system consisted of two species of *Trichogramma* parasitoids and their common lepidopteran host the flour moth as their resource under different gradients (low, medium and high host density). The first species *Trichogramma cacoeciae* had a distinct size benefit over its heterospecific *Trichogramma bourarachae* therefore based on the theory it was assumed that the larger species would be a stronger competitor. In contrast to what it was initially expected the smaller species managed to competitively exclude the larger one in all three host densities, however there were cases where the larger species was superior. The results are discussed with regard to different modelling approaches and additional results on the fecundity and host discrimination for each parasitoid species are also presented.

Do the domestic sparrows, *PASSER DOMESTICUS ITALIAE* (VIEILLOT, 1817), originated in Italy?

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Recent zoogeographical comparisons have generated the hypothesis that the current population of Italian sparrows, *Passer domesticus italiae* (Viellot, 1817), of the Cretan area (Crete, Kasos and Karpathos) may have had a recent anthropochorous origin, since it cannot be ruled out that they were introduced onto the Greek islands – even deliberately – in historical times, possibly in the form of individuals of Italian origin. The aim of this paper is to investigate this hypothesis from a genetic point of view. Thus, we have sequenced 500bp of ND2 mtDNA gene from Cretan, Italian and European sparrows. Haplotype cluster analysis suggests that sparrows from the Crete's area have a high similarity with Italian population.

Mediterranean diet of Fallow deer *(Dama dama)* of Rhodes during mid-dry and early-wet season.

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Food habits of fallow deer were determined based on fecal microhistological analysis. Feces were collected in two distinct seasons, mid-dry and early-wet season. Both seasons were considered to be critical in terms of food availability. Based on the results of microhistological analysis, fallow deer diet could be characterized as an intermediate feeder.

Adaptations for water and heat management in the rock-dwelling land snail *Albinaria.*

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Aridity and high temperatures that can lead to dehydration are major environmental pressures for land snails. Therefore, water retention and heat regulation are crucial elements for their survival, particularly during aestivation. It is therefore essential for the survival success of these animals to have adaptive traits that enable them to withstand such unfavourable conditions in the wild. *Albinaria*, a speciose land snail genus, display a great variety of shell structures, the most notable of which are the shell ribs. These are transverse protrusions of the shell along its surface with great intra- and interspecific variation of size and density. The great variety of shell structures in *Albinaria* is attributed to water management adaptations, but detailed experimental data concerning the significance of ribbing in respect to environmental variables and the animals' water budget are lacking. We experimentally tested shells differing in ribbing density and intensity, as well as in the general shell morphometry, in regard to their reflectance ratio, water retention capability, water loss rate, heat regulation ability and water permeability. We found differences in all experiments between different shell types (smooth, semiribbed, ribbed) and shapes, indicating that the different combinations of shell structures may confer various sets of advantages and disadvantages to the animals bearing them. All the above parameters relate to the animals' water budget regulation and thus its survival ability in the Mediterranean semi-arid ecosystems. Nevertheless, the phylogenetic signal in all the measured traits was random indicating a non-adaptive radiation shell differentiation process.

Conserving lizard diversity in a Mediterranean reserve, Cyprus.

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In the present study we explored the diversity patterns and the ecological preferences of a lizard community in the Xeros Potamos protected area, in SW Cyprus. We recorded lizard species abundance and 16 environmental parameters that described their microhabitat within eight quadrats of 10 ha each, representing the main habitat types of the study area. Sampling was repeated four times from April to October 2006. We identified eight lizard species, five of which are protected under European legislation *(Ablepharus budaki, Chalcides ocellatus, Laudakia stellio, Mediodactylus kotschyi, Ophisops elegans),* and one that is listed as endangered *(Acanthodactylus schreiberi)* based on IUCN assessment. The microhabitats used by the resident lizard community in the study area were best defined by substrate, bush cover, humidity, altitude and inclination (RDA). Cultivated land with hedges was the most specie-srich habitat type for lizards; hence maintenance of hedges needs to be considered a primary objective for the conservation of the local herpetofauna. The typical habitat for the endangered species *A. schreiberi* consisted of humid sandy river banks with bush cover. This habitat type is currently threatened by the Xeros Potamos River channelization. Immediate action should involve the establishment of a control mechanism for the protection of the sandy riverbeds from illegal deposit of construction debris, the removal of embankments, the restoration of natural species habitats and the sustainable use of water so as to maintain the natural ecological flow pattern of the river.

Analyses of Greek, Turkish and Hungarian scale insect faunas (Hemiptera: Coccoidea).

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The Superfamily Coccoidea is a group known as scale insects that contains many agricultural pests. The species list of scale insects known in Hungary Turkey and Greece is presented and analysed in zoogeographic point of view in this work. In total 452 species were found in these countries. The highest number of species we recorded from Turkey (290) followed from Hungary with 223 species and Greece with just 168 species. There are 50 species belonging to 35 genera of 7 families common in Greece-Hungary-Turkey. There are 66 species common in Greece and Hungary belonging to 43 genera, 76 species common in Turkey and Hungary belonging to 42 genera and 114 species common in Greece and Turkey belonging to 66 genera. The scale insect fauna in Greece and Turkey are quite similar and it is relatively different from that of Hungary. The lower number of species identified from Greece is probably because of less intense sampling than the two other countries. Especially the Pseudococcidae and Eriococcidae families seem to be unexplored in Greece. In Greece, most of the species has been found in 3 prefectures (Attiki, Magnisia, Thessaloniki) implying that surveys have been restricted in certain areas. A significant increase of the number of Euro-Siberian and Irano-Turanian elements in further study in Greece and Turkey is anticipated.

Cyprus waterbird Census 2005.

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Since December of 2004 BirdLife Cyprus has organised an annual systematic and quantitative monthly waterbird count, islandwide. The aims of this monitoring project are to assess the populations of waterbirds, nesting species, provide data on the importance of the island's wetlands to birds and monitor the state of the wetlands. Twenty wetlands, 5 natural and 15 artificial were selected for monitoring. The counting year is from December to November the following year. Observations were carried out on the 20th of each month. Participants were supplied by the Project coordinator with a check-list recording form that includes all the species to be counted plus information regarding the state of the wetland. A total of 104,395 waterbirds of 105 species were recorded for 2005. The most important species was the Greater Flamingo *Phoenicopterus roseus.* The wetland with the highest number of birds for the year was Akrotiri Salt Lake followed by Larnaca Sewage Works and Larnaca Salt Lake. The wetland with the highest Annual Diversity Index was Paralimni Salt Lake, followed by Asprokremnos Dam and Oroklini Marsh. Of the 17 nesters the most numerous were the Black-winged Stilt *Himantopus himantopus.* Important nesters of European Conservation Concern were the Spur-winged Plover *Vanellus spinosus*, Ferruginous Duck *Aythya nyroca,* Little Tern *Sternula albifrons,* Night Heron *Nycticorax nycicorax* and Kentish Plover *Charadrius alexandrinus.* Cyprus seems to be an opportunist staging site for migratory waterbirds dependent on weather. On the other hand artificial sites have provided habitat for the resident waterbirds plus the stimulus for the colonization of the island by new species.

A database system containing karyological data for the mammals of the Euro-Mediterranean region.

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The mammalian diversity that characterizes the Euro-Mediterranean region has been for long at the center of significant scientific research. As a result, the produced knowledge has grown to immense proportions and there emerges the task of how to better organize these data and turn them into a flexible and widely accessible tool that will aid the ongoing research on this field. In this context, an electronic database is hereby presented, which aims at gathering all the available karyological data that have arisen through the relevant studies of several years on populations of mammalian species in the Euro- Mediterranean region. The database has been designed to include information on the following major categories: Taxonomy (Family, Genus, Species etc), Karyology (2n, NF, chromosome morphology, heterochromatin addition, other notable chromosomal traits, etc), Specimen (collection date-period etc), Geography (Country, Locality, Coordinates etc), Reference (data source details) and there is also a 'Notes' field that allows for the inclusion of other significant information. The database is designed in such a way, that it will be easy at a later stage to incorporate data pertaining to other animal groups, i.e. amphibians, reptiles etc. At this point, more than 1,000 entries have been created, pertaining mainly to the genera *Mus* and *Microtus* (Rodentia), which exhibit notable karyological diversity. The application of targeted queries already provides useful comparisons and permits conclusions on the karyological differentiation both on an intra- and inter-specific level. Future plans include the continuation of data inputting and the creation of an online version of the database that will allow access to its contents and also remote data entry to authorized contributors.

