12th ICZEGAR ABSTRACTS

12TH INTERNATIONAL CONGRESS
ON THE ZOOGEOGRAPHY AND ECOLOGY OF GREECE
AND ADJACENT REGIONS

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

12th ICZEGAR, 18-22 June 2012, Athens, Greece

Organized by the Hellenic Zoological Society

Organizing Committee

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Under the auspices of the National and Kapodistrian University of Athens and the Department of Biology of the NKUA

PREFACE

The 12th International Congress on the Zoogeography and Ecology of Greece and Adjacent Regions (ICZEGAR) is taking place in Athens, 34 years after the inaugural meeting. The congress has become an institution bringing together scientists, students and naturalists working on a wide range of subjects and focusing their research on southeastern Europe and the Eastern Mediterranean. The congress provides the opportunity to discuss, explore new ideas, arrange collaborations or just meet old friends and make new ones. It is especially attractive to young people as they have the opportunity to present their work and learn about the modern trends of science.

This volume includes 191 abstracts of 90 oral presentations and 101 posters that were accepted for presentation at the 12th ICZEGAR. The aim of this book of abstracts is to present current subjects that interest the research community of southeastern Europe and the Eastern Mediterranean. The abstracts are presented in two sections: invited speakers and all the other abstracts in alphabetical order. An index of all the authors can be found at the end of this volume. The international nature of this congress is reflected by the participation of 526 authors from 35 countries and 159 research institutions, universities, museums, NGOs, academies, public authorities and protected area management authorities.

The Organizing Committee would like to express its warmest thanks to all the invited speakers, namely, François Bonhomme (Université Montpellier, France), Salvador Carranza (Institut de Biologia Evolutiva – CSIC/UPF, Spain), Johannes Foufopoulos (University of Michigan, USA), Shai Meiri (University of Tel Aviv, Israel), Nikolaos Schizas (University of Puerto Rico, Puerto Rico), Thomas Schmitt (Universität Trier, Germany) and Katerina Trantalidou (Ephorate for Palaeoanthropology-Speleology, Min. of Culture, Greece).

This congress is dedicated to the memory of Prof. Ioannis Matsakis who first conceived the idea, organized the first congress and supported it in many ways. It is also dedicated to those researchers working in this area who passed away during the last three years. Special mention should be made to László Gozmány, Wolfgang Lopau, Oliver Paget, Adolf Riedel, Otto von Helversen and Fer Willemse who remained close to the congress and the zoogeographical and ecological research in southeastern Europe and the Eastern Mediterranean.

The Organizing Committee

Scientific Programme

Monday, June 18

18.00-21.00 Registration and welcome reception

Tuesday, June 19

9.00 Opening ceremony

9.30 **Plenary Session** (Room 1)

S. Carranza
Forgotten in the ocean: systematics, biogeography and evolution of the reptiles of the Socotra archipelago

Room 1
Terrestrial Invertebrates I

10.20 Processes that shaped *Zonites* distribution: a combined phylogenetic and niche-modeling approach.
P. Kornilios, C. Kassara, E. Thanou, K. Vardinoyannis, M. Mylonas & S. Giokas

10.40 The evolution of dextrality within a sinistral land-snail genus
E. Stamataki, P. Kornilios & S. Giokas

11.00-12.00 **Coffee break**

12.00 Molecular phylogeny and phylogeography of the two close related snail genera *Helicigona* & *Campylaea* (Gastropoda: Pulmonata) in Greece
N. Psonis, K. Vardinoyannis, M. Mylonas & N. Poulakakis

12.20 The diverse scorpions of Greece and adjacent regions
V. Fet

12.40 Genetic structure and phylogenetic relationships incongruent with palaeogeography and current taxonomy in hygrophilous isopods of Greece
M. Kamilari, A. Liontos, E. Klossa-Kilia, G. Kilias & S. Sfenthourakis

Room 2
Amphibians & Reptiles

10.20 A comparative study of the mating call of *Pelophylax ridibundus* (Pallas, 1771) and *P. kurtmuelleri* (Gayda, 1940) from syntopic and allotopic populations
S. Lukanov, N. Tzankov & D. Simeonovska-Nikolova

10.40 The influence of habitat features on amphibian distribution in northeastern Greece
E. Kret & K. Poirazidis

11.00 Modelling beta diversity patterns in insular systems
E. Pitta, C. Kassara, S. Giokas & S. Sfenthourakis

11.20-12.00 **Coffee break**

12.00 Species delimitation in the rock-dwelling geckos of the *Ptyodactylus hasselquistii* complex (Reptilia: Gekkota) under an integrative approach
M. Metallinou, T. Wilms, H. Červenka, L. Kratochvil, A. Schmitz, M. Robinson & S. Carranza

12.20 Phylogenetic relationships and phylogeography of *Ablepharus kitaibelii* (Sauria: Scincidae) species complex in the Eastern Mediterranean
E. Skourtanioti, P. Kapli, P. Lymberakis, C. Ilgaz, Y. Kumlutaş, A. Avcı, F. Ahmadzadeh & N. Poulakakis

12.40 Morphology and genetics of the nose-horned viper (*Vipera ammodytes*) in the Cyclades, Greece
S. A. Roussos, L. Tomovic, M. Dimaki, R. E. Strauss, L. D. Densmore III

13.00-15.30 **Lunch Break**

15.30 **Plenary Session** (Room 1)

T. Schmitt
Phylogeography of southeastern Europe

Room 1
Terrestrial Invertebrates II

16.30 Canopies of Mediterranean trees as arthropod habitats
M. Kalogirou, Z. Liantraki, Z. Mavrea & D. Kollaros

17.10 Phylogeography of *Anterastes* (Orthoptera, Tettigoniidae): 16s rDNA and COI suggest inconsistent speciation patterns
S. Kaya, B. Çiplak, Z. Boztepe & I. Gündüz

17.30 Testing diversification processes within Anatolia via statistical phylogeography
İ. K. Sağlam, S. Küçükyıldırım, H. Mergen, H. Ünal & S. S. Çağlar

17.50-18.30 **Coffee break**

18.30 Preliminary time series zoogeographical evaluation of regional endemic bush cricket *Isophya rizeensis*
C. Karacaoglu & S. S. Çağlar

18.50 Can humidity and seasonality explain body size variation in males of the color polymorphic bush cricket *Isophya rizeensis*? An information theoretic approach
A. C. Kuyucu, S. S. Çağlar, Ç. Karacaoğlu & İ. K. Sağlam

19.10 Can the same phenological model predict moth population activity in distinct geographical regions of Southern Europe?
P. Damos, C. P. Bonsignore, F. Gardi & D. Kostopoulos

19.30 Determination of sympatry and hybridization between two pine processinary moth species *Thaumetopoea pityocampa* and *T. wilkinsoni*
K. Ipekdal, S. S. Çağlar & C. Kerdelhue

Room 2
Birds I

16.50 Monitoring frequency & breeding success of the Griffon Vulture (*Gyps fulvus*) colonies in Crete
S. M. Xirouchakis

17.10 The diet composition of Bonelli's Eagle *Aquila fasciata* determined from different study methods
S. Iezekiel, D. E. Bakaloudis, C. G. Vlachos & A. Legakis

17.30 Characteristics and conservation of heronries in Greece
S. Kazantzidis & G. Yfantis

17.50-18.30 **Coffee break**

18.30 Fluctuations and trends of waterfowl populations wintering in Greece during the period 1968-2006
S. Kazantzidis, G. Handrinos, H. Alivizatos, T. Akriotis & D. Portolou

18.50 The effects of human settlements on bird species richness in landscapes of different altitudes
S. G. Plexida & A. I. Sfougaris

19.10 Identification of marine important bird areas for the Mediterranean Shag (*Phalacrocorax aristotelis desmarestii*) and Audouin's Gull (*Larus audouinii*) in Greece
J. Fric, T. Kastritis, P. Dendrinos, P. Kasapidis, P. Peristeraki, G. Karris & A. Manolopoulos

19.30 Can black vulture flight corridors stay free from proposed wind turbines?
D. Vasilakis, S. Schindler, P. Whitfield, K. Poirazidis, E. Kret & V. Kati

Wednesday, June 20

9.00 **Plenary Session** (Room 1)

S. Meiri, A. M. Bauer, L. Chirio, G. Colli, I. Das, T. M. Doan, A. Feldman, F.–C. Herrera, M. Novosolov, P. Pafilis, D. Pincheira-Donoso, G. Powney, O. Torres-Carvajal, P. Uetz & R. van Damme

Are lizards feeling the heat? A tale of two temperatures

Room 1
Terrestrial Invertebrates III

10.00 Fine structure of the scales of *Tychius* Germar, 1817 (Coleoptera: Curculionidae: Curculioninae) species
M. Erbey & S. Candan

10.20 Molecular systematic analysis of the *Odocnemis* Allard, 1876 species (Coleoptera, Tenebrionidae, Helopini) from Turkey
N. Alpagut Keskin, B. Keskin, M. Nabozhenko, A. Papadopoulou & A. P. Vogler

10.40 The effect of vegetation structure on ground-dwelling Coleoptera along a gradient from unburnt and burnt forest to open habitats
E. Karameta, A. Stantsidou, A. Legakis & I. Anastasiou

11.00 Responses of beetle communities to fire in Mediterranean ecosystems
I. Anastasiou, E. Chalvatzis, V. Laskari, A. Legakis & S. Sfenthourakis

11.20-12.00 **Coffee break**

12.00 Revisiting the biogeographic patterns of the Aegean tenebrionid beetles: new data and new insights
A. Papadopoulou, I. Anastasiou, A. Legakis, K. Triantis & A. Trichas

12.20 Study of the fauna of terrestrial arthropods in post-fire succession stages of a Mediterranean forest (*Pinus halepensis*)
I. Anastasiou, M. Stalimerou, S. Terzopoulou, F. Spagopoulou, E. Pitta, S. Sfenthourakis & A. Legakis

12.40 Notes on Buprestidae beetles on the Northern Sporades island complex
P. V. Petrakis & A. Legakis

13.00 The world species of *Caenocrepis* Thomson (Hymenoptera: Pteromalidae), egg parasitoids of Curculionidae (Coleoptera)
M.-D. Mitroiu

Room 2
Birds II

10.00 Home range size and foraging habitat use by breeding Lesser Kestrels (*Falco naumanni*) in agroecosystems of central Greece
C. G. Vlachos, D. E. Bakaloudis, K. Kitikidou, V. Goutner, V. Bontzorlos, M. A. Papakosta, E. Chatzinikos

10.20 Sex determination of Cory's Sheawaters offsprings on the Strofades islands colony (Ionian Sea, Greece): a combined molecular and morphometric approach
G. Karris, S. Xirouchakis, E. Thanou, M.–D. Voulgaris, S. Fraguedakis-Tsolis, S. Sfenthourakis & S. Giokas

10.40 Spring raptor migration in Dadia National Park, NE-Greece: where do they come from, where do they go?
S. Schindler, B. Cárcamo, K. Poirazidis, C. Ruiz, C. Scandolara, C. Eastham, G. Catsadorakis

11.00 Suitability of wetland stopovers for migratory birds along the 'Ionian flyway'
R. Merken, J. Teunen, F. Bazigou & N. Koedam

11.20-12.00 **Coffee break**

12.00 Migration of the Turtle Dove *Streptopelia turtur* through south-western Greece. Biometrics of the species in Greece
M. Dimaki, C. Barboutis, & H. Alivizatos

12.20 Diet analysis of the Mediterranean Shag (*Phalacrocorax aristotelis desmaretsii*) using conventional techniques and next generation sequencing
P. Kasapidis, J. B. Kristoffersen, A. Christidis & J. Fric

13.00 The Prespa lakes as a wintering site for waterbirds: results of 25 years of uninterrupted monitoring
I. Koutseri, Y. Kazoglou, A. Krause, A. Logotheti, M. Malakou, H. Nikolaou, L. Nikolaou, S. Shumka, M. Velevski & G. Catsadorakis

13.20-15.30 **Lunch break**

15.30 **Plenary Session** (Room 1)

J. Foufopoulos
Linking ecological processes with biodiversity patterns in the Aegean Sea: from individual populations to regional species assemblages

Room 1
Terrestrial Invertebrates IV

16.30 The palaearctic species of *Reikosiella* (Hymenoptera, Eupelmidae): an enigmatic group of parasitoid wasps
L. Fusu

16.50 Carry load composition in the harvester ants of the genus *Messor* in a typical Mediterranean ecosystem
C. Georgiadis & A. Legakis

Room 2
Birds III

16.30 Use of an unmanned aerial system (UAS) for counting nests of waterbirds at lake Mikri Prespa, Greece
P. Dendrinos, S. Adamantopoulou, M. Malakou & G. Catsadorakis

16.50 Pelicans *Pelecanus* spp. at Prespa National Park, Greece; an overview of 28 years of applied research, monitoring and conservation management
G. Catsadorakis, M. Malakou, H. Nikolaou & A. Crivelli

17.10 Foraging habitat selection by breeding Lesser Kestrels, *Falco naumanni*, in Thessaly, central Greece and conservation implications
A. Galanaki, A. Fielding, M. Jones & T. Kominos

17.10-17.50 Poster session

17.50-18.30 **Coffee break**

18.30-19.50 Round Table: Zoogeographical and ecological research in the southeastern Mediterranean and the Balkans: working under the economic crisis

21.00- Congress banquet

Thursday, June 21

9.00 **Plenary Session** (Room 1)

K. Trantalidou
Observations on species diversity and faunal exploitation in the Greek peninsula and the islands at the outset of the Holocene period: insights from caves and residential camps

Room 1
Marine Invertebrates

10.00 Genetic differentiation among basins of the Mediterranean Sea: a meta-analysis
A. Chenuil

10.20 Mediterranean marine caves: reservoirs of poriferan diversity
V. Gerovasileiou & E. Voultsiadou

10.40 Using morphological characters to estimate geographic variation for the Mediterranean bath sponge *Spongia officinalis* and assess the taxonomic validity of its associated morphotypes
T. Dailianis & E. Voultsiadou

11.00 Demographic characteristics of the Mediterranean gorgonian *Eunicella* spp. in the Aegean Sea
M. Sini, J. Garrabou & D. Koutsoubas

11.20-12.00 **Coffee break**

12.00 Cephalopod fauna over the eastern Ionian slope: new information from predation by long-line caught bony fish
E. Lefkaditou, C. Mytilineou, A. Anastasopoulou, K. Dogramatzi & C. Smith

12.40 The reproductive cycle of the sea urchin *Paracentrotus lividus* in the central Aegean region
A. Stamouli , A. Lolas & D. Vafidis

Room 2
Mammals I

10.00 Aegean monkeys: from a comprehensive review to a re-interpretation
B. Urbani & D. Youlatos

10.20 Modelling the potential distribution of the European ground squirrel (*Spermophilus citellus*) in Central Macedonia, Greece using the maximum entropy algorithm
C. Astaras, D. Youlatos & J. Marino

10.40 Preliminary results from the investigation of the parasitic fauna of European ground squirrel (*Spermophilus citellus*) in Greece
A. Diakou, E. Kapantaidakis & D. Youlatos

11.00 General morphology and spatial distribution of burrow entrances of the microtine rodent *Microtus guentheri* (Danford & Alston, 1880) in the National Park of Dadia - Lefkimi - Soufli forest
K. Tritsis, S. Bratsioti, A. Kallimanis, K. Poirazidis, D. Youlatos

11.20-12.00 **Coffee break**

12.00 Taxonomical status and phylogenetic relations between the "atticus" and "thomasi" chromosomal races of the underground vole *Microtus thomasi* (Rodentia, Arvicolidae)
M.T. Rovatsos, J.A. Marchal, A.Sánchez & E.B.Giagia-Athanasopoulou

12.40 Genetic analysis of stone marten (*Martes foina*) Greek populations
M. A. Papakosta, M. Andreadou, A. Tsoupas, N. Karaiskou, D. E. Bakaloudis, E. Chatzinikos, A. Sakoulis, A. Triantafyllidis & C. G. Vlachos

13.00 Dietary geographical variation of the stone marten (*Martes foina*): A meta-analysis approach
M. A. Papakosta, K. Kitikidou, D. E. Bakaloudis & C. G. Vlachos

13.20-15.30 **Lunch break**

15.30 **Plenary Session** (Room 1)

F. Bonhomme
How history, local adaptation and oceanographic features may or not shape Mediterranean phylogeography

Room 1
Freshwater Fish

16.50 Feeding habits of juvenile thin-lipped grey mullet, *Liza ramada* (Risso, 1826) and leaping grey mullet, *Liza saliens* (Risso, 1810) in the Neretva river estuary (eastern Adriatic, Croatia)
A. Conides, V. Bartulovic, D. Klaoudatos & B. Glamuzina

17.10 Diversity and distribution of freshwater fishes in Albania
R. Šanda, S. Shumka, I. F. Wilson, J. Vukić, D. Ulqini, J. Křížek & A.Crivelli

17.30 Diversity, distribution and status of fishes in the Devoll-Osum-Seman rivers system (Albania)
S. Shumka, A. Cake & O. T. Sandlund

Room 2
Mammals II

16.30 Wolf (*Canis lupus*) activity patterns in central and northern Greece studied with satellite telemetry
Y. Iliopoulos, Y. Lazarou, M. Petridou & K. Selinides

16.50 Habitat analysis of the Balkan chamois (*Rupicapra rupicapra balcanica*) in its southernmost limit of distribution in Europe (Mt. Gkiona, Greece)
D.–H. Papaioannou, S. Sgardelis, V. Chondropoulos & P. Dimopoulos

17.10 The Hellenic bear, monk seal and wolf registers: paving new ways for large carnivore conservation in Greece through genetic monitoring
A. A. Karamanlidis, G. Amato, E. Androukaki, S. Czarnomska, P. Dendrinos, L. Georgiadis, B. Jędrzejewska, L. Krambokoukis, M. Niedziałkowska, M. Psaradellis & J. Schultz

17.50-18.30 **Coffee break**

18.30-19.30 Poster session

19.30-20.30 General assembly of the Hellenic Zoological Society

Friday, June 22

9.00 **Plenary Session** (Room 1)

N. Schizas
Mesophotic coral ecosystems of Puerto Rico and adjacent islands

Room 1
Freshwater & Marine Fish

10.00 Non-indigenous fish species in Greece: results of a hydrographic basin survey
N. Koutsikos, S. Zogaris, L. Vardakas, Y. Chatzinikolaou, D. Kommatas, V. Tachos, & A. N. Economou

10.20 Trace metal accumulation in atlantic salmon smolt (*Salmo salar* L.) organs from river Storelva catchment area, Norway
V. Yancheva, B. O. Rosseland, B. Salb, H.-C. Teien, I. Velcheva & E. Georgieva

11.00 Fish assemblage variation at boat seine fishing grounds
E. Lefkaditou, G. Petrakis, S. Kavadas & A. Siapatis

11.20-12.00 **Coffee break**

Marine Reptiles and Mammals

12.00 An increasing sea turtle population following 15 years of nest protection
D. Margaritoulis, A. F. Rees & T. Riggall

12.20 Conservation status of short-beaked common dolphins in the Gulf of Corinth, Greece
S. Bonizzoni & G. Bearzi

12.40 Reproductive parameters of the critically endangered Mediterranean monk seal in the area of Northern Sporades, Greece
P. Dendrinos, E. Tounta, A. A. Karamanlidis & A. Legakis

13.00 Social structure and behavior of the unique Mediterranean monk seal colony of the island of Gyaros
A. A. Karamanlidis, M. Psaradellis & P. Dendrinos

Room 2

General Biodiversity Issues

10.00 Monitoring the effects of the highway Siatista - Krystallopygi (K45) on wildlife in Greece
A. A. Karamanlidis, J. Beecham, M. de Gabriel Hernando, L. Georgiadis, K. Grivas, L. Krambokoukis, N. Panagiotopoulos & G. Papakostas

10.20 Biodiversity of Araks river valley
M. Arakelyan

10.40 Island biogeography using multiple taxa on the same set of islands
S. Sfenthourakis, E. Gkotsi & K. A. Triantis

13.00-15.30 **Lunch break**

Saturday, June 23

Conference excursion: Cruise in the islands of the Saronikos Gulf

ABSTRACTS

HOW HISTORY, LOCAL ADAPTATION AND OCEANOGRAPHIC FEATURES MAY OR NOT SHAPE MEDITERRANEAN PHYLOGEOGRAPHY

François Bonhomme

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The marine species of the Mediterranean and the near Atlantic offer varied phylogeographic situations ranging from no East-West differentiation at all to a much more fragmented situation. In this talk, I will briefly review the various cases known to date and conduct a discussion on the forces at play behind the patterns observed. If glacial vicariance is indeed the prime initiator of differentiation, oceanic currents and water fronts play different roles. The former are a motor for gene flow while the latter serve as traps for pre-existing genomic incompatibilities according to the prediction of theory. This challenges the view that local adaptation takes place in high gene flow species. Nevertheless apparent isolation-by-distance probably also occurs depending on the species' dispersal capabilities although known cases are scarce. The temperate Mediterranean being a rather young sea, the question arises as to whether or not these are transient or equilibrium patterns. Finally does this water cul-de-sac work as a promoter for evolutionary novelty or just as a temporary repository? The question is left pending.

FORGOTTEN IN THE OCEAN: SYSTEMATICS, BIOGEOGRAPHY AND EVOLUTION OF THE REPTILES OF THE SOCOTRA ARCHIPELAGO

Salvador Carranza

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Continental islands are very important hotspots of biodiversity and provide premier settings for studying the evolutionary and ecological processes that have resulted in such unique biotas. The Socotra Archipelago, in the western Indian Ocean, is a case example of an ancient continental fragment, a block of Precambrian Gondwanaland with a long biogeographic history. Often referred to as the "Galapagos of the Indian Ocean", it was designated a UNESCO World Heritage Natural site in 2008 as a result of its high level of endemicity at both specific and generic levels. From an evolutionary point of view, the archipelago is of particular significance because of its ecological diversity and long biogeographic history and thus represents a unique model to unravel the origin and speciation process in ancient continental fragments and to understand how different biogeographic, evolutionary and ecological factors have interplayed in the assemblage of Socotra's unique biota. The integration of phylogenetic and phylogeographic analyses at multiple loci and at various evolutionary time scales, allowed us to reconstruct the evolutionary history of the 18 species of endemic geckos of the Socotra Archipelago of the genera *Hemidactylus*, *Pristurus* and *Haemodracon*, giving an approximate time frame to the origin and in situ diversification in these three groups. The study revealed the existence of complex patterns of within-island diversification and high levels of intra-species genetic divergence and suggesting that the interplay of both historical and ecological factors seems to have a role in the speciation process.

LINKING ECOLOGICAL PROCESSES WITH BIODIVERSITY PATTERNS IN THE AEGEAN SEA: FROM INDIVIDUAL POPULATIONS TO REGIONAL SPECIES ASSEMBLAGES

Johannes Foufopoulos

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With its thousands of islands, the Aegean and Ionian Seas offer an exceptional opportunity to study the effects of fundamental ecological processes on the distribution of species. Greek land-bridge islands formed following a series of natural habitat fragmentation events caused by post-Pleistocene rising sea levels. This progressive isolation means that resident reptile communities are largely shaped by a long-term, largely deterministic extinction process in which species progressively disappeared in a predictable fashion. While island characteristics like size and duration of isolation dictated how far down this path of impoverishment an island community has proceeded, the exact position of each species in this sequence of extinction is determined by its individual life history characteristics such as body size, habitat specialization, as well as sensitivity to hot and arid conditions. As a result, past extinction records can also be used to infer how current species communities are likely to respond not only to continuing fragmentation but also to future shifts in climate.

Reptile community composition on Aegean islands is shaped by the survival and demise of individual populations, which in turn is determined by ill-understood within-population processes. By comparing island populations of a model lizard species, we show how reduced population size and long-term bottlenecks drive genetic impoverishment through drift. This process in turn appears to undermine immune function and can ultimately lead to the demise of a population by rendering it susceptible to parasitism and disease. Ultimately, over long periods of time, such general, within-population phenomena will undermine the survival of individual populations and are the driving force behind the extinction processes described earlier.

ARE LIZARDS FEELING THE HEAT? A TALE OF TWO TEMPERATURES

Shai Meiri [1,*], Aaron M. Bauer [2], Laurent Chirio [3], Guarino Colli [4], Indraneil Das [5], Tiffany M. Doan [6], Anat Feldman [1], Fernando-Castro Herrera [7], Maria Novosolov [1], Panayiotis Pafilis [8], Daniel Pincheira-Donoso [9], Gary Powney [10,11], Omar Torres-Carvajal [12], Peter Uetz [13] & Raoul Van Damme [14]

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Temperature is of paramount importance for animal ecology and life history – but what temperature is it? Physiologists usually examine the influence of animal body temperatures, while biogeographers and macroecologists usually use environmental temperatures. We used a large (898 species) dataset of lizard body temperatures, and the mean annual temperatures across their geographic ranges to examine the relationships between these two measures. We examined factors influencing body temperatures, and tested for the influence of both temperatures on life history traits. Surprisingly, we found that body temperatures and mean annual

temperatures are uncorrelated. Accounting for activity time, use of space (fossorial and semi aquatic species were "colder"), insularity (mainland species are "hotter") and phylogeny, the two temperatures are positively correlated. High body temperatures are associated with large hatchlings (contra the temperature size rule) and with increased rates of biomass production. High annual temperatures are associated with high productivity and increased brood frequency, but clutch sizes, age at first reproduction and longevity decrease with increasing annual temperatures. The surprisingly greater effect of environmental temperatures on lizard life history traits hints that global warming may have a profound influence on lizards, although currently we found little association between temperature and extinction risk.