Insular wetlands of Greece and their role in wildlife biodiversity: the case study of Zakynthos island (Western Greece – Ionian Sea).

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Wetlands constitute a great variety of valuable ecosystems supporting wildlife biodiversity and human activities. However, in Greece, it's only during the last decade that systematic studies on wetlands in the insular area complexes of the Aegean and Ionian Sea have been conducted. The present work consists part of a broader research project, coordinated by WWF Hellas, aiming at the study and preservation of Greek insular wetlands in the Ionian Sea and is focused on the area of Zakynthos Island. In 2008-2009, we estimated a number of 10 wetlands using GPS, GIS and remote sensing data. In addition, a data collection of ecological parameters as well as a quantification of anthropogenic activities around the wetlands was carried out. According to a first step evaluation, the saline of Katastari and the Keri Lake, being defined respectively as parts of an Important Bird Area (IBA, GR086) and a NATURA 2000 site (GR2210002), have been considered as the most significant wetlands on the island. Within the current work, a more systematic recording of the Katastari saline (NE Zakyhnthos, 170 ha) wealth and the hosted avifauna species' richness has been implemented. Furthermore, a standardized questionnaire has been used in order to identify the local community perception concerning the saline management. The aforementioned results, in combination with the specific geological status and the socioeconomic culture of the area, point out certain priorities for wetland management and preservation and embrace an integrated, science-based approach to migratory bird conservation and other wildlife in Zakynthos.

Genetic variation of the MH loci in endangered *Ladigesocypris ghigii* populations and its implications for conservation.

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Many endangered species are distributed in small and isolated populations and therefore are susceptible to extinction since genetic drift makes them prone to loss of genetic diversity, higher levels of inbreeding, lower reproductive fitness and compromised ability to evolve. Gizani *(Ladigesocypris ghigii)* is a freshwater fish, endemic to Rhodes Island, Greece. Because of the restricted area of distribution and the continuous habitat deterioration, gizani is one of the most endangered fish species of top priority for conservation in Europe, since two of its populations have recently become extinct and most of the remaining populations exhibit persistent declining tendencies. Here we assessed the polymorphism of the MH class I, UBA gene and class II, DAB gene, compared the genetic variability with that revealed with neutral genetic markers and discussed the importance of functional genes in a continuously bottlenecked populations in relation to their viability. In accordance with mitochondrial and other nuclear markers all populations suffer not only from low allele numbers, but also from an extremely low degree of divergence between alleles in both MH loci (two and four alleles and 0.0037 and 0.011 mean nucleotide diversity for UBA and DAB respectively). Although, cases exist where very low MH diversity has been found in viable populations, it certain that if the decline of the *L. ghigii* population size continues, the genetic variation at these immunologically important genes will be completely lost, leaving all populations susceptible to outbreaks of infectious disease, events which would undoubtedly contribute to their future extinction.

Intraspecific mitochondrial DNA variation of the oak gall wasp *Andricus lucidus* (Hymenoptera: Cynipidae).

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The objective of this study was to infer intraspecific mitochondrial DNA variation and phylogenetic relationships of *Andricus lucidus* haplotypes from Turkey. An 2540 bp mitochondrial DNA region covering ND4, ND4L, tRNAThr, tRNAPro, ND6, partial cyt b gene and a second 1800-bp fragment comprising the ATPases (6, 8) and COIII of *A. lucidus* amplified by PCR were digested with eight restriction enzymes. A total of 26 composite haplotypes were detected among 144 individuals collected from 9 populations. The estimated average haplotype and nucleotide diversity within populations were 0.7113 and 0.091582, respectively. The average nucleotide diversity among populations was estimated as 0.6858. Dendrogram obtained using PHYLIP program depicting the phylogenetic relationships of *A. lucidus* haplotypes indicated that there was an obvious relationship between geographical distribution of the haplotypes and their clustering. Haplotype 22 found in the Van population was the most basally located and the most divergent haplotype. The most common haplotype (Type 1) shared between the Adıyaman, Elazığ, Kahramanmaraş and Muş populations formed a cluster with the haplotypes found in the geographically close populations from Bitlis, Elazığ and Bingöl. All remaining haplotypes formed the next grouping which was further divided two smaller clusters. The first cluster was composed of haplotypes found only in the Kahramanmaraş population. Haplotypes found in the Adıyaman, Bingöl, Muş and Malatya populations were grouped together meanwhile Kayseri and Malatya haplotypes formed the second grouping. The present study indicates that the oak gallwasp haplotypes found in different populations from Turkey have significant amount of genetic diversity and they form geographically significant groupings.

The distribution of species belonging to the family Hygromiidae (Gastropoda: Pulmonata) in Turkey.

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The Hygromiidae, one of the helicoid families distributed in Western Palearctic, is represented by 4 subfamilies, 22 genera and 106 species in Turkey. Of the subfamilies, Cochlicellinae consists of 1 genus and 3 species, Monachiinae 7 genera and 66 species, Geomitrinae 2 genera and 4 species and Hygromiinae 12 genera and 33 species. The family members, accounting for 17% of Turkish land snails, are especially common in coastal regions. Genus *Monacha* FITZINGER is the most speciose of the family in Turkey where early half of the all extant taxa in this family can be found and most of these (n=39) are endemic mainly to parts of northern and southern Anatolia. In this study, the distributional features of genera and species belonging to the family in Turkey is briefly reviewed.

Insights into the evolutionary history of *Scolopendra cretica* (Chilopoda, Scolopendridae) in the island of Crete.

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The species *Scolopendra cretica* belongs to the *Scolopendra canidens* complex *(S. canidens, S. clavipes, S. cretica* and *S. dalmatica)* is endemic to the island of Crete and its adjacent islets and one of the most common centipedes of the island. Virtually nothing is known about the evolution of the species on the island of Crete, whereas its relationships with the remaining species of the *canidens* complex have not been studied comprehensively. Being an endemic species to the island of Crete differentiating in the island for at least 5 my, it may serve as an ideal organism for the evaluation of the palaeogeographic scenarios that have been proposed for the island of Crete as accounting for the distributional patterns of many animal and plant taxa. In this perspective the evolutionary history of the species on the island of Crete is approached using a phylogenetic and population genetics framework. The obtained pattern is investigated for its coincidence with the palaeogeographic evolution of the island of Crete. At the same time the phylogenetic relationships of *S. cretica* with its congeneric species are inferred.

Range expansion of Eurasian Jay *(Garrulus glandarius)* in Northern Peloponnese, Greece.

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Data from sightings and censuses along motor ways, combined with other observations, is used to document a significant range expansion of Eurasian Jay *(Garrulus glandarius)* in terms of both altitude (from upland to lowland) and habitat type (from woodland to orchards and human habitations) in Northern Peloponnese, Greece. The species used to be a strictly woodland species in Peloponnese, confined in upland deciduous and mixed forests, from at least 300 m upwards, avoiding lowland areas and human habitations. In 1993 the first sighting of a Jay was made in West Corinthia along the National motorway Athens – Patras. More sightings started to accumulate along this road and in other parts of lowland Corinthia and Achaia Perfectures -areas lacking natural woodland but covered with dense orchards, mainly of lemon and olive trees. Today, Jays are commonly seen inside orchards, along roads and near houses at sea level. In 2009, breeding within 200 m from the coast, and further sightings from the seashore consist a situation unbelievable 20 years ago. The reasons for this range expansion are not known. Yet, the gradual, and rapidly accelerating in recent years, abandonment of the intense lemon (and, to a lesser extent, olive) cultivations, seems to have played a role. These cultivations in the area concerned (once producing almost 8% of the global lemon production) have gradually turned form carefully pruned and cleaned orchards, to an almost impenetrable “woodland” of dense foliage, thorny twigs and tall bush. Breeding Jays seem to prefer this habitat type.

Genentic divergence among Greek populations of the species *Sphaeroma serratum* (Crustacea, Isopoda).

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The family Sphaeromatidae (Flabellifera) includes species that colonize marine shorelines, as well as freshwater habitats. Sphaeromatid isopods are ideal for addressing life history, ecology, biogeography and phylogenetic hypotheses, because they exhibit extreme morphological diversity, they are readily collectable in many habitats and some genera are speciose, while others are monotypic. *Sphaeroma serratum* (Fabricius, 1787) is a marine isopod belonging to the large family Sphaeromatidae, which is distributed widely in the shallows of the tidal zone. In the present work the molecular phylogeny of several Greek populations of the species *Sphaeroma serratum* was studied, in order to estimate isolation rates and test for possible geographic structure in the genetic make-up of the respective populations. The material used was collected from both the western and central Greece (Ionian Sea, Patraikos and Korinthiakos Gulfs) and the Aegean Sea. Two mitochondrial markers (16S rDNA & COI) were used, which were amplified by the Polymerase Chain Reaction (PCR). Sequencing resulted in 396 bp for 16S rDNA and 500 bp for COI, from which genetic distances were calculated and phylogenetic trees were constructed using three different algorithms (Neighbor Joining, Maximum Parsimony & Bayesian Inference). The results show great genetic divergence among *Sphaeroma serratum* populations. Divergence patterns do not show any clear geographic structure, but there is large genetic distance between neighboring populations implicating the existence of cryptic species, which may be related to the different levels of salinity observed in these regions. The study will continue with the analysis of more populations, from more locations.

Preliminary approach of the biology of reproduction of Crete's endemic lizard *Podarcis cretensis* (Sauria: Lacertidae).

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In Greece 7 species of the lizard genus *Podarcis* are found, of which 5 are endemic. *Podarcis* are medium-sized saxicolous or terrestrial lizards. *Podarcis cretensis* was recently split as a separate species from *Podarcis erhardii.* So far there has been no specific study on the species which inhabits many different habitats from sea level to an altitude of 2000m a.s.l. in Western Crete and rocky islets of Eastern Crete. The purpose of this work is to describe the elements of the reproductive cycle of *Podarcis cretensis* by studying populations from different habitats. The questions had to do with the period of the lizard's reproductive activity and its clutch size. We examined in total 175 animals from Crete. We measured the length (SVL) and noted the animal's sex. We counted the number and measured the size of eggs from females and the condition and size of testes from males were measured. From the analysis and processing of the results it appears that female *Podarcis cretensis* have 2 breeding periods, clutches of 1 to 4 eggs in each birth, while males have synchronized growth of the gonads during the same periods.

Individual identification of Brown Bears from their footprints.

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Protection and management of threatened animal species require accurate methods of population size estimation that include individual identification of animals. The present study attempts to develop an objective non-invasive method for the identification of individual brown bears *(Ursus arctos)* from their footprints. For these purposes, we measured 16 forefoot print and 8 stride linear dimensions from 7 radio-collared and 4 unknown bears in Central Pindos Mts. Multiple regression analyses and decision trees were subsequently applied to reduce the sample of effective measurements and effective sample of footprints. Finally, footprint width, length from nail to base of digit III, width of digit V, and left stride length were selected as the most significant measurements for the identification of brown bear individuals at 94% accuracy. Furthermore, significant correlations between footprint width and specific body dimensions that individually characterized distinct animals, emphasizes the importance of the method. In this way, the present study suggests that brown bears can be individually identified from their footprints with a high level of accuracy and the method can be used for population estimation of the species.

Population structure of *Mauremys rivulata* in natural and artificial wetlands.

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The difference in population structure and growth rates for *Mauremys rivulata* in natural versus artificial wetlands was investigated using mark and recapture methods. The population sizes in each wetland were also estimated. The natural wetland was a back channel of the Almyros river in northern Crete, and the artificial wetland was a holding pond that is part of the Pombia water treatment center in southern Crete. Mark and recapture data collected over four years was used with newly collected data to estimate population sizes, growth rates, and population dynamics. Recaptures from Pombia and from Almyros were used to determine growth. Measurements used to determine growth rates were straight carapace length versus weight and total growth of straight carapace length. Results on growth rates were compared to a base study done in Jordan. Differences between artificial and natural wetlands will be discussed.

Aegean Sea Amphibians: moving towards an uncertain future.

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The Aegean Sea, as it is defined by more than 4,000 islands of an astonishing variety of sizes, landscapes and geographic isolation from the mainland, is home to hundreds of endemic species. Located at the biogeographical crossroads of three continents it has always been a meeting point of distinct faunas and floras all shaped by the long of presence of human activities. But these very same human activities are nowadays jeopardizing the impressive biodiversity of the region. The distribution of the Aegean Sea amphibians coincides, in almost all cases, with the network of wetlands occurring in this area. The outstanding importance of wetlands, representing a hot spot in terms of biodiversity, is undermined by the rarity of these special habitats and is under critical risk because of their uncertain future. Aegean Sea harbours ten species, including three endemics and two representing the only European populations. Furthermore experts believe that some populations may be discrete species. Although molecular and bioacoustics' techniques provide to taxonomy powerful tools for a more detailed description of amphibian diversity, global change and direct human activities threat the very existence of amphibians. In this study we tried to assess the impact of global change on amphibian populations in Aegean Sea though there is only limited background information (there are no population density estimations). To evaluate climate changes we present data regarding temperature and rainfall during the last fifty years in a vertical gradient along the Aegean Sea. Our data suggest that while temperature is rising, rainfall is decreasing at a slow but constant rate. These changes should have a direct impact on the vulnerable wetlands where evaporation rates would accelerate and rain water supplies diminish. The situation seems to be more critical in the southern Aegean Sea, where more endemic species and fewer wetlands are present.

Avifauna monitoring programme in the National forest of Parnitha Mountain following the catastrophic fires of 2007.

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Following the catastrophic forest fires of 2007 which resulted in the destruction of 4900ha of the National Forest of Parnitha Mount, the Hellenic Ornithological Society (HOS) initiated the Parnitha Monitoring Programme. The project, which relies on the participation of volunteer recorders, aims to evaluate the long-term effects of the fire on the avifauna of the area. In particular, the main objectives are to assess changes in the diversity and distribution of bird species, as well as the rate of recolonization of the area and the use of different habitats within burnt and unburnt forest stands. Apart from the above, the project aims to strengthen "citizen science" actions developed by HOS and through these to train volunteers for conservation and monitoring programmes. The monitoring methodology followed were point counts, with selected points being located along the 100km main road network. In all, 90 predefined points are monitored once every 2 months, covered by 6 field teams comprising of 3-4 volunteer recorders each. All bird species identified were recorded per point during a 5 minute period in 4 specified distance bands, namely <50m, 50-100m, >100m and flyovers. Point data were collated in 3 basic categories, mainly burnt, unburnt and mixed stands, and analyzed using GIS. As expected, the first results show that the number of individuals, as well as the number of species, is greatest in unburnt stands of the area, a difference which is more pronounced during winter months. Spatial analysis of data allows for the delineation of the possible distribution of each species using IDW Interpolation method.

Molecular insights into the phylogeny of the genus *Dendarus* in the Aegean region.

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The genus *Dendarus* (Coleoptera; Tenebrionidae) is distributed throughout the Mediterranean basin from Morocco to the Caucasus. Yet, its taxonomy is complex, unstable and continuously revised due to the great morphological and ecological plasticity of its species. Based on the current taxonomy, the genus shows a remarkable degree of diversity with 36 species in the area of Greece (27 are strictly island endemics). In the present study, the question of phylogenetic relations among the species of *Dendarus* encountered in the Aegean region was addressed using partial mitochondrial [cytochrome oxidase I (COI) and 16S rRNA (16S)] and nuclear [elongation factor-1 alpha (Ef-1a)] DNA sequences. The data support the monophyly of *Dendarus* and suggest the presence of several distinct phylogenetic lineages. By examining intraspecific relations it was found that extant populations of several syntopic and taxonomically well-established species (i.e., Cretan species; *D. foraminosus, D. wettsteini*) are not monophyletic. The distinct geographic distribution of the major clades of the phylogenetic tree and its topology suggest a spatial and temporal sequence of phylogenetic separations that coincide with some major paleogeographic separations during the geological history of the Aegean Sea. The results stress the need for a reconsideration of the evolutionary history of Aegean *Dendarus* species and help overcome difficulties that classical taxonomy has encountered at the species level.

Opisthobranchs (Mollusca: Gastropoda) of the island of Crete: new records and notes for their zoogeography and ecology.