MESOPHOTIC CORAL ECOSYSTEMS OF PUERTO RICO AND ADJACENT ISLANDS

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The world's coral reefs have been the subjects of intense research, but only a handful have concentrated on deep reef environments largely due to logistical and safety issues with SCUBA diving. New technologies, specifically mixed-gas (Trimix) diving and closed-circuit rebreathers, now permit divers close-range access to reef environments greater than 50 m in depth. The deep-water coral reef communities (Mesophotic Coral Ecosystems, MCEs) differ from their shallow counterparts in several important characteristics, including: lower light irradiance and differing spectral qualities, decreased biological (reduced grazing) and physical disturbance (diminished wave effects, lower temperature fluctuations), lower sedimentation, and differing substratum orientation due to shelf break angle. At 40-50 m depth these differences include a decrease in cover of scleractinian corals and an increase in sponge and algal abundances. Because of the close proximity to shallow water reefs, it has been hypothesized that MCEs may be a "source" (or "sink") of larvae for shallow reefs. MCEsof Puerto Rico and other Caribbean islands provide a unique system to examine the patterns of genetic connectivity for scleractinian corals and their zooxanthellaesymbionts (*Symbiodinium* spp.) and their adjacent shallow water counterparts. The coral *Agaricialamarcki* harbors zooxanthellaeand inhabits both shallow and mesophotic habitats. We tested the hypothesis that mesophotic corals harbor different *Symbiodinium* communities than the shallow water counterparts. The genetic diversity of *Symbiodinium* isolated from shallow and mesophotic populations of *Agaricialamarcki* of Mona Island, southwestern Puerto Rico, and St. Thomas (US Virgin Islands). The genetic lineages of *Symbiodinium* were determined by molecular cloning of the internal transcribed spacer of rDNA(ITS2). Preliminary data has revealed strong patterns of depth-specific association of the symbiont lineages indicating a depth-driven adaptation of the zooxanthellae. Newdata will be presented from ongoing work on the *Symbiodinium* lineages found at different depths.

PHYLOGEOGRAPHY OF SOUTHEASTERN EUROPE

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Southeastern Europe is considered as one of the important Mediterranean sub-centres and glacial refugia for warm adapted species during the cold stages of the Pleistocene. However, the Ponto-Mediterranean glacial refuge was often not simply continuous along the coasts of the Balkan Peninsula, but had several core areas often with even further subtle substructures as revealed for numerous Mediterranean taxa. At least a differentiation into an eastern and a western flank of the Balkans is commonly observed. Other temperate taxa, in particular of the group formerly considered as Siberian elements, had multiple extra-Mediterranean glacial retreats in the Balkan Peninsula and the Carpathian Basin.

On the other hand, southeastern Europe is also characterised by a large variety of different high mountain systems owing their specific biogeographical patterns. These mountains harbour a large number of endemic taxa with a centre in the eastern Balkan mountains. The Carpathians also represent an important reservoir of mountain species with their southern and eastern parts being highly influenced from the Balkans or representing endemic intra-specific lineages, while the northern parts (i.e. Tatras) are more similar with the northeastern Alps. Additionally, also the western Balkan mountains exhibit important mountain biota and might have had strong impact on the colonisation of the eastern Alps.

All this underlines the high biogeographical importance of southeastern Europe as one hot spot of European biodiversity and endemism, and hence high conservation necessity.

OBSERVATIONS ON SPECIES DIVERSITY AND FAUNAL EXPLOITATION IN THE GREEK PENINSULA AND THE ISLANDS AT THE OUTSET OF THE HOLOCENE PERIOD: INSIGHTS FROM CAVES AND RESIDENTIAL CAMPS

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The animal remains from inland sites (e.g. Theopetra cave in Thessaly, Kleissoura rock- shelter at the edge of the Argive plain, Franchthi cave -overlooking the Argolic Gulf- in the Peloponnese, Schistos cave on Mount Aigaleo in Attica) provide information on Upper Palaeolithic through Mesolithic faunas, relating trends in human subsistence, regional ecology and taphonomic process. In some assemblages, the dominance of one or a few large animals reflects natural variations in biotic diversity or specialized hunting and habitat-specific patterns of land use by late Pleistocene foragers.

Island sites, such as Maroulas on Kythnos in the Cyclades or cave of Cyclops on Youra in the Northern Sporades, present findings from 9th millennium BC onwards. Bone and molluscs records from those settlements reveal that, at least, a part of the diet of the small pre-agricultural communities was based upon fish-shellfish, birds and ungulates. In addition to prey composition, less intensified processing of carcasses may also indicate less rising pressures on the supply of animal foods in the environment.

On the islands, suids seemed to have been kept under a certain control, a kind of human domination over them. That parameter coupled with the fact that islands are natural enclosures influenced the size of the animals. Genetic research is in progress in order to investigate the controversial subject of the suids morphological changes and the human mobility. Measurements of carbon and nitrogen stable isotopes of bone to evaluate the eventual changes in boar's diet due to the human pressure reveal an herbivore rather than an omnivore regime.

Progressively, the buck of suids was replaced by caprins. At Cyclops cave goats appear as early as the beginning of the 8th millennium having a size equivalent of the recent wild animals of the Zagros Mountains. Attempts to discover the origin of those animals by tracking the lineage back in time are still in progress.

RECENT FINDINGS OF THE NEON FLYING SQUID *OMMASTREPHES BARTRAMII* (CEPHALOPODA: OMMASTREPHIDAE) ALONG THE EASTERN AEGEAN SEA: EVIDENCE OF ITS SPAWNING GROUND EXPANSION

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The neon flying squid *Ommastrephes bartramii* is a cephalopod distributed in subtropical and partly temperate waters of the Pacific, Indian and Atlantic oceans - including the Mediterranean Sea. Its abundance is directly linked with water temperature which impacts upon its distribution according to seasonal variations. Although it is known to occur in the Aegean Sea since the middle of the 19th century, it has scarcely been recorded until the last decade. Findings of the species have increased since 2008, with stranded females more frequently discovered along the north coast of Crete, suggesting a spawning ground within the Crete Basin (South Aegean). This study aims to report two *O. bartramii* findings in the eastern Aegean in March 2012: one large mature female with a Total Length (TL) of 16,300 mm and a Mantle Length (ML) of 600 mm and approximately 9 kg; the second an incomplete specimen. As *O. bartramii* spawning is related to optimal thermal habitats, we support the theory where the northward expansion of its distribution in the Aegean is partially due to global warming and meteorological forcing, which have affected the thermohaline conditions in the Levantine Intermediate Water (LIW) and thus, enhanced biodiversity. If this temperature trend continues (as expected), favouring and accelerating the settlement of thermophilic endemic and alien species, we presume that the number of findings of *O. bartramii* may exponentially increase over time.

BIRD RINGING IN ATTICA, CENTRAL GREECE, YEARS 2001-2011

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Bird ringing has taken place in Attica since 2001 and with greater intensity since 2008. The aim was to study bird migration, as well as to take measurements, fat scores and other data. Ringing sites were three wetlands (Schinias Marsh, Brexiza Marsh and Loutsa Lagoon), as well as a park in Galatsi, Athens. Birds were caught with mist nets and ringed, aged, sexed and weighed, while measurements, mainly of wing and tarsus, as well as fat scores, were taken. In total, 3,263 birds of 88 species were ringed. The species ringed in greatest numbers were Chiffchaff (*Phylloscopus collybita*), Blackcap (*Sylvia atricapilla*) and House Sparrow (*Passer domesticus*). Other species ringed in good numbers were Cetti's Warbler (*Cettia cetti*), Robin (*Erithacus rubecula*), Reed Warbler (*Acrocephalus scirpaceus*), Chaffinch (*Fringilla coelebs*), Sardinian Warbler (*Sylvia melanocephala*), Willow Warbler (*Phylloscopus trochilus*) and Serin (*Serinus serinus*). The most notable species was a Yellow-browed Warbler (*Phylloscopus inornatus*), a vagrant in Greece. There were two foreign recoveries, a Reed Warbler and a Swallow (*Hirundo rustica*), both ringed in Hungary, as well as numerous local retraps. The results indicate that the ringing sites, particularly the wetlands, are very important for bird migration and require effective protection measures, as well as further study of the bird populations.

USING HABITAT SUITABILITY MODELS AND GRAPH THEORY TO STUDY MOVEMENT PATTERNS AND HABITAT USE OF BROWN BEARS

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In the present study, we propose a framework to evaluate habitat use and movement patterns of brown bear (*Ursus arctos*) by combining two different approaches: habitat suitability models and graph-theory. Telemetry data from eight (8) radio-collared bears were collected over a twenty-month period. Using up to 4,653 GPS radiolocations, and a series of layers (i.e. land use type, topological) we applied a maximum-entropy approach to develop habitat suitability models. Our model provided quantitative measures of suitable habitats. Next, we employed a graph-theory approach to construct network models of potential connectivity among patches of different suitability. We used a series of metrics to describe network topology and to examine the structure, robustness and connectivity of the network. We further used a Markov Chain approach to study the movement pattern among patches of different quality. Selected network topology metrics were not related to suitability value of patches, indicating that patches could facilitate connectivity regardless of their quality. The analysis revealed important key patches whose removal affects the structural robustness of network. Overall, our results demonstrate that most common movements appear between patches of the same quality (i.e from low to low quality and from high to high quality patches). The proposed framework could easily be applied to real movement networks providing insights for identifying key sites that may be critical to connectivity. Also, this approach better informs conservation decision making, providing insights on how to assess the coherence and ecological sufficiency of sites utilized by protected species.

MOLECULAR SYSTEMATIC ANALYSIS OF THE *ODOCNEMIS* ALLARD, 1876 SPECIES (COLEOPTERA, TENEBRİONIDAE, HELOPINI) FROM TURKEY

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The genus *Odocnemis* Allard, 1876 (Coleoptera: Tenebrionidae) is one of the specious group with many endemics in Anatolia and Thrace. Species are mostly described from subalpine zone. Current species delimitation was based on general morphological characters. Because a phylogeny of group was not available, species definitions and monophyly of the group were untested hypotheses. The aim of this study is to reconstruct the phylogeny of *Odocnemis* species using new morphological and molecular data sets to formally test delimitation of species. Phylogenetic analyses comprising Parsimony and Bayesian searches were conducted for mt-cox1 and nuclear Mp20 loci each consisting of 829 and 821bp, respectively. Molecular analyses on cox1 loci resulted in 11 main cox1 clades for *Odocnemis* species most of which also highly supported with Mp20 trees and haplotype network. Patterns of nucleotide diversity, haplotype numbers and hierarchical AMOVA for cox1 and Mp20 were consistent with high-level genetic differentiation among species and species groups.

RESPONSES OF BEETLE COMMUNITIES TO FIRE IN MEDITERRANEAN ECOSYSTEMS

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The dynamics of soil arthropod communities after fire can offer crucial insights to successional processes and are under intensive study, especially in Mediterranean ecosystems where fires occur very often and are considered an integral part of their structure.

In this work we explore the effects on carabid and tenebrionid beetle communities of the extensive and intensive fires that occurred in 2007 at the Peloponnese (southern Greece). In doing so, we also explore the role of the respective communities in neighbouring non-burnt forest fragments, as well as open fields without arboreal vegetation. The study focuses in three sites, two of which were covered with pine forests (one with *Pinus nigra* and the other with *P. halepensis*) and the third with oak forest (*Quercus frainetto*). Collecting was performed using pitfall traps (3 replicates of 10 traps in each burnt forest and non-burnt fragment sites and 2 replicates in nearby non-burnt forests and open fields). Traps were placed in two consecutive years (2009 and 2010) for 3 consecutive 15-days periods in May-June during each year.

Results show that diversity is generally lower in most burnt sites but at comparable levels and seems to be quickly recovering, as evidenced also by the very high rates of species turnover between the two years. Beetle communities of the three forest types differ in their responses to fire. The non-burnt forest fragments seem to be crucial for the quick recovery of beetle communities.