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Opisthobranch fauna of the island of Crete is poorly known in comparison to other parts of the Greek Seas and the Mediterranean Sea. An extensive SCUBA survey of the coasts of the island of Crete and its surrounding small islets, in various types of soft and hard substrate habitats from the sea level down to 40m depth, have resulted in the recording and/or collection of many opisthobranch species. A total of 41 species (belonging to 6 classes out of 9 worldwide and 23 families out of a total of 75 worldwide) comprise the opisthobranch mollusc fauna of the island of Crete nowadays. Among the recorded species in this study, 19 constitute new records for the mollusc fauna of the island of Crete *(Aplysia dactylomela, A. depilans, A. punctata, Bursatella leachii, Cratena peregrina, Dendrodoris grandiflora, Discodoris atromaculata, Elysia timida, Flabellina affinis, Flabellina pedata, Haminoea cyanomarginata, Hypselodoris orsinii, Hypselodoris picta, H. villafranca, Janolus cristatus, Philinopsis depicta, Piseinotecus gabinieri, Thuridilla hopei* and *Umbraculum umbraculum),* while one *(Piseinotecus gabinieri* Vicente 1975) had not been previously reported from the Eastern Mediterranean Sea. It is worth mentioning that three species (almost 10% of the total No of species) are allochthonus (alien) species, indicating a gradual shift over time in the zoogeographical composition of this taxon, a phenomenon which has recently been reported also for other major taxa (e.g. Crustacea, Pisces) of marine organisms distributed in the island of Crete and emphasizes the necessity of more intensive studies of the molluscan communities in the area.

Ecological quality of river Nestos (Hellas) and its tributaries in September 2008.

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With the approval of the European Water Framework Directive 2000/60/EC, the ecological integrity has become a primary objective in monitoring programs of surface waters. For this reason, the present study assessed the ecological quality of transboundary river Nestos (NE Greece) by evaluating benthic invertebrates, physico-chemical and hydromorphological parameters. Macrozoobenthos and water samples were collected from 12 sites during September 2008. The physical structure of the river had been previously recorded in June 2008 using the River Habitat Survey (RHS). Statistical (Cluster, FUZZY and CANOCO) analyses were performed and HES national score was used in order to classify the sites according to their water quality. For sites corresponding to RM-2 and RM-4 river types, additional intercalibration multimetric indices were calculated. Nestos main course appeared to have "moderate" ecological quality except for one sampling site, Temenos, which had "poor" ecological quality. The functioning of two hydroelectric power plants was found to be the primary factor affecting benthic fauna communities. Unknown sources of pollution coming for the frontier country of Bulgaria may have also contributed to the impoverishment of water quality. For tributaries, the ecological quality ranged from "good" to "high". The macroinvertebrate communities were those characteristic of natural to semi-natural conditions.

Distribution and density notes on breeding populations of two *Sylvia* species in Greece.

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Among *Sylvia* species *S. melanocephala* is a very common and widespread resident in Mediterranean and *S. rueppelli* is a locally common summer visitor in Greece very little studied. They both breed in similar types of habitat. The aim of this project was to study the distribution of these two species in two regions of Greece and their allopatric and sympatric densities in relation to vegetation, altitude and slope. We counted the number of pairs of the species in seven stations of Asterousia mt. in Crete and one of Ymittos mt. in Attica using point counts during spring 2009. At the same time vegetation coverage, dominant vegetation species, altitude and slope were noted. Distribution maps were drawn and istograms of densities related to station, vegetation, altitude and slope were extracted. Densities of each species are lower when sympatric and higher density for *S. melanocephala* occurs in bushes of *Calicotome villosa* and for *S. rueppeli* in bushes of *Quercus coccifera*. *S. melanocephala* prefers total coverage of vegetation above 90%, while *S. rueppelli* does not seem to differentiate its density according to vegetation coverage. Low altitudes are preferred from *S. melanocephala* and higher from *S. rueppelli* and the same pattern is also followed for slope. Competition is probably the main reason for the reduction of densities in sympatry and for the distribution of species in different altitude and slope.

Geographical distribution and chromosome study of the underground vole *Microtus thomasi* in Albania and Montenegro.

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The underground vole *Microtus thomasi* is a Balkan endemic species, with a wide distribution in the grasslands and crops of Greece, Albania and former Yugoslavia. Extensive studies in Greek populations in a period of more than 15 years, revealed a remarkable chromosome polymorphism, affecting the autosome number and the sex chromosome morphology. In order to expand our knowledge in the vole's populations in Albania and Montenegro, we examine 77 individuals from 14 localities, by obtaining chromosomal material from bone marrow and treated according to the standard C- and G- banding staining. All individuals examined, belonged to the chromosome races *"thomasi"* (2n=44, FN=44), "subalpine" (2n=42, FN=42) and "Rb-subalpine" (2n=40, FN=42), which are also distributed in Greece. Furthermore, the C-banding pattern revealed an extended sex chromosome polymorphism, demonstrating three different variants of X and three different variants of Y chromosomes. If we take into consideration chromosomal data from Greek, Albanian and former Yugoslavian populations, *M. thomasi* seems to appear the highest chromosomal variability compared to other species of this genus. So, we assume that due to the limited mobility of the underground vole and the rough terrain of the Pindos mountain range, it is possible that geographical barriers isolated several small populations, where inbreeding and random genetic drift fixed different chromosomal mutations, giving rise to this extensive chromosomal polymorphism.

Sex chromosome evolution in *Microtus thomasi:* repetitive DNA sequences and chromosome painting.

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The underground vole *Microtus thomasi* demonstrates considerably increased chromosome polymorphism, resulting at least five chromosome races: "*thomasi*" (2n=44, FN=44), "*atticus*" (2n=44, FN=46), "subalpine" (2n=42, FN=42), "Rb-subalpine" (2n=40, FN=42) and a new at the province of Edessa (2n=38, FN=42). In addition to chromosome number differences, each chromosome race present several of X and Y chromosomes variants, differing in the morphology and/or heterochromatin constitution. Since classical cytogenetic and phylogenetic analysis with mitochondrial genes did not provide a clear pattern, we tried to expand our knowledge on the evolutionary relation of *M. thomasi* chromosomal races and sex chromosomes by using FISH with different repetitive DNA sequences and chromosome painting. For this analysis we used probes of isolated repetitive sequences as satellite DNAs and retrotranposon (LINEs and SINEs), either from *M. thomasi* (Mth-Alu900, Mth900-LINE, Mth480-SINE) or from other closely related *Microtus* species (MSat160). The satellite DNAs (Mth-Alu900 and Msat-160) were located on the pericentromeric heterochromatin, while L1 and SINE are distributed homogeneously in the euchromatic regions of all chromosomes, but not in the pericentromeric and sex chromosomes heterochromatin. Finally, chromosome painting probes were prepared by microdissection and DOP-PCR of the acrocentric smaller Y chromosome (Y0) and of the small arm of the "*atticus*" subtelocentric X chromosome. Surprisingly, we obtained very similar result with both probes in the X and Y sex chromosomes. In general, the X chromosomes presented signal along the euchromatic regions, and the Y chromosomes in terminal and pericentromeric regions. However, the painting pattern revealed more variability than previously described by C-banding analysis, demonstrating a very complex sex chromosomes evolution in *M. thomasi.*

Contribution to the Collembola fauna of Crete and notes on the distribution of species typical of the Mediterranean region (Insecta, Collembola).

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According to the "Species list of the fauna Europaea" (last update 19 April 2007, *http://faunaeur.org/species_list.php)* 76 species and subspecies are known from the island Crete. The aim of our study is to update the Collembola checklist of Crete, in order to provide information about newly recorded species (biology, biogeography) and about its endemic species. Distribution patterns of species typical of the Mediterranean region are described. Based on extensive faunistic studies within the White Mountain region (West Crete), new species were recorded from this island (Schulz & Lymberakis 2006: 12 (trap samplings from 1990 –1992), Schulz 2008: 13 (substrate samplings from 2004) and Schulz: 14 (substrate and soil samplings from 2006). We analysed both the literature and our own collection data to establish the distribution of springtail species typical of the Mediterranean region. The faunistic studies of the White Mountains yielded 39 new species records. Consequently there are now 115 collembolan species and subspecies known from Crete. Most of the newly recorded species are widespread within Europe, but also some rare species were found (e.g. *Megalothorax incertus* and *Cryptopygus orientalis).* The proportion of endemic species is high (nearly 10%). Two endemic species, *Dimorphotoma porcellus* and *Proisotoma anopolitana,* show special morphological changes (ecomorphosis). *Caprainea bremondi* and *Jordanathrix articulata* (Bretfeld 1999) are typical Mediterranean species.

Aegean Biogeography: A landbridge island perspective.