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STUDY OF THE FAUNA OF TERRESTRIAL ARTHROPODS IN POST-FIRE SUCCESSION STAGES OF A MEDITERRANEAN FOREST (*PINUS HALEPENSIS*)

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Fire is a major disturbance in Mediterranean ecosystems, especially in pine forests, that alters dramatically the landscape and brings vegetation in earlier succession stages. The Aleppo pine forests have developed adaptations for a speedy recovery after fire, and the usual succession involves herbaceous or phryganic vegetation at first, scrub vegetation in various stages and finally, the formation of a new forest. These changes in vegetation lead to corresponding changes in the structure and composition of animal communities.

In the present work, we studied the communities of terrestrial arthropods in 6 stages of post-fire succession of the Aleppo pine forest in Mt. Parnitha, using pitfall traps. In each biotope we placed 3 or 4 transects with 10 traps each from April till December. Each trap was collected every 15 days. The terrestrial isopods and the species of Coleoptera Carabidae and Tenebrionidae were studied at the species level, while the other macroarthropod groups were recorded at the class level.

Arthropods at the class level and isopods at the species level show their maximum activity either during summer or during spring or both spring and autumn. Tenebrionidae are more active especially during spring and summer while Carabidae have two activity maxima, one in spring and one in the summer. The differences that are observed in the composition and abundance of the terrestrial arthropods, both at the class and the species level, are in accordance with the succession stages of the vegetation. The changes in the relative abundance and in the dominance pattern are possibly the result of adaptation of terrestrial arthropods to disturbance which is characteristic of Mediterranean-type ecosystems

LITTER IN THE GUTS OF DEEP-WATER FISH IN THE EASTERN IONIAN SEA

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Anthropogenic litter is common in the marine environments and underlines the need for local initiatives to combat this problem. Litter of anthropogenic sources was found in the stomachs and intestines of four Elasmobranch species and one bony fish caught in the Greek Ionian Sea during experimental fishing, in two sub-areas: a coral (CA), and a non-coral area (NCA). Materials of anthropogenic origin such as plastic, metals, wood and chicken bones were identified in the gut of the Elasmobranchs pelagic stingray, blackmouth catshark, longnose spurdog, velvet belly and the bony fish blackspot red seabream. Most of the anthropogenic remains were plastic items and this could be explained by the fact that they easily disperse widely at various depths and their degradation occurs slower in the sea due to cool waters. Since the occurrence of these materials was relatively infrequent for most species, it is likely that their consumption was accidental. Elasmobranchs seem to swallow more litter than bony fish. The higher consumption of litter by Elasmobranchs may be related to their ability to consume virtually anything of appropriate size during their feeding activity or even to satisfy their curiosity for these objects. In addition, they may confuse marine litter with food. Most fish with ingested litter were found in the CA indicating that this sensitive environment needs more protection. Further work should be carried out in the future, focusing particularly on the ingestion of litter by marine organisms and the related interaction and impact on the populations.

LANDSCAPE GENETICS OF EUROPEAN BROWN HARE POPULATIONS OF CRETE

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Landscape features have been shown to strongly influence dispersal and therefore, the genetic population structure of organisms. European brown hares comprise a challenging case given the species' biological traits (e.g. high dispersal capability, female philopatric behavior) and the high genetic diversity detected in Greece. The aim of the study was a) to identify suitable habitats for the species on the island of Crete and assess their connectivity, b) to examine whether habitat preferences and dispersal pathways differ among sexes, and c) to combine landscape, ecological and genetic information in an attempt to disentangle observed patterns of genetic diversity. We assessed the influence of several natural and human-made landscape features on European brown hare distribution and gene flow by analyzing individuals collected throughout the island of Crete and screened for mitochondrial and microsatellite markers. Despite the relatively small scale of the study area, significant population structure was found. Landscape features were shown to significantly affect European brown hare dispersal and gene flow. Habitat suitability maps indicated that the mountainous areas are the less suitable places for hares. Furthermore the least-cost pathways differ between the two sexes. Genetic data analysis revealed strong population structure and the presence of barriers to gene flow that were highly correlated with landscape (natural as well as human-made) features leading to reduced connectivity among insular European brown hare populations of Crete. Our results stress the need of a holistic approach such as landscape genetics to disentangle observed patterns of genetic diversity.

BIOCOMMUNITY OF OWLS IN MEDITERRANEAN AGROSYSTEMS

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The objective of the present study was to collect information on the distribution, population density and habitat preferences of nocturnal birds of prey in a typical agricultural area of the Mediterranean. Systematic surveys were conducted from February to May 2010 in central Crete (Heraklion prefecture) covering all major rural habitats of the area which totaled 1080 km^2. The species recorded, by the aid of playback calls, were the Barn owl (*Tyto alba*), the Little owl (*Athene noctua*), the Long-eared owl (*Asio otus*) and the Scops owl (*Otus scops*). The number of territorial pairs detected was on average 651±127 which produced an estimated density of 1 territorial pair/ 1.66 km^2. The most abundant species were Scops owl and Barn owl with 446±100 pairs (territory size: 2.5 km^2) and 188±46 pairs (territory size: 5.6 km^2) respectively. Thereafter we constructed a set of generalized linear models (GLMs) by using habitat variables acquired from the Corine Land Cover database and elaborated by geographical information system software. The ecological implications of results was that olive groves harbour the highest density of owl species (i.e. 1 pair/ 0.6 km^2) followed by mixed cultures (1 pair/ 1.1 km^2). The study pinpoints the conservation value of olive groves and mosaic agrosystems, unlike monocultures which are characterized by intense seasonal population fluctuations. Moreover, we support that the community of nocturnal raptors could be used as a bioindicator for the environmental quality of Mediterranean landscapes.

MODELLING THE POTENTIAL DISTRIBUTION OF THE EUROPEAN GROUND SQUIRREL (*SPERMOPHILUS CITELLUS*) IN CENTRAL MACEDONIA, GREECE USING THE MAXIMUM ENTROPY ALGORITHM

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The European ground squirrel (*Spermophilus citellus*) populations in Greece are limited to the northern regions of the country and lie at the southern edge of the species' range in Europe; an area characterized by the typical high seasonal temperature changes of the Mediterranean basin. Despite some recent studies on the species' ecology in central Macedonia, our understanding of its distribution in Greece remains poorly known, confounding the effective monitoring of population trends and the development of a national conservation action plan. We used 908 recent presence-only records for the European ground squirrel, primarily within the Prefecture of Thessaloniki, to build and test habitat suitability models for the species in Central Macedonia, applying the maximum entropy (Maxent) algorithm to uncorrelated environmental (e.g. land-use, elevation, slope, soil type) and human-related (e.g. population and road density) variables available through European and global GIS data repositories. We identify priority areas for future surveys which have conditions similar to those where the species is known to occur and discuss the species' ecological requirements especially in terms of observed discontinuities in its potential distribution. Finally, using a small number of presence records from western Macedonia, we explore the effect of scale in the European ground squirrel's distribution modelling.

POLYPRION AMERICANUS OCCURRENCE IN A CORAL AND NON-CORAL AREA OF THE EASTERN IONIAN SEA

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Few published information exist for the wreckfish *Polyprion americanus* from the Hellenic Seas. The occurrence of the wreckfish and some aspects on the life history of the species in a coral (CA) and a non-coral (NCA) deep-water area of Eastern Ionian Sea are presented in this work. Two surveys of long-line experimental fishing have been carried out off Cephalonia Island in depths ranging between 350 and 850 m during summer and autumn 2010. Feeding analysis was based on frequency of occurrence of prey categories.

In total, 35 specimens were caught in both areas between 450 and 800 m depth. The majority of individuals (60%) were captured in CA. Wreckfish was fished in CA in both seasons, while in NCA it was caught only in summer with one exception in autumn. Most female and most mature wreckfish were captured in CA. The size distribution of *P. americanus* in the whole study area ranged between 455 and 1010 mm TL. However, in CA, the majority of specimens (66.6%) were found between 660 and 780 mm with a peak at 700 mm, whereas in NCA no pattern was observed. The bigger-deeper pattern for size-depth relationship was not very clear, since small individuals were also observed in deep waters. Diet of wreckfish included Osteichthyes, cephalopods, crustaceans, Anthozoa and Polychaeta. Although the number of caught wreckfish was quite low, we could suggest that the coral area is more attractive for *P. americanus*.

THERMAL ECOLOGY IN ISLAND POPULATIONS OF THE AEGEAN WALL LIZARD

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Global climate change has impacted natural ecosystems globally, and is expected to lead to numerous species extinctions. The effects are predicted to be particularly severe for populations that have been reduced and isolated through anthropogenic habitat fragmentation. Despite the worldwide occurrence of both phenomena, we have a poor understanding of how habitat fragmentation (and the associated loss in genetic diversity) renders species susceptible to climate change. In this study, we investigate how habitat fragmentation and the concomitant loss in genetic diversity affect the thermal preferences of different populations of a model ectothermic organism. We take advantage of a well-characterized, natural fragmentation process, during which land-bridge islands were formed by rising sea levels in the Aegean Sea (Greece). These islands harbor relict Aegean Wall Lizard (*Podarcis erhardii*, Lacertidae) populations, which are poor over-water dispersers and have lost different amounts of their original genetic diversity through drift. We quantified aspects of thermal and physiological ecology in populations from one large, genetically diverse baseline island, as well as two offshore islets. This allowed us to determine whether environmental differences (on the large island) or genetic impoverishment (on small islets) affect the thermal ecology of the species. Although populations across the three islands did not differ in mean or variance of field body temperatures or in selected ("preferred") temperatures, we did find significant differences in water loss rates corresponding to dryness of the habitat. Our results suggest that loss of genetic diversity does not appear to affect thermal ecology, while locally prevailing conditions do.

CONSERVATION STATUS OF SHORT-BEAKED COMMON DOLPHINS IN THE GULF OF CORINTH, GREECE

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The short-beaked common dolphin *Delphinus delphis* has declined throughout the Mediterranean and this population has been classified as Endangered in the IUCN Red List. The Gulf of Corinth is one of the few eastern Mediterranean areas where these animals still occur. However, only 28 (95% CI = 11-73) common dolphins live in the Gulf, as compared with 835 (95% CI = 631-1106) striped dolphins *Stenella coeruleoalba*. Information on the distribution of both species can support conservation and management efforts. Between 2009 and 2011 we conducted systematic boat surveys covering the entire Gulf, totaling 10781 km of navigation and 186 dolphin sightings. Common dolphins were observed exclusively within striped dolphin groups. Dolphin movements recorded during 198 h of group followings covered about two thirds of the Gulf's total area, with a marked preference for its central and eastern portions, where waters are up to 900 m deep. No sightings occurred in the shallower western part of the Gulf, suggesting limited movements across the Rion-Antirion Strait. We argue that the few common dolphins living in this semi-closed ecosystem constitute a subpopulation sensu IUCN, i.e. a geographically and otherwise distinct group in the global population with little demographic or genetic exchange. As such, common dolphins in the Gulf of Corinth would meet the IUCN criteria for classification as "Critically Endangered". Future studies should identify the key environmental and other variables affecting habitat use in the Gulf, and determine if and how human impacts affect their status and trends. We identify research methods that can achieve this goal.

PELICANS *PELECANUS* SPP. AT PRESPA NATIONAL PARK, GREECE; AN OVERVIEW OF 28 YEARS OF APPLIED RESEARCH, MONITORING AND CONSERVATION MANAGEMENT

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The nesting and feeding ecology of Dalmatian *Pelecanus crispus* and great white *Pelecanus onocrotalus* pelicans nesting together at Lake Mikri Prespa, NW Greece is being studied and monitored for conservation reasons since 1987 by a mixed Greek and French group of researchers. The aims had been to understand basic nesting and feeding traits of the species in order to disclose factors affecting population dynamics and trends and adopt appropriate management measures. The study and monitoring were intensive between 1984 and 2002 and less so afterwards. By monitoring basic parameters such as colony and clutch size, incubation period, laying date initiation, breeding duration, hatching and fledging success, size of breeding units, mortality rates etc. as well as monitoring of prey fish populations and nesting sites quality and availability, it was concluded that breeding success is largely depended on hatching success affected mainly by disturbance by humans as well as quality of nesting islands. Therefore main management measures addressed the following: elimination of disturbance, minimization of mortality factors for adults and immature birds and enhancement of their feeding grounds and nesting sites as well as support in years of adverse environmental conditions. Over the years these have lead to an impressive increase of both species by 400-800% creating the largest nesting colony of the Dalmatian pelican in the world. Problems and limitations in working with highly endangered species are also discussed.

GENETIC DIFFERENTIATION AMONG BASINS OF THE MEDITERRANEAN SEA: A META-ANALYSIS

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Relatively numerous population genetics and phylogeographic studies of marine species of the Mediterranean Sea recently became available. Numerous publications conclude that there is no differentiation within the Mediterranean Sea (quite often, for species with planktonic larvae), but a deeper analysis often reveals that the absence of significant differentiation only reflects a limited statistical power. The aim of this study is to present a new methodology for the study of genetic differentiation among a defined group of regions. Applying this to the Mediterranean Sea using hydrological and environmental data, I hope to compare two hypotheses about the factors responsible for the biogeographical split among marine provinces (in particular the Levantine one): differences in survival or barriers to migration, among regions. I use and develop simple meta-analytical methods to study genetic differentiation among predefined geographical units. The originality of the approach is to compare genetic differentiation among the same region pairs for different species, taking into account unequal sample sizes and polymorphism values (cf the problem cited in the introduction). The preliminary results obtained so far (in February) suggest that the most distinct regions within the Mediterranean are not the most commonly invoked ones, and that survival differences may be more important than dispersal barriers (although this still needs to be confirmed).

FEEDING HABITS OF JUVENILE THIN-LIPPED GREY MULLET, *LIZA RAMADA* (RISSO, 1826) AND LEAPING GREY MULLET, *LIZA SALIENS* (RISSO, 1810) IN THE NERETVA RIVER ESTUARY (EASTERN ADRIATIC, CROATIA)

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The present paper studies the food composition of thin-lipped grey mullet, *Liza ramada* and leaping grey mullet, *Liza saliens* juveniles in the estuary of the Neretva River in the southeastern Adriatic. Twelve different animal food categories were identified for the thin-lipped grey mullet, *Liza ramada*. The greatest diversity was recorded in April at the Port of Ploče when 10 categories were present. In addition, six diatom taxa were noted. Harpacticoid copepods were the most common prey (39%) in these samples, followed by insects (32%) and cladocerans (12%). All other prey accounted for less than 4%. Insects represented 99% of prey in the stomachs of specimens sampled from the freshwater Crna Rijeka River. The present study confirms a carnivorous diet for *Liza ramada*, however low similarity between prey items indicated opportunistic feeding. Thirteen different animal food categories were identified for the leaping grey mullet, *Liza saliens*. The highest prey diversity occurred during September when eight different groups were recorded. Harpacticoid copepods were the dominant prey in the stomachs of leaping grey mullet, *Liza saliens* juveniles during the period from August to December and nematodes replaced those as the dominant prey from January to April. Plant material in the stomachs started to appear at 24 mm of standard length, and was common prey in fish larger than 26 mm. Insects were the most frequent prey at the freshwater sites. The results indicate a transition for *Liza saliens* from carnivorous fry to herbivorous-detritivorous juveniles.

USING MORPHOLOGICAL CHARACTERS TO ESTIMATE GEOGRAPHIC VARIATION FOR THE MEDITERRANEAN BATH SPONGE *SPONGIA OFFICINALIS* AND ASSESS THE TAXONOMIC VALIDITY OF ITS ASSOCIATED MORPHOTYPES

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Sponges are basal metazoans characterized by notable morphological plasticity. The morphological diversity deriving from this plasticity has often caused controversies regarding the taxonomy of certain poriferan taxa, but has seldom been examined at a geographical scale. Herein we examine morphometrically the common Mediterranean bath sponge *Spongia officinalis* (accounting both traditionally recognized morphotypes "mollissima" and "adriatica"), in order to investigate implications for taxonomy and assess the potential role of geographic division in morphological variation. For this purpose, we analyzed 21 morphological characters for 60 individuals collected from 11 geographic locations in the Eastern and Western Mediterranean (Aegean Sea, Gulf of Marseille and Alboran Sea). Characters were related to both the external morphology (e.g. size, color, pore dimensions and distribution) and the skeletal structure (e.g. primary and secondary fiber dimensions, type and abundance of inclusions); their diversity among morphotypes and locations was estimated with standard statistical methods (regression, ANOVA, MDS). Our results showed that morphologic characters were unable to clearly discriminate between the morphotypes of *S. officinalis*, confirming the recent molecular findings that suggested a taxonomic uniformity of the species along its Mediterranean distribution. Hence, the types "mollissima" and "adriatica" should be regarded as two extremities of the species' intrinsic morphologic diversity, with intermediate types commonly observed, at least in the Aegean. Contrastingly, the majority of quantitative morphologic characters exhibited significant variation among geographic locations and individuals –in accordance to expectations for a morphologically plastic organism–, thus suggesting a putative influence of environmental variation to the observed phenotypic traits.

CAN THE SAME PHENOLOGICAL MODEL PREDICT MOTH POPULATION ACTIVITY IN DISTINCT GEOGRAPHICAL REGIONS OF SOUTHERN EUROPE?

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In this work, we investigate the prediction capability of a logistic model in forecasting moth phenology of two lepidopteran pest species which are active in two distinct geographical regions in Southern Europe. Male moth phenology of *Anarsia lieneatella* Zeller (Lepidoptera: Gelechiidae) and *Grapholitha molesta* Busck (Lepidoptera: Tortricidae) was observed in typical agricultural landscapes located in the Calabrian region of Southern Italy (39.28°N, 16.13°E) and Veria region in Northern Greece (40.32°N, 22.18°E). Forecasting performances were further evaluated by using RMSE and Pearson x2 statistics. Adult male moth phenology of *A. lineatella* appeared quite similar in Southern Italy and Northern Greece and specimens completed 4 flights per year. Statistical results suggest that the phenology of *A. lineatella* could be predicted with high accuracy in both regions by using the same logistic model. Populations of *G. molesta* depended strongly upon the particular location of research. Moth phenology of *G. molesta* appeared quite unpredictable by using the same logistic equation in both regions. This deviation could be probably addressed to regional specific population trends, since sample estimates of population sizes for *G. molesta* varied considerably between the two geographical regions. Current results suggest that it is possible to improve the prediction capability for *G. molesta* by combining more than one model in respect to generation and/or region. Thus in cases where population dynamics diverge significantly among different geographical regions, the logistic model may yield acceptable projections when a region specific constraint, based on past observations, is added, resulting to significantly less prediction error.

ECOLOGICAL NICHE SITES AND TAXOMONIC IDENTIFICATION OF YELLOW MITES (TYDEIDAE) IN FRUIT ORCHARDS OF NORTHERN GREECE

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In this study efforts are made for classification of mite specimens discovered in bark crevices and larval shelters of Lepidoptera in fruit orchards of Northern Greece. Diagnostic features encompassed from slide preparation of specimens and examination by light microscopy. The diagnostic-morphological characters to identify the most abundant specimens of *Lorryia sp.* and *Pronematus sp.* are given. The study also reports the presence and abundance of Tydeidae individuals recorded inside of hibernacula of *A. lineatella* in IPM and conventional orchards

NEW RECORD OF *PYEMOTES* SP. (ARACHNIDA: PYEMOTIDAE) IN AGRO ECOSYSTEMS OF NORTHERN GREECE AND ITS BIOLOGICAL FEATURES

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Prostigmatid mites of the genus *Pyemotes* were first described by Krczal (1959) in parasitized specimens of *Cryptotermes brevis* and *Araecerus levipennis*. This study officially reports for the first time the presence of *Pyemotes* sp. in geographical areas of Northern Greece in parasitizing lepidopteran larvae of *Anarsia lineatella* (Lepidoptera: Gelechiidae). Samples of parasitized larvae with *Pyemotes* sp. were collected from numerous peach orchards of representative distribution representatively in agricultural landscapes of Northern Greece (40.32°N, 22.18°E - 40.16°N, 22.04°E). Individuals were further transferred to the laboratory for rearing and identification. The collected individuals had typical shape with an elongate body having the first two pair of legs widely spaced from the posterior two pair legs. Individuals were anchored on their larva host using their needlelike chelicerae. To further investigate some of the biological features of the specimen, the parasitized larvae with individuals of *Pyemotes* sp. were reared on their host and at constant laboratory conditions (25°C, 65±5%RH and 16:8h L:D). Parasitized larvae with mated females of *Pyemotes* sp. reproduced ovoviparously under laboratory conditions. Eggs hatched within the ovaries and the immature stages remained inside the enlarged opisthosoma until they reached sexual maturity. The longevity and reproductive capacity of female individuals, when reared on *A. lineatella* larvae, were approximately 12-18 days and 115-132 offspring, respectively. In some cases more than one individual (3-5) were observed to parasitize one lepidopteran larva. The parasitic ability of the above species on larvae of important pests is discussed.

THE NORTHERN DISTRIBUTION LIMITS OF *DORCADION AXILLARE* KÜSTER, 1847 (COLEOPTERA, CERAMBYCIDAE): A BULGARIAN ENDEMIC SPECIES

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The longhorn beetle *Dorcadion axillare* Küster, 1847 is currently considered as endemic for Bulgaria. It was actually recorded at the beginning of the 20th century by Montandon (1908) from several localities in SE Romania but these records were overlooked or misinterpreted by subsequent authors. Based on all published data, museum specimens and field surveys *D. axillare* is confirmed to be present in the Romanian fauna more than one hundred years after the last published record. The populations distributed north of the Danube are morphologically different from those in the type locality (Balkan Mountains, Bulgaria) and they are considered to belong to a different subspecies which is currently under investigation.

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REPRODUCTIVE PARAMETERS OF THE CRITICALLY ENDANGERED MEDITERRANEAN MONK SEAL, IN THE AREA OF NORTHERN SPORADES, GREECE

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The Mediterranean monk seal, *Monachus monachus* (Hermann, 1779), is one of the 33 pinniped species surviving today in the world and the only pinniped species of the Mediterranean Sea. It is estimated that its total world population does not currently exceed 600 individuals and therefore the species is considered as critically endangered. The largest part of the total population is found in Greece where it is estimated that approximately 250 animals live. Monk seal pupping activity and pup development was monitored for 13 consecutive years (1990-2002) in the wider area of the National Marine Park of Alonissos, Northern Sporades, Greece. The methodology used was based on the systematic monitoring of the marine caves that are used by the seals for pupping and lactating and consisted of: a) visits to the marine caves in order to carry out direct observations, and b) the use of pre-programmable still cameras. Ninety-four newborn pups were recorded in 12 different marine caves. In 83 cases the date of birth of the newborn pup was determined. When placing the birth dates in the 52-week year calendar, they showed a normal distribution with 90% of the births occurring between the 36th (end of August) and the 46th (mid-November) week of the year with a peak in the second week of October, indicating a synchronous breeding season. In addition, data on the development of the newborns up to the third month of their lives are also presented.

USE OF AN UNMANNED AERIAL SYSTEM (UAS) FOR COUNTING NESTS OF WATERBIRDS AT LAKE MIKRI PRESPA, GREECE

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Aerial surveys are valuable means for wildlife research and management. Recently, the use of small, unmanned aerial systems (UAS) has become a useful tool for many wildlife applications, such as provision of low-altitude aerial imagery. We tested the use of a high-tech remote-controlled, electric-powered helicopter (model Kestrel 1000, CARVEC Ltd, UK) in order to obtain aerial images of birds nesting in large reed beds inaccessible from land or water around Lake Mikri Prespa, northern Greece. The area of Prespa is a large basin at an altitude of 850m which contains two lakes, Mikri and Megali Prespa. The area is a very important habitat for avifauna, with over 260 species of birds. We obtained 120 good quality aerial photographs of nest concentrations of 12 different species of waterbirds such as herons, cormorants, pygmy cormorants and pelicans. From the examination of the photographs it was evident that nests could be easily identified and counted, different nesting bird species were identifiable and other information such as number of chicks and state of development could also be obtained. Furthermore, no disturbance of nesting birds was observed while the helicopter was flying at an altitude of 80 meters above ground level. We conclude that the use of light UAS for counting nesting birds at large tracts of otherwise inaccessible wetland vegetation is cost-effective and can provide data for accurate counts of birds' nests that cannot be seen from any vantage point on land.