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The thousands of Aegean islands, with their complex palaeogeographical and palaeoecological history, diversity of ecosystem types, rugged topography, and the wide range of areas they span, offer an excellent natural experimental setup for island biogeography studies. An increasing number of phylogenetic and phylogeographic analyses based largely on molecular markers are gradually revealing the importance of vicariance events, dispersal, and in situ speciation in shaping current distributional patterns of a variety of organisms in this region. This body of knowledge leads to new insights into the effects of crucial historical events especially for endemic forms. At the same time, important contributions to ecological biogeography have been made after analyses of insular communities on Aegean islands. These include the Choros model, new approaches to the Small Island Effect, the application of structural equation models in biogeographical analyses, concepts regarding non-adaptive radiation, and several other innovations and elaborations of new ideas. The richness and variety of Aegean islands provide a valuable tool for testing hypotheses of island biogeography and macroecology, e.g., regarding species turnover, the role of habitat diversity, species co-occurrence etc. Here, we present a concise account of major contributions to Aegean biogeography. Furthermore, we combine these with new insights gained regarding patterns and processes that characterize landbridge islands in general and oceanic archipelagos such as Hawaii and the Canaries, with the aim of obtaining a more comprehensive understanding of spatial biodiversity patterns in the Aegean region.

Dispersal ability, habitat suitability and distribution patterns of brown bear *(Ursus arctos)* affected by the newly constructed Egnatia highway – N.Pindos - Greece.

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Landscape fragmentation and habitat loss are considered as major threats for large carnivores such as bears. Road networks have been identified as one of the most likely causes leading to the reduction and the isolation of suitable habitats and the increase of landscape heterogeneity. In addition, a series of studies have demonstrated that roads are directly linked to wildlife mortality (e.g., vehicle collisions). Thus, road impact upon large carnivores has been receiving a lot of attention from conservationists. However, among the studies focusing on the ecological effects of roads only few have aimed at studying species responses/feedback to a newly established road network. In the present study, we use telemetry data and develop a series of models to test dispersal ability, habitat suitability and distribution patterns of bears versus a newly constructed road in a mountainous anb semi-mountainous ecosystem. Data on annual movements of 18 male and females adult bears located in the vicinity of the 42km alignment of the new Egnatia highway in eastern Pindos, Greece, were collected during a 2 year period. Our results demonstrate that adult bears utilized smaller habitat patches close to the highway, limiting their dispersal abilities. Estimated home ranges decreased in surface at the sites around the main highway corridor even when we detected no clear difference in suitability of the landscape matrix between those sites and those located at a larger distance from the highway. An analysis of habitat suitability performed for both presence/absence data and abundance of presence demonstrated that bears select sites of relatively higher elevations. Conclusively, the distance from the highway was identified as the most critical factor influencing the relative use of habitat cells that could even share similar environmental characteristics.

A computer-aided estimation of Nematode body size and biomass.

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A major task in the frames of the 7th framework EU project SOILSERVICE is to undertake food-web analysis in order to estimate resilience of soil functions and services under disturbance and climate change. For building realistic food- web models we need some good biomass estimations of the major groups of soil biota. Among other soil animals Nematodes is a very diverse group including bacterial and fungi feeders, plant feeders and predators. Thus, their role in regulating soil functions is very important. For estimating biomass of Nematodes we developed a computer program that estimates nematode body size (length, width and volume) from microscopic images. For each image file in a directory the program tries to isolate the nematode from the background and if succeed it takes the measurements needed to estimate the volume. If the automatic detection fails (and there are several reasons for that) the program asks the user to provide leading points across the edge of the Nematode body and interpolates between points in order to estimate the body size. For the estimation of the volume we consider each small segment of the body as a part of a cone. For the estimation of biomass we used resent specific gravity estimates for nematodes (Carta and Carta 2002).

Effect of familiarity on social relationships and spacing behavior of mound-building mouse *Mus spicilegus* in summer.

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Mus spicilegus is an outdoor species from southern-eastern Europe, adapted to agroecosystems. In the present study, I tested for the effects of familiarity on social behavior of male and female mound-building mice in summer with dyadic encounter tests conducted in the field. I hypothesized that both males and females should respond less aggressively to their close neighbors than to the rest ones. The field investigation was conducted in northern Bulgaria, in a 1 ha secondary ecosystem, which was in succession on the place of agroecosystem of *Helianthus annus* L. The Capture-Mark-Recapture method was used. Several indices of spacing behavior such as distance of recapture, home ranges were analyzed. In parallel, social interaction between mound-building mice was studied in intraspecific male-male and female-female dyadic encounters. The encounters were performed in the same habitat patch with an arena made of transparent Plexiglas. Each mouse was tested with at least two others, but captured at a different distance. All tested mice were adults. Results indicated that males responded less aggressively to their immediate neighbors than to more distant ones. Similar responses were not found in females. In July, home ranges of female mound-building mice were separated and their relationships were agonistic. The ultimate reasons for the displayed behavior of male and female *M. spicilegus* are discussed.

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The use of Contingent Valuation Method (CVM) to economic valuation of marine biodiversity: the case of Mediterranean Monk Seal.

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This paper presents a goods and services approach to determine the economic value of *Monachus monachus* with the aim of clarifying the role of valuation in the management and conservation of marine biodiversity. The CVM study considered here was carried out in three different towns of Greece (Volos, Thiva and Kozani) and looked at willingness-to-pay (WTP) for protecting the Mediterranean seal. The data consist of two responses: first, a binary response detailing whether or not respondents were in principle prepared to pay for the protection of *M. monachus;* secondly, those respondents who answered "yes" to the first question were then asked to state their maximum WTP for its protection. Also crosstab and chi-square tests was used for statistical inference on the independence of the respondents' attitude towards socioeconomics characteristics. The criteria that were used were x2, Cramer's V and Gamma. For each region the Pearson x2 shows clear deference between peoples' WTP (x2=9.33, p=0.09, Cramer'V=0.206). The statistical significance of the observed differences in the stated WTP amounts can be explained by observed differences in education level, personal income, family income, opinion for the compulsory of seal protection and the people's ecological conscience. Across sites 76.4% of the 220 respondents were willing to pay towards a trust fund for seal conservation. The main motives/values for positive WTP were: existence value (54.1%), option value (37.3%), bequest value (35.5%), quasi option value (20.9%) and use value (15%). The main reasons for non-willingness to pay were limited income and the belief that conservation is government responsibility.

Ecology of soil arthropods in a dune ecosystem of Cyprus.

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The soil arthropod fauna of a dune ecosystem in the southern coast of Cyprus was studied during one year using pitfall traps that were collected at monthly intervals. The specimens were identified down to order level except for Coleoptera that were identified to family level. The main macroarthropod groups were ants, tenebrionid Coleoptera and Opiliones. The Shannon-Wiener diversity index shows intense temporal variation, with minimum values during winter and maximum during spring and summer when most of the species richness is observed. Temporally grouping monthly samples showed two periods, each divided into two seasons. During the cold period (November-March) species richness is significantly lower while during the dry and warm period (April-October) species richness is higher, especially for thermophilous groups that can adapt to sandy habitats and often move vertically in the soil towards more suitable conditions. The groups that are most abundant in numbers are present in areas with more dense plant cover in contrast with uncovered areas with intense sunlight.

Biodiversity of Farwa Island.

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Farwa island considered as one of the biggest and most important island in Libya. It located in the Mediterranean north western part of Libya, about 2Km from the Abukamash coast, and it's about 150Km western of Tripoli. It has a suitable climatic condition and unique diverse habitats of extensive tidal area, sand dunes, trees, mud flat, marshes, drying salt lakes, and beaches. The mean annual temperature is 19ºC and the mean annual rainfall reaches 200mm. These different conditions provide a good habitat for many plant and animal species. The most common plant species at this area are: *Eucalyptus gomocephala, Retama retam, Phoenix dactylifera, Artimisia compestris, Thymelaea hirsute, Juncus maritmus, Helicrysum stoechas, Ephedra alata, Lyceum europeaum.* And the most common mammal species seen in Farwa Island are *Lepus capensis, Vulpes vulpes, Poecilictis libyca, Hystrix cristata.* There are many kinds of reptiles like lizards, snakes, and sea turtles. And also there are many kinds of arthropods like beetles, butterflies, moths, ants, bees, wasps, locusts, spiders and scorpions. Water birds form the most important fauna elements in Farwa Island. This island is the most important area in Libya for many migratory birds, especially for the birds which are under world wide danger of extinction like *Sterna bengalensis, Larus audouinii, Phalacrocorax aristotelis, Aythya ferina, Numenius tenuirostris.* There are many migratory bird species breeding at this island, the most common are *Sterna albifrons, Sterna caspia, Sterna hirundo, Tringa tetanus, Larus cachinnans,* and *Charadrius alexandrinus.* Fawa island provides many kinds of birds with proper conditions for nutrition, reproduction, sheltering and wintering, because of its different habitats and convenient climate condition.

Elements of breeding biology and estimation of reproductive success in a N. Aegean colony of the seabird *Phalacrocorax aristotelis desmarestii.*

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The Mediterranean shag *(Phalacrocorax aristotelis desmarestii)* is a seabird endemic to the Mediterranean Sea and the Black Sea region. The subspecies' biology and ecology are poorly studied, especially in the eastern part of its distribution, although many of its populations live in Greece. North Aegean is considered one of the most important regions for its reproduction. This study presents the first results regarding the reproductive success of the subspecies based on the monitoring of a colony in Xironisi, Kavala, during one reproductive period. The colony was repeatedly visited in 20-days intervals from February to May. In every visit the island coasts were censused from boat, all visible nesting sites were recorded and those that were accessible were marked and used to estimate elements of reproductive success. More than 80 reproductively mature individuals occupied the island, 34 nests were recorded and reproductive success was estimated in 19 of them. Nests were built in various habitat types but shags favored covered cliffs over the sea, since nest density was higher there. Several characteristics of the nests were recorded (type, size, direction, coverage etc) and their correlation with breeding success was estimated. The reproductive period began on the first week of February and was completed by the first week of June. Egg laying was asynchronous, although the majority of eggs were laid between mid-March and the first week of May. Clutch size was high (2,74), only 17% of the eggs laid were lost, while hatchling mortality was low. Most of the chicks were ringed, in order to estimate site fidelity during cencuses that will take place in the same colony the following reproductive periods. Blood samples were also taken and will be used for the population's genetic structure analysis.

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Identifying Greek freshwater fish species through DNA barcoding: the case study of lake Kerkini.

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Actions are needed in order to record and conserve the diminishing terrestrial as well as aquatic biodiversity. These include the creation of a universal database, in which every species (including endangered ones) would be recorded. This identification could be accomplished through DNA Barcoding, a fast and accurate method based on sequencing the mitochondrial gene cytochrome oxidase subunit I (COX I). This particular region was selected for its sufficient intrerspecies diversity, as well as its adequate phylogenetic signal. The protocol includes DNA isolation from soft tissue subsamples, followed by amplification and sequencing of the desirable fragment. Sequences are then submitted to BOLD database *(www.fishbol.org)* and used to draw conclusions. The Greek freshwater fish fauna is still under intensive taxonomic revisions, thus it provides a good chance for species identification based on DNAbarcoding. In the present work we used fish specimens from Lake Kerkini and we also examined whether the DNA barcoding method discriminates fish populations of the same species among different lake systems. During the period 2007-2008 we collected 56 individuals, representing 13 species and 4 families. Sequences 655 bp long were obtained, which were characteristic of each species and therefore valid as molecular barcodes. Genetic distances among sequences of different taxa, calculated according to the K2P model, were consistent with previous studies. The phylogenetic tree constructed stresses the need for taxonomic reevaluation of some species. Sequences from the common species of the lakes Doirani, Volvi (previous work 2006 – 2007) and Kerkini were compared and some location-based variations were detected and discussed.

Genetic structure of European *Tinca tinca* populations.

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In the present work the genetic structure and evolution of *Tinca tinca* (Cyprinidae) populations was studied based on sequencing of three mitochondrial DNA regions. DNA was extracted from 50 muscle tissue fish samples of five European countries (Czech Republic, Greece, United Kingdom, Romania and Spain). PCR was subsequently used for amplification of the following mtDNA regions: the D-loop, a part of cytochrome c oxidase subunit I (COXI) gene and a part of cytochrome b (cytb) gene. PCR products were sequenced and all sequences were aligned and observed for genetic polymorphisms. In total 1,665 base pairs were analyzed. The D-loop region was found to be more polymorphic in comparison to the COXI and the cytb regions (24, 10 and 4 point mutations, respectively). This can easily be attributed to the characteristic higher mutation rates of the D-loop region. Haplotypes are clustered in two main phylogenetic groups with average nucleotide divergence among them approximately 2%. Czech and Romanian populations include both haplotype groups, Greek and UK samples form one group, while Spanish samples belong to another group. Thus, the phylogeographic signal in the distribution of the two groups does not seem to be clear enough, although conclusions based on the three mitochondrial regions separately, are generally in agreement.

Monitoring plan of habitats and threats of the protected area Hortarolimni – Alyki, Lemnos island, North Aegean.

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The island of Limnos (North Aegean), includes some of the most important coastal habitats of the Aegean region, not only because of the importance of their plant communities and floristic elements, but also because they are characterised of high level of naturalness. In the context of the monitoring program, we studied the sand dunes of the coastal zone and the residual oak forest *(Quercus macrolepis).* The sand dunes are placed on the bay of Keros - Hortarolimni - Alyki and constitute a very extensive zone, which is unique for the Aegean area (except the case of Crete). Sampling effort was based on 70 permanent line transects on which we plot on average 5 quadrat plots (2X2 m) in each transect. In each plot we recorded all the taxa, the habitat type and the presence of ruderal taxa. The creation of the profile of the sand dune - coastal system and the assessment of the threats in the sand dune zone was the main goal of the sampling. Although the fact that the sand dunes, as coastal habitats, are recently facing moderate pressures (mainly because of the touristic development) the sand dunes of Limnos include habitats that due to their extension and their naturalness can be characterized as habitats of special value. The forest of *Quercus macrolepis* is mainly a residual forest, which consists of scattered mature oaks in the agricultural zone between the villages Kontopouli and Repanidi. We sampled 15 random plots on the scattered tree areas and 8 preselected plots on forest patches. Each plot was 0,1 ha and all the mature trees, young trees and their canopy cover was measured. The presence situation is critical for a conservation point of view, based on the fact that even the loss of an individual tree can have negative impacts for the whole forest. The regeneration rate of the forest is extremely low and measures must be taken for the protection of this remaining habitat.

Morphometric variation of Greek house mouse populations: is karyotype "stronger" than geography?

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The presence of Rb metacentric chromosomes in wild populations of the house mouse *Mus mus domesticus* has been intensively studied due to a)the theoretical impact of these chromosomes on the gene flow among populations characterized by different chromosome numbers, and b)the consequent effects on the ongoing speciation processes. The study of the Rb chromosome system of NW Peloponnisos by means of allozyme and mtDNA genetic markers analysis failed to reveal any relationships based on either chromosome number or geographical affinities. In the present work we applied morphometric methods in order to study the patterns of variation in certain morphological characters of these organisms. By means of Geometric Morphometrics we analyzed 588 skulls from 63 Greek localities (~250 from NW Peloponnisos) applying 14 landmarks on the dorsal and 16 landmarks on the ventral side of the skull. Furthermore we conducted an outline analysis of shape variation for the first upper right molar (M^1) using Elliptic Fourier Analysis. Taking under consideration the chromosome numbers of the individuals (mainly from the Rb system of the NW Peloponnisos) there was a clear discrimination of three major groups: the group of all-acrocentric mice (2n=40), the group with mice characterized by the maximum number of Rb metacentrics (2n=24), and the group with intermediate numbers (2n=26-39). Our results are in congruence with other studies from other Rb systems, implying the multiple effects of the Rb metacentrics on house mouse populations.

Comparison of global growth and reproduction patterns in Round Sardinella *(Sardinella aurita)* stocks.

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Differences in life history characteristics (i.e. growth, maturation, spawning and longevity) among distant populations of fishes provide material for assessing patterns and mechanisms of phenotypic divergence. The plasticity and adaptability to environmental changes of round sardinella *(Sardinella aurita)* and its wide geographical range, provide a model system for studying the evolution of reproductive and growth strategies. The growth parameters and several indices used to describe the growth potential of the fishes as well as the reproductive characteristics of 30 round sardinella stocks were used to compare its growth and reproductive strategies and to interpret the origin of any life-history discrepancies with respect to likely selection pressures driven by environmental differences. The Mediterranean and Atlantic round sardinella stocks exhibited different growth strategies. A western-eastern gradient was observed for the Atlantic stocks. Such a gradient was not observed for the Mediterranean stocks in either the longitudinal or the latitudinal axis. The duration of round sardinella's spawning is more extensive in the southern than in the northern part of the Mediterranean Sea. In the Atlantic, the reproduction of round sardinella is highly variable regarding the onset and duration of spawning. Consequently, its reproduction lasts throughout the year in eastern Atlantic exhibiting intra-annual variations with one or more peaks of reproductive activity. Finally, in the western part of Atlantic Ocean, the pattern changes and it seems that reproduction is governed by a latitudinal effect and is confined to a specific time of the year.