PRELIMINARY RESULTS FROM THE INVESTIGATION OF THE PARASITIC FAUNA OF EUROPEAN GROUND SQUIRREL (*SPERMOPHILUS CITELLUS*) IN GREECE

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The European ground squirrel (*Spermophilus citellus*) is categorized as vulnerable (IUCN). Greek populations can be especially important, as they are found at the periphery of the southern border of the range of this species. The aim of the current study is to investigate the parasitic fauna of *S. citellus* in Greece, in order to enrich our knowledge on the health status and potential threats for this species and to consider any possible importance of its parasites to domestic animal or public health. Up to date, 120 animals from 5 different populations have been examined for endoparasites. Feacal samples were collected from burrow entrances and were examined by flotation and sedimentation method, while Ziehl-Neelsen stained smears were prepared and stored for the detection of *Cryptosporidium* oocysts. Of the 120 animals examined 118 (98.33%) excreted *Eimeria* spp. oocysts (*E. callospermophili*, *E. citelli, E. cynomysis* and other two unidentified species). *Entamoeba* spp. was found in 30 (25%) animals and *Brachylaima* sp. in 5 (4,16%). Only a few feacal smears for *Cryptosporidium* spp. have been examined until now, however the presence of the parasite was already recorded. The high prevalence and heavy infection with *Eimeria* spp. observed in our survey is implying probable clinical condition. The recorded *Eimeria*, and most likely, *Entamoeba* species are exclusive parasites of *Spermophilus* spp., thus no expected risk for domestic animal and public health exists. On the other hand, *Cryptosporidium* spp. and parasites of the genus *Brachylaima* may represent a possible threat to other animals and humans.

MIGRATION OF THE TURTLE DOVE *STREPTOPELIA TURTUR* THROUGH SOUTH-WESTERN GREECE. BIOMETRICS OF THE SPECIES IN GREECE

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The aim of this study is to describe the migration phenology and biometrics of the Turtle Dove *Stretopelia turtur* for the first time in Greece. Turtle Doves breed in N. Africa and most of Europe and eastwards to central Asia. It is a long distance migrant that winters in sub-Saharan Africa. Close to eleven million Turtle Doves migrate every year between their breeding grounds in the Western Palearctic and their wintering grounds. Bird ringing was carried out in Antikythira Island, south Greece, during 1998-2011. The island is a very important stopover site for bird migration. The birds were caught using mist-nets. In total 597 Turtle Doves were ringed during 12 spring migration seasons (1998, 1999, 2002-2011) and 10 autumn seasons (1998, 1999, 2003-2005, 2007-2011). The wing length of the Turtle Dove is found to be 176 (108 – 194) mm and the tarsus is 22.9 (19.3-29.6) mm. The mean body mass was 124.4 (68-188) g. The mean body mass during spring was 122.49 ± 17.07 (68.0-168.0) g and during autumn was 175.25 ± 5.53 (169.0-188.0) g. The body mass of the species showed a significant difference between seasons ($U = 1964.0$, $Z = -9.0$, $p<0.001$). Birds trapped during spring were significantly lighter than those that were preparing to cross the sea and the desert during autumn. Based on our data, the species passes through Antikythira between early April (8/4 was the first catch) and late May (23/5 last catch) during spring and between early September (2/9 first catch) and late September (28/9 last catch) during autumn.

A CATALOGUE OF COLEOPTERA SPECIMENS WITH POTENTIAL FORENSIC INTEREST IN THE GOULANDRIS NATURAL HISTORY MUSEUM COLLECTIONS

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We present a catalogue of the Coleoptera specimens in the Goulandris Natural History Museum collections that have potential forensic interest. The aim of this presentation is to advertise this collection as a reference for identifying these species. Forensic entomology can help to estimate the time elapsed since death by studying the necrophagous insects collected on a cadaver and its surroundings. In the present study, the authors present a catalogue of insect specimens of the families that have been reported near human cadavers. They belong to the families Silphidae (diet necrophagous-predaceous) 3 species, Staphylinidae (diet predaceous) 6 species, Dermestidae (diet necrophagous) 11 species, Cleridae (diet predaceous) 6 species, Ptinidae (diet saprophagous) 4 species, Nitidulidae (diet saprophagous) 6 species and Histeridae (diet saprophagous-predaceous) 11 species.

DIET OF STERLETS AND AQUATIC MACROINVERTEBRATES COMMUNITY ASPECT IN THE SERBIAN PART OF THE DANUBE RIVER

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This work aims to present the macroinvertebrate community of the Danube River in Serbia, as well as the stomach content in sterlets (*Acipenser ruthenus* Linnaeus, 1758). Fish were sampled in locality Backa Palanka (1,300 river km) using nets of different mesh sizes (32-50 mm) in September and October 2007. In total 25 fish specimens of 1+ and 2+ ages were collected and examined. Macroinvertebrates were collected using benthic hand nets with mesh size 500 and 250 μm and benthological dredge. Identification was carried out to the species level, except in cases of damaged and juvenile individuals. Eleven sterlets had empty stomachs, while in 14 other, by examination of the stomach content, a total of 146 individuals of seven macrozoobenthos-groups have been found: Oligochaeta (40.63%), Amphipoda (14.51%), Isopoda (3.17%), Gastropoda (4.75%), Trichoptera (5.54%) and Diptera (31.40%). Among the determined macroinvertebrates, were recorded Gastropoda (65.75%), Bivalvia (29.45%), Oligochaeta (3.42%) and Diptera (1.37%). Research of sterlet diet in the Serbian section of the Danube River, in previous studies, has revealed that Trichoptera, Chironomidae (Diptera) and Amphipoda represented the main part of its diet, with reduction of variability in the food composition after the construction of dams ("Djerdap gorge"). The insect component of the bottom fauna (Neuroptera, Ephemeroptera, Hemiptera and Plecoptera) which was present as food items in the diet of sterlets fifty years ago, does not exist any more due to changes in environmental conditions (morphological parameters and pollution).

COMPOSITION AND DISTRIBUTION OF AQUATIC MACROINVERTEBRATES IN RESPECT TO THE BOTTOM TYPE IN A HIGHLAND STREAM

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Aquatic macroinvertebrates were sampled from the Moravica River (South-West Serbia) for two years in order to evaluate the differences in invertebrate communities in respect to habitat types. The aim was to analyze the bottom fauna and to study the substrate heterogeneity and the grouping of macroinvertebrate taxa on each substrate type according to ecological features. There were eight bottom substrate types (cobble (C), gravel (G), sand (S) and mud (M) in varying proportions (C-G, G-S, S-M, M-D)) which were used as defining parameters for site localization. A total of 66 samples were collected. A total of 13 taxa groups, with 147 taxa, were found. Insect orders Ephemeroptera, Trichoptera, Plecoptera, Chironomidae, Diptera, Coleoptera and Heteroptera were found to be the dominant component of the community. All examined substrate types from the sampled sites were colonized by *Rhithrogena semicolorata* and Chironomidae. The types of substrate with the highest taxa richness are the cobble-gravel microhabitat and the gravel microhabitat, respectively. Downstream sites are colonized by benthic communities represented by a great number of Oligochaeta species (19). There is a correlation between changing of substrate types along the watercourse, from high participation of hard bottom microhabitats (cobble, gravel), and the consistency of bottom fauna structure and composition. The dominant role of aquatic insects (other than Diptera) in the upper part of the stream is slowly replaced by representatives of Oligochaeta and Chironomidae, with more taxa and greater abundance. This study indicates that the macroinvertebrate community is dependent on its bottom substrate, as well as on river regulation and pollution sources.

MITOCHONDRIAL GENETIC VARIATION AND INVASION HISTORY OF RED PALM WEEVIL, *RHYNCHOPHORUS FERRUGINEUS* (COLEOPTERA: CURCULIONIDAE), IN THE MIDDLE-EAST AND THE MEDITERRANEAN BASIN

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The Red Palm Weevil (RPW), *Rhynchophorus ferrugineus* (Olivier), (Coleoptera, Curculionidae, Rhynchophorinae), is an invasive pest of palm trees. The RPW has invaded the Middle East and several countries of the Mediterranean Basin during the last three decades. The mitochondrial genetic variation of the RPW was investigated in the Middle East and the Mediterranean basin areas using partial sequences of the Cytochrome c oxidase sub-unit 1 (CO1) gene. A 546-base pair portion of COI gene was sequenced for 310 individuals of the RPW sampled from 14 different invaded countries resulting in eight different haplotypes. Eight haplotypes were subdivided into two phylogenetic groups according to their geographic positions. The obtained genetic diversity suggested that the RPW population subdivided genetically into different sub-populations under the influence of genetic drift favored by founder events. The RPW followed three different routes of invasion during the last 30 years. Likely, the Middle East populations and the Mediterranean ones are originating from different geographic populations of the RPW. The data reported in this paper present an interesting and useful step toward the understanding of the genetic variation and invasion history of the RPW.

TWO NEW RECORDS OF CURCULIONIDAE (COLEOPTERA) FOR THE FAUNA OF TURKEY

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In this study, two species of Curculionidae (Coleoptera) family, *Coniocleonus nebulosus* Linnaeus, 1758 (Lixinae) and *Mecinus janthinus* Germar, 1817 (Curculioninae) were recorded for the first time in Turkey. The specimens were collected from different localities on Bolkar Mountains of Turkey in 2006. The materials are deposited in the Kırşehir Zoology Laboratory, in Turkey. The genitals were prepared by standard methods. For *M. janthinus* Germar, 1817: body long, cylindrical, blackish blue or dark blue, eyes round and slightly projected, rostrum bent, antennae blackish brown or black, pronotum oval, lateral edges round, elytra long, cylindrical, profemurs toothed (♂), claws basally contiguous, 3.6 mm, spermatheca like sickle, ramus like canal, nodule seems circular and rather dilated, and strongly sclerotized. For *Coniocleonus nebulosus* Linnaeus, 1758: body black or blackish red, surface covered with grey hairs, eyes elliptical, rostrum short, wide, parallel-sided, antennae dark red, pronotum broad, surface indented, postorbital lobe prominent, projection of prosternum pointed, elytra parallel-sided towards the posterior, femurs slim, defenseless, claws strong and basally contiguous, 12.6 mm, spermatheca like hook, ramus and nodule slightly projecting. After diagnosis we described the specific characters of species and their genital organs (spermatheca) in drawing. The Bolkar Mountains are found between Europe, Iran and the Mediterranean regions together with the Sahara-Arabian subregion, and constitute a passing zone among zoogeographic regions. Thus, the Bolkar Mountains are very rich and important mountains for Turkey and Europe. In Turkey they include many faunistic components of Europe, Mediterranean and the Iran-Turan regions. As a result, this study shows that new species and records can be found with more similar investigations. The aim of this study was to review the materials and supply new contributions to the fauna of Turkey.

FINE STRUCTURE OF THE SCALES OF *TYCHIUS* GERMAR, 1817 (COLEOPTERA: CURCULIONIDAE: CURCULIONINAE) SPECIES

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In this study, three species of *Tychius* Germar, 1817 (Coleoptera: Curculionidae: Curculioninae) were used. For investigation, the specimens of *T. aureolus*, *T. breviusculus* and *T. squamulatus* were selected from museum materials. For the first time, the specimens were examined under the light microscope and obtained photos of the species. For the scanning electron microscope, the species were cleaned and mounted with double-sided carbon tape on SEM stubs, coated with gold in a Polaron SC 502 Sputter Coater, and examined with a JOEL JSM 6060 SEM operated at 10 kV. Then, we investigated the surface morphology of scales on x500, x1000, x1500. In light microscope, the morphology of the species (*T. aureolus*, *T. breviusculus* and *T. squamulatus*) are similar, such as in color or shape. Especially, the scales of *T. aureolus* and *T. breviusculus* appear completely of the same shape and color, but the scales of *T. squamulatus* are different than of the other species; especially the scales on the pronotum are more like the other species than on the elytra. In the scanning electron microscope, the morphology of scales that covered the surface of the body appear rather different on each species. In *T. aureolus*, the scales are longitudinal, oblong, the apical part is oval, the scale surface has longitudinal process and the lateral of apical is nearly straight, while in *T. breviusculus*, the scales appear oblong, towards the apical end they are less wide, the surface of each scale has longitudinal process, the lateral of apical seems serrate. In *T. squamulatus*, the scales are oval and wide and the surface has densely short projections. The scales are very important characters for taxonomy in insects. Caldara (1990) had drawn the scales of some species of the genus *Tychius*. In our investigations, the scales of *T. aureolus*, *T. breviusculus* and *T. squamulatus* appear similar in the light microscope, but in the scanning electron microscope, they have a lot differences, especially regarding their surface morphology. As a result, we thought that the investigations of the surface morphology of scales by scanning electron microscope in insects are very useful for taxonomical studies which separate similar species.