Tracking bird's biodiversity in the city of Thessaloniki, Greece.

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The city of Thessaloniki (including its conurbations) is the second largest urban area of Greece. It is situated on Thermaikos gulf in North Greece among important Ramsar and Natura2000 wetlands, such as Axios – Aliakmonas - Gallikos Delta and Lakes Volvi and Koronia. The bird recording project is a renewal of 90's recording and began on autumn 2007 by volunteers. Ten parks which differ in size, urban habitats, vegetation structure and anthropogenic disturbance were selected. The survey takes place in each park once a month or even more often. The rest of the city is also being monitoring but irregularly. So far, 98 bird's species have been observed. A first estimation of abundance, distribution and season status of each species has been developed. Parks accordingly to their concentrations in species and individuals have been classified. The park between Touba's embankment and Pileas ghyll concentrates the most (46%) and more rare species for Greek cities (e.g. *Perdix perdix)*. This research is quite innovating for Greece since the knowledge on urban ecosystem's biodiversity is limited and future management actions could have unexpected influence on urban wildlife. These are preliminary results; our goal is to continue monitoring and to publish a book which will highlight urban biodiversity, encourage public awareness and active participation in urban wildlife conservation and promote conservation of other threatened natural ecosystems.

Economiv value of conservation: the case of the edible sea urchin *Paracentrotus lividus.*

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The sea urchin *Paracentrotus lividus* is common in the Mediterranean and his prices, in different market all over the world, fluctuate according to the roe quality. This price reflections only a part (use value) from his total economic value. This study investigates the public interest, experience and knowledge of them, the relationship between public attitudes and the willingness to pay for his conservation and uses Contingent Valuation Methods (CVM) to estimate its total economic value (use and non use value, existence and bequest value). Data on the perception's willingness to pay (WTP) for the conservation of sea urchin were collected using administered questionnaires who asked participants to state their maximum WTP for its protection. The results show that 53.6% of the 211 respondents has test sea urchin, 63.3% of them eat very often and a significant percent (61.6%) believes that it is very beneficial to include sea urchin in our diet. On the other hand, 83.9% of the participants were willing to pay for sea urchin conservation and only the 16.1% of them ware unwilling to pay for different reasons (e.g. conservation is already funded by national and regional governments; it is a responsibility of the government; etc). The annual average WTP value per participant using the CVM was 76.87 €. Factors that influence the decision to support conservation of sea urchin include the respondent's active participation in activities for the protection of environment ($x2=5.074$, $p=0.024$, Cramer'V=0.156).

Molecular identification and distribution of *Ochlerotatus mariae* complex across the Northeastern Mediterranean coast.

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*Ochlerotatu*s mariae complex consists of three species, namely *Ochlerotatus mariae, Ochlerotatus zammitii ve Ochlerotatus phoeniciae,* in the Mediterranean region. Among these species, *Oc. zammitii* and *O. phoeniciae* exist in Turkey and it has been suggested that they are distributed allopatrically based on the so called unreliable morphological characters. In the present study, zoogeographic distribution of *Oc. zammitii* and *Oc. phoeniciae* in Turkey, which is the only country they exist together, was determined using molecular markers. In this content, larvae samples were collected from 24 different localities along Northeastern Mediterranean coast, ranging from Kuşadası to Samandağı, in 2007-2009. rDNA ITS2 region of the genomic DNA isolated from the collected larvae samples was amplified by polymerase chain reaction (PCR) and sequenced by Automated DNA sequencing. DNA sequence data of this study showed that samples from 12 localities from eastern and western parts of the Antalya Bay were *Oc. phoeniciae* while *Oc. zammitti,* respectively.

Ecological triangles in the Aegean Sea: the symbiotic associations among sea anemones, hermit crabs and gastropod shells.

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The ecological triangles have been poorly investigated in the Mediterranean, mainly focusing on population structure and the relations between the participant species. In the context of the very limited knowledge for the Aegean, a three-year study was carried out (2005-2008) to assess their qualitative composition and abundance and to investigate their distribution and allometric relationships. Overall, 193 samples were collected from trawl and small-scale fishery discards at four areas of the Aegean (Thermaikos Gulf, Spetses, Mykonos, Crete). The sea anemone *Calliactis parasitica*, 9 gastropods *(Tonna galea, Phalium granulatum, Galeodea echinophora, Natica stercusmuscarum, Hexaplex trunculus, Bolinus brandaris, Charonia tritonis variegata, Bolma rugosa, Aporrhais pespelecani)* and 4 hermit crabs *(Dardanus arrosor, D. calidus, Pagurus excavatus, Paguristes eremita)* were recorded. The association between *D. calidus* and *C. parasitica* was referred for first time in the Eastern Mediterranean. The ecological triangle formed by the species *P. eremita – H. trunculus – C. parasitica* dominated (24%) followed by that of *P. eremita – B. brandaris – C. parasitica* (15%). The allometric analyses showed a significant relation between hermit crab and shell size, leading to the conclusion that the greater the individuals the more suitable shells they select, proportionally with their size. The qualitative analysis of the samples distribution indicated that the Aegean Sea can be divided in two biogeographic sectors, i.e. North and South. The quantitative analysis also showed differences in the abundance of the ecological triangles per study area. Further research is required in order to understand the ecological triangles distribution pattern over the Mediterranean.

Are *Anguilla anguilla* populations panmictic? Preliminary results.

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The European eels *(Anguilla anguilla)* are characterized by a unique life cycle. They live and mature in the fresh waters of the continent, they travel to the Sargasso Sea where they mate, lay eggs, and die while the offspring travel back to Europe by the Gulf Stream. Due to this distinctive life strategy, scientists have argued for many years whether the European eel populations belong to a single panmictic population or not. This work aims to examine the genetic structure of European eels by investigating patterns of mitochondrial DNA polymorphism. DNA was isolated from individuals belonging to 6 different populations (one from England, three from France, and two from Greece) with the CTAB protocol. Initially, polymorphism was evaluated at two mitochondrial DNA regions, the whole cytochrome b gene (~1200 bp) and part of the D-loop (~500 bp). These two regions were PCR amplified and sequenced. Results showed that the cytochrome b gene is more polymorphic than the D-loop region. Therefore, analysis will be focused on the former with sequencing of additional individuals. The reconstructed phylogeny using maximum parsimony in MEGA (ver. 4) demonstrated that the sequences do not follow any particular phylogeographic pattern. This indicates that there is no geographical isolation between European eel populations and that all individuals belong to one panmictic population. The results of this research are in agreement with previous works based on analysis of the cytochrome b gene polymorphism.

A fish-based index for assessing the biotic integrity of the Evrotas River (Greece).

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The Water Framework Directive 2000/60/EC (WFD) has set the legislative basis to protect and manage all European inland waters and requires scientific tools to assess the qualitative state of surface waters. Freshwater fish are considered one of five "biological quality elements" by the WFD; they can be used to assess surface-water ecosystem biotic integrity. We conducted ichthyological surveys in the Evrotas river basin (Peloponnese) using standardized electrofishing methods at 66 sites during the years 2007-2008. A preliminary index of biotic integrity (IBI) was developed through the following steps: a) designation of biotic types (river typology) using fish-assemblage cluster analysis, b) establishing type-specific biotic reference conditions by utilizing historical data, descriptive statistics of fish assemblages, and natural history baselines (expert judgement), c) identification of appropriate biotic metrics (ichthyological attributes that are known to respond to anthropogenic degradation/pressures) for each river type, and d) the initial application and calibration of the type-specific metrics within the multimetric index. According to the results, three generic biotic river types were identified and delineated along a longitudinal gradient from the headwaters to the river-mouth. Eight icthyological metrics where devised (3-5 for each river type); these include attributes such as species-richness, fish abundance, proportion of native species, and specific ecological requirements of the local ichthyofauna (seven freshwater fish species). Finally, the selected metrics were used to construct an index scale producing a five-point assessment scheme as proposed by the WFD (i.e biotic integrity assessment ranged from high, good, medium, poor to bad). Applying the index to site-based fish survey data revealed widespread degradation in river ecosystem biotic integrity for the major part of Evrotas River. Specifically more than half of the sampled sites (52%) were classified as being in "bad" condition. This situation was largely attributed primarily to overexploitation of the water resources and the effects of prolonged drought during 2007. Monitoring fish communities and relating anthropogenic pressure with community and species attributes will assist in ameliorating this provisional assessment tool. Finally, the application of a fish-based index may contribute to effective River Basin Management Planning for preserving and/or restoring water bodies within this distinctive and threatened river basin.