ENDOPARASITES IN BLACK-NECKED GREBE (*PODICEPS NIGRICOLLIS*) FROM BIRDS THAT DIED AFTER AN OIL SPILL ACCIDENT

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On December 3rd 2011, thirteen (13) black-necked grebes (*Podiceps nigricollis*) exposed to an oil spill in Thermaikos golf, Thessaloniki, Greece, were brought to the First Aid Station of the organization "Action for Wildlife". Despite the support provided, the birds died after 1-4 days. The aim of the present study was to investigate the parasites of the black-necked grebes and to assess the role of parasites to the health status of this bird species. At necropsy, lesions compatible with toxicosis were observed in the trachea, lungs, proventriculus, intestine, kidneys, liver and spleen. Liver and stomach (proventriculus and gizzard) samples were collected and subjected to toxicological examination. The respiratory system and digestive tracts of the birds were examined for the presence of parasites. In addition, feacal material from the final part of the intestine was examined by two parasitological methods (sedimentation and flotation). Parasites were found in all of the birds (100%). The most prevalent were the cestodes that were found in big numbers in the intestine of all birds. Nematodes were found in 8 and trematodes in 5 birds. Finally, coccidian oocysts were found in one bird. The results of the present study indicate that, although parasitism was not the cause of death for the birds examined, it is probably a serious threat that relegates the health status and poses challenge to the conservation of this bird species.

ENDOPARASITES OF EUROPEAN COMMON QUAILS (*COTURNIX COTURNIX COTURNIX*) HUNTED IN NORTHERN GREECE

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The European common quail (*Coturnix coturnix coturnix*), a small migratory bird, is found in parts of Europe. It is listed on Annex II/2 of the EU Birds Directive as a species for which hunting is permitted. However, it has been characterized as a species that has a poor conservation status in Europe, as it showed decreasing population trends in many countries in the recent years. We report here the preliminary results of a study which had the aim to investigate the parasites of the digestive system of the common quail, in order to evaluate the role of parasitism to the conservation status of this bird species. To date, 66 birds have been examined. The birds were hunted in areas of Northern Greece, in autumn 2011. The hunters were keeping the digestive tracts of the birds, which were transferred to the laboratory and examined for the presence of parasites. In addition, feacal material from the final part of the intestine was examined by two parasitological methods (sedimentation and flotation). Parasites were found in 15 out the 66 birds (22.72%). More precisely, *Eimeria* spp. oocysts were found in 11 (16.6%) birds, the cestode *Lyruterina nigropunctata* was found in 3 (4.54%) and *Ascaridia* spp. was found in 1 (1.51%) bird. Our results to date, demonstrate a relatively low prevalence of parasites in common quails. This fact advocates the hypothesis that parasitism does not represent a serious threat for the health status and conservation of this bird species.

THE DIVERSE SCORPIONS OF GREECE AND ADJACENT REGIONS

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When 13 years ago we (Fet & Braunwalder, 2000) reviewed Aegean scorpions for ICZEGAR-1999, we could not explain why Greece, along with the adjacent Balkans and Anatolia, had a rather low species diversity. Are scorpions special? Why are not they diverse? But they are! Already Aristotle noted that all scorpions are not the same. C.L. Koch (1837) ingeniously outlined local species, but lumping trend prevailed. As indicated by a record number of "subspecies" in the Mediterranean *Euscorpius*, it contained a not-so-hidden diversity. We rediscovered the forgotten Peloponnese endemic *E. naupliensis*, a sister species to a possible bottleneck survivor *E. italicus* (Gantenbein *et al.* 2003; Fet *et al.* 2006); we redescribed Balkan *E. hadzii* and *E. sicanus* (Fet & Soleglad 2002; Fet *et al.* 2003). Over a dozen species of *Euscorpius* are projected for Greece alone, some sympatric (e.g. on Mt. Olympos, Mt. Ossa). At least three *Euscorpius* species live in Bulgaria (Fet & Soleglad 2007). The Western Balkans and Anatolia have diverse populations of subgenus *Alpiscorpius*, absent from most of Greece. Based on DNA markers, the first phylogeographies were published for *Mesobuthus* and *Iurus* (Parmakelis *et al.* 2006a, b). Monotypic, relict genera of Iuridae, rarely collected but ignored for decades, yield new insights; several new, allopatric species of *Iurus* and *Calchas* are now described from Anatolia (Fet *et al.* 2009; Kovařík *et al.* 2010). A picture that emerges of scorpions in Greece and adjacent lands is that of diverse and rich taxa, a promising group for speciation studies.

VARIATION OF ANT ALATE PHENOLOGY IN CRETE, GREECE

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When starting a new colony, virgin queens mate with males during the nuptial flight at a specific time of the year. Under evolutionary pressure, species have distributed the time of their reproductive phase in order to avoid competition for food and space. To study this phenomenon, we used flying males and females captured during their nuptial flight with light traps that were set up for one year. Initially the individuals from each trap were sorted to morphospecies (due to the lack of appropriate taxonomic references), identified as males and females and their relative abundance was recorded. For each morphospecies we calculated its nuptial flight phenology throughout the year. Our results indicate that different species perform their nuptial flight at different time periods. Three different types of patterns for the species' reproductive phase were determined: (1) partially overlapping reproductive period with varied abundance peaks, (2) overlaying reproductive periods and (3) distinct reproductive periods. Most species were active during early spring, avoiding the establishment of new colonies during the hot summer months. In general, male numbers were greater than those of females, confirming the notion that males are more 'expendable' than females.

IDENTIFICATION OF MARINE IMPORTANT BIRD AREAS FOR THE MEDITERRANEAN SHAG (*PHALACROCORAX ARISTOTELIS DESMARESTII*) AND AUDOUIN'S GULL (*LARUS AUDOUINII*) IN GREECE

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Important Bird Areas (IBAs) are key sites for the conservation of birds, identified on the basis of internationally agreed and standardized criteria. The LIFE project "Concrete conservation actions for the Mediterranean Shag and Audouin's Gull in Greece, including the inventory of relevant marine IBAs", LIFE07 NAT/GR/000285 is aiming to identify IBAs at sea (Marine IBAs) for the Mediterranean Shag (*Phalacrocorax aristotelis desmarestii*) and Audouin's Gull (*Larus audouinii*), seabird species of high conservation concern, in order to improve the coverage of the IBA network in the marine environment of Greece, which is currently incomplete. The Marine IBA delineation process is based on the standardized BirdLife International methodology. The data on at-sea distribution and behaviour of seabirds, collected by line transect boat surveys, coastal counts and telemetry is overlaid by oceanographic, biological and seabird diet data to delineate Marine IBAs as polygons which fulfill the IBA selection criteria. The Marine IBAs for the Mediterranean Shag and Audouin's Gull in Greece have been identified in the coastal waters surrounding breeding colonies, which are used for feeding and maintenance activities, as well as at sites of non-breeding congregations. The preliminary inventory of the Marine IBAs includes 34 sites for the Mediterranean Shag and 27 sites for Audouin's Gull, covering a total surface marine area of 8690 km^2 of marine areas in the Aegean and Ionian Sea, providing a list of sites with the

highest priority for conservation and management of these two above seabird species and their marine habitats.

FORAGING DISTRIBUTION AND BEHAVIOUR OF THE AUDOUIN'S GULL (*LARUS AUDOUINII*) IN THE AEGEAN SEA

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The Aegean Sea is the main breeding region of the Audouin's Gull (*Larus audouinii*) in the Eastern Mediterranean with 85 breeding sites identified during the last 15 years. The aim of the present study is to assess the foraging distribution and behaviour of the Audouin's Gull at selected colony sites to determine the foraging range and strategies, as well as variations in foraging behaviour among individuals and sites. The methods used included telemetry in association with visual observations. In total 25 tracking devices (radio-transmitters, GPS dataloggers and GPS-Bluetooth transmitter) have been mounted on incubating Audouin's Gulls during 2009-2011 at breeding colonies on Leipsi, Amorgos and Skyros, resulting in 53 foraging tracks consisting of almost 26,000 bird locations with known behaviour. The tracked Audouin's Gulls fed primarily in coastal waters at distances of up to 10-14 km away from their native colony sites with variations in foraging dispersal and foraging strategies among sites and individuals. Particular individuals show high preference to specific foraging strategies associated with human activities at sea (e.g. feeding at fish farms or fishing vessels). The results of the study demonstrate that the Audouin's Gulls in Greece are mainly coastal feeders using open sea areas for movements between foraging areas or feeding at fishing vessels. The same marine areas and neighbouring coastline are regularly used for resting. The understanding of local movements and foraging behavior is vital for an effective prevention and mitigation of threats, such as, depletion of food sources, pollution, and degradation of marine and coastal habitats.

THE PALAEARCTIC SPECIES OF *REIKOSIELLA* (HYMENOPTERA, EUPELMIDAE): AN ENIGMATIC GROUP OF PARASITOID WASPS

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Until the monograph of Bouček on Australasian Chalcidoidea published in 1988, most *Reikosiella* species were described in *Eupelmus*. There is only one Palaearctic species currently included in the genus, the European *Reikosiella hungarica*, the combination being recently proposed by Askew & Nieves-Aldrey. Species of this genus are only rarely collected or reared from a range of plant material, but almost nothing concrete is known on their biology or diversity in the Palaearctic. The present work was instigated by a cytogenetic study on several *Eupelmus* species, which showed that *Eupelmus rostratus* has a karyotype dissimilar to that of other species of the genus. The information on the chromosome complement combined with morphological features show that *Eupelmus rostratus* belongs to *Reikosiella*.

This revision is based on the examination of all available types, specimens from six major natural history museums and recently collected material from Greece, Romania and South Korea. From the nine species treated here, two are new combinations from *Eupelmus* and six are newly described (two from Greece, three from South Korea, one from the United Arab Emirates). Although three of these species were reared from cynipid galls, the exact hosts are still unknown. For most specimens where detailed collecting data are available, this indicates an arboreal life style. The peculiar biology of Palaearctic *Reikosiella* species explains well they rarity in collections and probably they are rather rarely collected than rare. It is expected that further research will uncover an even larger diversity of this enigmatic group of parasitoid wasps.

FORAGING HABITAT SELECTION BY BRREDING LESSER KESTRELS, *FALCO NAUMANNI*, IN THESSALY, CENTRAL GREECE AND CONSERVATION IMPLICATIONS

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The lesser kestrel, *Falco naumanni*, is a small migratory raptor that in Europe, is mainly restricted to the Mediterranean Basin. It breeds in colonies in towns and villages and forages in steppe-like habitats, such as grasslands and low-intensity cultivated plains. A main cause of its decline in its breeding grounds in lowland Europe is the loss or deterioration of its foraging habitats, primarily as a result of changes in agricultural practice driven by the CAP in the EU over the last decades. The aim of this study is to assess the importance of agricultural areas as foraging habitats for the preservation of lesser kestrel breeding populations in Thessaly, Central Greece, during the chick rearing period. The study area consists of agricultural land dominated by cotton and cereal fields and open hilly areas with grasslands, and is surrounded by mountains. Generalised Linear Models and habitat selection analysis were used to study lesser kestrel abundance in its feeding areas based on a set of environmental predictors. Foraging lesser kestrels were positively associated with non-irrigated land (mainly dry cereals) and grassland (including pastures and fallow land). A raptor species specialised in agricultural habitats could be an important means for the assessment of the long term impact of CAP in the environment and a very useful tool in the conservation planning of biodiversity in traditional agricultural ecosystems.

CONTRIBUTION TO THE SPINY OYSTER *SPONDYLUS GAEDEROPUS* (BIVALVIA) AUTOECOLOGY

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In this work epibionts, condition index, age and growth of the famous and unstudied edible bivalve *Spondylus gaederopus* were studied. The samples were collected from 8 - 20 m depth in the Kelyfos island (Toronaeos Gulf, N Aegean, Greece) during November 2007 - October 2008 in an almost bi-monthly basis. The epibionts were identified at higher taxon levels. The shell length, wet and dry weights (body and valves) were measured. The condition index (CI%) was calculated by the formula: body weight/total shell weight x100. Age determination was based on the number of dark zones on a section at the umbo area. The growth rate was based on the temporal growth at the margin of a standard size (7.0 ± 0.2 cm) shell. Nine epibiontic taxa were recognised; Porifera appeared almost everywhere. The growth is continuous during the year with different rates seasonally. It was faster in the spring after the winter/spring higher food availability. The condition index was high in spring and did not exceed an average of 3 % (dry weights) due to its heavy valves. Spiny oyster is a lifespan species with a maximum age of 18 years and a maximum length of 6.9 cm, while the largest (9.2 cm) was 10 years old. Males were generally smaller (younger) than females. A wide growth range and age for similar oyster size was observed. The von Bertalanffy equation was estimated. Further, detailed studies can contribute both to the knowledge of this species' ecology and the effective protection of the marine environment.