Colony size, nesting site selection and habitat use of Lesser Kestrel *Falco naumanni* on the island of Lemnos, North Aegean.

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Among the Greek islands, Lemnos holds the largest breeding population of Lesser Kestrels *Falco naumanni.* During 2008, we studied colony size, nest site selection and habitat use of the colonies in seven villages surrounding the SPA site of wetlands Hortarolimni – Alyki of Lemnos. We found 80 breeding pairs in five colonies and the colony size varied from 11 to 24 breeding pairs. The majority of the nests were found on derelict houses (83%), on the roofs (87%) and usually in suitable holes under old fashioned tiles (56%). The mean height of the nests was 5 m (s= ± 2.33). Random sampling in the buildings of the villages showed that the proportion of used buildings to derelict ones was 52:48 %. Moreover, the proportion of roofs with old fashioned tiles and suitable holes for nesting was equal to other types of roofs (eg new roofs). Lesser Kestrels seemed to prefer specific habitat types for foraging (cereal and set aside crops). To conclude, Lemnos holds a large and viable population of Lesser Kestrel due to high nesting availability in the villages and optimal foraging conditions.

Two case studies on marine fish assemblages associated with fish aggregating devices (FADs) in Greek waters.

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Worldwide, more than 300 species have been observed in association with floating structures, and fishermen exploit these associations to expand their catches. Two research projects were carried out in Greek waters to improve our knowledge on structure-associated aggregations in the area, investigating also the potential use of moored FADs as fisheries enhancement tools. A total of 13 species, six of which belonged to the family Carangidae, were recorded beneath/around floating units, but well pronounced differences in species composition and abundance appeared between the two areas of investigation. Off southern Peloponnisos, *Coryphaena hippurus* was one of the most abundant species of the FAD community, followed by *Naucrates ductor* and *Trachurus picturatus,* while off Kalymnos Isle *C. hippurus* exhibited significantly lower abundance, *N. ductor* was absent from the FAD vicinity, and small juveniles of *Caranx crysos* and *Seriola dumerili* dominated. Species-specific patterns of use and residence times contributed significantly to short-term variability of fish assemblages at FADs. Certain species were located immediately beneath the floating structures; Carangidae species exhibited a schooling behaviour of similar-sized fishes, while *Balistes carolinensis* and *Polyprion americanus* were represented by solitary specimens. On the other hand, other species such as *C. hippurus* appeared to move around the structures in varying distances. FAD-associated communities in the two study areas comprised mainly immature juveniles not of interest to any fishery, except for *C. hippurus* which however exhibited limited abundance particularly in Dodecanese waters.

Genetic variation and biogeography of the Corfu toothcarp *Valencia letourneuxi* Sauvage, 1880 (Pisces, Valenciidae) based on microsatellite markers.

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Valencia letourneuxi is a small-bodied freshwater fish species, characterised by low population densities. It belongs to the Valenciidae family that consists of only 2 species: *Valencia letourneuxi* and *Valencia hispanica.* The Greek *Valencia* toothcarp, endemic in Western Greece, the Peloponnese and Southern Albania, is generally one of the most endangered species of Europe. The study of its genetic variation is necessary in order to assess risks and define the appropriate protection strategies. An enriched genomic library was developed for microsatellite-containing sequences and primer sets were designed, optimized and applied on *V. letourneuxi* populations collected from seven different water reservoirs in W. Greece, as well as on the phylogenetically close species, *V. hispanica* and *Aphanius fasciatus.* From the 28 initial primer pairs, seventeen proved to give the best results in subsequent genotyping of sampled populations. The analysis showed evidence of reduced genetic variation and heterozygosity. Furthermore, phylogenetic relationships among populations seem to have a geographical correlation and therefore be related to past gene flow and to the geological history of the region.

Sponges associated with the ecosystem engineering tunicate *Microcosmus sabatieri* in the South Aegean (eastern Mediterranean).

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The solitary ascidian *Microcosmus sabatieri* is a commercially exploited tunicate forming dense populations on rocky cliffs over the Aegean Sea. It is considered an ecosystem-engineer enhancing local biodiversity, due to the dense coverage of its wrinkled tunic by numerous epibiotic organisms. Considering the very restricted knowledge on the faunal assemblages associated with ascidians and the fact that all existing information deals exclusively with free motile species, the main goal of the present work was to study the symbiotic sponge fauna. Ten to fifteen *M. sabatieri* specimens were randomly collected at ten stations located in four Dodecanese islands (Kandeliousa, Tilos, Symi, Chalki) in depths between 30 and 50 m. Overall, 41 epibiotic demosponge species were found. Three of them, *Forcepia luciensis, Hymedesmia pansa* and *Hyrtios collectrix,* are new elements for the Aegean fauna. Each ascidian hosted 1-3 sponge individuals belonging to 1-2 different species. Most sponges were encrusting; nevertheless massive forms, such as *Ircinia variabilis* and *Chondrosia reniformis* dominated in terms of frequency and abundance. These species together with the encrusting *Phorbas tenacior* prevailed in sponge coverage. The epibiotic sponge assemblage showed increased spatial heterogeneity. Sponge diversity, abundance and coverage had similar values among stations, but differed among islands, with increased values in Kandelioussa and Tilos populations; thus, a declining trend was assessed following a NW to SE gradient. Sponges mainly covered the posterior-ventral surface of the ascidian tunic, in contrast with macroalgae which predominated in the most exposed to light anterior and dorsal surfaces.

Freshwater biogeographical units in Greece: where to draw the lines?

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The concept of freshwater "ecosystem regions" or ecoregions has recently been revived especially due to the Water Framework Directive 2000/60/EC (WFD) that introduces the European Union's first policy-relevant ecoregion map. This biogeographical map has been adapted, with minor changes, from J.Illies's (1978) aquatic zoogeographic delineations. In the context of the WFD, ecoregions for inland waters are meant to act as regional units with relatively homogenous patterns in their aquatic biotic communities, in order to assist a continent-wide surface waters typology. We examined the WFD ecoregion boundaries in Greece employing the distributions of freshwater fish assemblages, selected aquatic/semi-aquatic zoobenthos taxa, and climatic characteristics. We initially investigated boundary-delineation criteria based on a biogeographically-guided ecoregion concept. We mapped prominent biogeographic discontinuities (faunal assemblage breaks in species distributions) based on drainage basin biotic affinities and their physiographic watershed boundaries. Biogeographic discontinuities closely coincided with well-recognized geographic barriers to species' dispersal as influenced by geological history and climatic conditions. Charting biogeographically-based regional units is especially challenging in Greece due to its remarkable biogeographical heterogeneity and many knowledge gaps in freshwater-dependent species' distributions. Poorly documented and flawed boundary delineations are evident in both Illies's and other freshwater biogeographic maps. Here we present our preliminary delineations of the seven distinct freshwater biogeographical units identified in Greece and we comment on further needs for the development of a freshwater biogeographical map.

Preliminary data on the reproduction of *Acanthodactylus schreiberi schreiberi* in a sand dune ecosystem in Cyprus.

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The reproduction strategy of a population of the lacertid lizard *Acanthodactylus schreiberi schreiberi* was studied during two consecutive years in the southern parts of Lady's mile beach, Cyprus.Data regarding sexual dimorphism, age at maturity, reproduction periods, clutch size, number of clutches per year, egg and juvenile characteristics as well as growth rates were collected from March to November 2007 and March to August 2008. Sexual dimorphism in the examined population was evident: males had significantly larger body size (SVL) and head dimensions than females. Tail colour was also different between sexes with males having white tails in contrast with a yellow tail of the females that alternates to reddish during the beginning of the reproductive period. All the immature individuals have reddish tails. Differences were also recorded in the minimum SVL attained at sexual maturity between the two sexes. The reproductive period of the studied population starts in May and ends in late August. Females, depending on their age, lay one or two clutches per year. The first clutch is produced on June and the second one at the end of July. Female SVL was negatively correlated with the egg-laying date. Thus, the older the female, the sooner it laid eggs and therefore the sooner it copulated during the reproductive period. The population is characterized by a small clutch size (max of three eggs) and large sized eggs. There seems to be no significant correlation among mother's SVL and clutch size.

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