ANALYSIS OF ANIMA WILDLIFE REHABILITATION CENTRE DATA FOR THE PERIOD 2008-2011

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One of the main tasks of a rehabilitation centre is the collection and analysis of the patient admission data in order to determine the causes and patterns of wildlife admission to rehabilitation and to provide valuable information for an effective wildlife management and protection. Since 2008 ANIMA -the Association for the Protection and Welfare of Wildlife- has been systematically collecting data on the causes of wild animal admissions to the First Aid Centre. The information is collected using a specific protocol and entered into a specially designed database. During the study period 2008-2011, a total of 5,653 individuals have been admitted, a vast majority of which were birds. The results clearly indicate seasonal variations of admissions related primarily to natural ecological seasons, e.g. migration and breeding seasons, or to human activities e.g. hunting. The majority of admissions are related to accidents, peaking during spring and autumn migration, as well as during chick fledging period. The poaching incidents are strongly related to the hunting period, with the majority of victims being raptors. During all study years the proportion of bird species groups remains almost stable, while there is a clear differentiation of species and causes of admission originating from the cities and the countryside. The admission data provides useful indicators of the state of threats to wildlife in Greece and their trends; however, sampling limitations and factors affecting it prevent a clear assessment of their extent and impacts on wildlife populations.

A MARINE SPECIES (*ATHERINA BOYERI*, RISSO 1810) EXPANDING ITS DISTRIBUTION IN INLAND WATERS OF ANATOLIA

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Sand smelt is known as a marine-estuarine species having a wide distribution area covering coasts of northern Atlantic Ocean, Mediterranean Sea, Black Sea and Caspian Sea. This euryhaline species is also known to live in lower parts of rivers, estuaries and costal lakes. This species was recorded from all coasts of the seas surrounding Anatolia, also from lagoons and lakes having connection with seas. In the mid 1940's sand smelt was recorded from lake Sapanca. In 1991 *A. boyeri* was reported from İznik lake, which has no direct connection to the sea. During the last decade there were new records from different natural and man-made lakes of Anatolia i.e. reservoirs on Kizilirmak, Sakarya, Aksu and Orontes rivers. Sand smelt established successful populations in the third and fourth greatest lakes of Turkey. The populations inhabiting the above mentioned lakes and reservoirs are isolated and have no connection with the sea. In Turkey, the distribution of this species in freshwater has been expanding conspicuously during the last decade by illegal introductions and is becoming popular for fishermen due to its economic value. The common features of these sand smelt populations confined to freshwater are successful breeding and filling vacant pelagic niches and becoming dominant fish. We should consider the ecological impacts such as predation on zooplankton, competition with endemic fish species and fishes having economical value. Due to life history traits such as short life cycle, early maturation and prolonged reproduction period, this species has a great potential of being an invasive in freshwaters of Turkey.

CARRY LOAD COMPOSITION IN THE HARVESTER ANTS OF THE GENUS *MESSOR* IN A TYPICAL MEDITERRANEAN ECOSYSTEM

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Harvester ants are one the most important factors of seed predation and dispersal in Mediterranean ecosystems. Their foraging strategy, ethology, physiology, energetics, and even morphology in relation to seed harvesting has been well documented during the past decades, exceeding more than 80 published papers. On the other hand, a full census of what harvester ants bring back to the nest has been somewhat elusive of documentation, although numerous sightings of harvester ants foraging on insect carcasses, flowers, fruits and other plant material have been reported or personally communicated. In this study we present the first comprehensive recordings of the carry load composition in harvester ants. Data were collected from 3 nests belonging to different colonies and twice a day (in the morning and the evening), during 2 years from April to November. Ants are shown to carry plant material (avg 9.61%, max 19.26% [Apr/morning], min 2.43% [Aug/evening]), animal material (avg 3.31%, max 5.67% [Aug/morning], min 2.18% [Apr/evening]) and soil particles (avg 17.82%, max 50.73% [Nov/morning], min 4.49% [Aug/morning]) apart from seeds (avg 20.58%, max 57.23% [Sep/evening], min 2.38% [Apr/evening]). The seasonal shift in this composition is depicted by correlating monthly data for each type of item carried. Ants modify their task according to the availability of food resources as well as the needs of the colony. Finally, we provide evidence that harvester ants rapidly alter their activity between food/seed harvesting to in-house tidying up and preparation for the winter almost immediately after the nuptial flight.

THE BAT FAUNA OF SKYROS ISLAND, SPORADES, GREECE

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Until very recently the bat fauna of Skyros was poorly studied and only two species, *Rhinolophus ferrumequinum* and *Eptesicus serotinus* had been reported from the island. In 2010 and 2011 a thorough inventory was undertaken, to reveal all bat species present on the island and to locate roosting sites and important feeding areas. Fieldwork included inspection of possible refugia, recordings of social and echolocation calls and mist netting. Four mines in the north part of Skyros were found to shelter *R. blasii*, *R. ferrumequinum*, *R. hipposideros* and *Myotis emarginatus*. One of them serves as reproduction site of several tens of individuals of *R. blasii* and *M. emarginatus*. Additionally, the social and echolocation calls of *Hypsugo savii*, *Pipistrellus kuhlii* and *P. pipistrellus* were recorded in several sites across the island. *Tadarida teniotis* was also recorded, although it is less common. According to our observations, at least nine bat species are present in Skyros. The northwest part of the island is the richest in bat species numbers and abundance, as it offers a variety of habitats including many roosting sites (mostly mines). Abundance was relatively high also in the central part were most settlements and cultivations are located. All bat species of Skyros are protected by several Greek and international laws and conventions. For an effective conservation of their populations in Skyros, the mines where they roost and the most important feeding sites (forested areas and wetlands with rich vegetation) should be managed properly.

BENTHIC ZONATION IN MARINE CAVES OF THE NORTH AEGEAN SEA

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Only few Mediterranean marine caves have been examined quantitatively for the spatial variability of their sessile benthic communities, while this kind of research is totally missing for the Eastern Mediterranean. In the present study two submerged caves at Fara (11-18 m) and Agios Vasilios islets (24-40 m), off Lesvos Island, were mapped in detail and their biological zoning was surveyed with SCUBA diving and non-destructive methods (photo-quadrats). The coverage percentages of twelve taxonomic groups were calculated for three sites (two walls and ceiling) and three zones (entrance, middle, inner) of each cave. A similar biological gradient was observed at both caves, with total coverage decreasing and algae being replaced by invertebrates towards the interior. Sciaphilic algae dominated at the entrance of Fara cave, while their coverage was similar to that of sponges in the more shadowy entrance of the deeper Agios Vasilios cave. Plant life disappeared in the middle zone of the former but penetrated this zone in the latter cave, which receives higher light intensity through the larger entrance opening. Sponges dominated in the middle and inner zones of both caves. Scleractinians presented higher coverage on the ceilings of most cave zones and polychaetes in the inner dark zone of Fara cave. The percentage of bare rock was higher in the dark terminal tunnel of Agios Vasilios cave. The variation in coverage percentages of all groups at different sites and zones reflects the variety of topographic and physical features among and within caves, indicating a high level of individuality.

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MEDITERRANEAN MARINE CAVES: RESERVOIRS OF PORIFERAN DIVERSITY

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Porifera thrive in shadowy hard-substrate environments and constitute the dominant animal group in marine caves. The present work aims to evaluate the significance of the marine cave habitat for the Mediterranean ecosystem by using Porifera as a reference group. A meta-analysis of data on sponge cave assemblages from the existing literature combined with primary data from Aegean Sea caves was accomplished. Several species found in the surveyed caves were new elements for the fauna of the Aegean Sea or Eastern Mediterranean. Cave dwelling sponges numbered 311 species, making up 44% of the Mediterranean Porifera. All classes of the phylum were recorded, while all demosponge orders, 88% of the families, and 70% of the genera were represented. Rare and cave-exclusive species were recorded, while caves appeared to be a very favorable habitat for certain demosponge groups. Cave assemblages of the different Mediterranean areas were compared revealing spatial variation in species richness and taxonomic diversity. Similarities in cave assemblages' composition among areas followed a pattern similar to that of the overall Mediterranean demosponge fauna. Species with an Atlanto- Mediterranean distribution and Mediterranean endemics prevailed among cave sponges, most of them having warm-water affinities. At least, concerning their sponge fauna, Mediterranean marine caves appear to be important biodiversity reservoirs of high representativeness, with unique faunal elements, presenting great scientific interest and deserving thorough study and protection.

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ASIAN TIGER MOSQUITO (*AEDES ALBOPICTUS*, DIPTERA: CULICIDAE) IN ATHENS, GREECE

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Aedes (*Stegomyia*) *albopictus* (Asian Tiger mosquito), an invasive mosquito species of great medical importance, was first found in Athens, Greece, in 2008. Within the next 2 years (2009-2010), its seasonal distribution and population abundance in the surrounding area of its first detection site was investigated. For this, a network of 50 ovitraps was set up in an area of 25km^2 and monitored for 17 months from 17 August 2009 to 31 December 2010. Weekly servicing of the ovitraps and subsequent laboratory treatment of the collected mosquito eggs revealed that *A. albopictus* is widespread in the whole study area and is the dominant container breeding *Aedes* species. Our results suggest that the Asian tiger mosquito is continuously active in Athens for over 8 months, from mid spring until the end of December, with a considerably high oviposition activity recorded during summer and fall. Additionally, comparison of its activity during late August and end of December, between the two consecutive surveillance years, indicated a significant increase of population abundance the second year. The current study provides information about the biology and potential population densities of *A. abopictus* in the urban environment of the city of Athens.

PLASTICITY IN SPIDER PHENOLOGY AND COMPOSITION AS A RESPONSE TO CLIMATIC VARIATION; AN EXAMPLE FROM EVROS DISTRICT

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We examined the response of arthropods to climatic variations through a comparative study on the composition, abundance and phenology on two characteristic habitats of Evros district. Two sampling stations were situated in Dadia (mixed forest and maquis) and near the University Hospital of Alexandroupolis (maquis). The climate of Dadia is characterized by very low winter temperatures and short, hot and dry summers. The climate near the University is milder, characterized by harsh winters, and hot, dry summers of longer duration. The aim of this work was to test the plasticity of spiders in response to variable climatic conditions and from there to extrapolate their capacity to overcome a general trend of climate change. The study was effectuated using pitfall traps and the analysis was performed on the family level, except for Gnaphosidae in which, species analysis was also performed. The analysis showed that, although the composition of families is not very different among the two sites, the abundance of spider communities, as well as species composition -when applicable- differed significantly. Similarly, phenological patterns of some dominant families were also different, implying that spiders have the capacity to adapt effectively to a fast changing climate by shifting their period of maximal activity a few months (e.g. Dysderidae) or even whole seasons (e.g. Amaurobiidae). As shown from species analysis of Gnaphosidae, climatic variance is translated to a variation in species composition and relative abundance between the two sites, notwithstanding their close geographical connection.

THE IMPORTANCE OF OLIVE GROVES FOR WINTERING BIRDS IN THE MEDITERRANEAN REGION

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Agricultural ecosystems have often been found to support very high levels of ornithofauna diversity and have thus, been recognized as significant bird habitats in the Mediterranean. In the present study, we aim to evaluate the importance of olive groves for overwintering birds, both in mainland Greece and on the islands. Study areas were located on the island of Lesvos (NE Aegean) and the area around Arta in Epirus (Western Greece). Olive groves were studied in comparison to the most extensive natural ecosystems of each area, which were pine forests and phrygana (garrigue) in Lesvos, and phrygana only in Arta. Abundance, species richness and population density of birds were assessed by point-counts in all habitats and diversity indexes were calculated. We found that olive groves sustain high levels of bird species diversity, both in Lesvos and in Arta (H'=1.87 and 1.77 respectively). In addition, about half of the recorded species in Lesvos (10 species) were observed exclusively in olive groves; the respective value in Arta was much lower (3 species). Significant differences were observed in species diversity and density between olive groves and natural ecosystems, in both areas studied (post hoc tests, $p < 0.001$). Therefore, it seems that olive groves play an important role for birds overwintering in the islands, with olives being a valuable energy source for them at that time. On the other hand, birds overwintering in the mainland, where greater habitat heterogeneity could offer alternative food sources, don't necessarily rely heavily on olive groves.

A CONTRIBUTION TO THE KNOWLEDGE OF THE STINK BUGS (PENTATOMIDAE, HEMIPTERA) IN THE ECOSYSTEMS IN TIRANA REGION (ALBANIA)

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This study aims to present a systematic and ecological analysis of the family Pentatomidae (stink bugs, Hemiptera), in different ecosystems of the Tirana region (Albania). The collection of biological material was performed during the period 2008-2010. We managed to collect a total of 102 individuals, which belong to 19 genera and 27 species. By analyzing the collected material, it was found that the genera *Carpocoris*, *Holcostethus* and *Stagonomus* were more frequently represented, with 3 species and a frequency of 11.11%. Habitats of the Iba station had more species than the other stations, with 14 species and a frequency of 51.85%, while the lowest number of species was found in the Ndroqi station with 9 species and a frequency of 33.33%. Based on the Jaccard index of similarity, Dajtit with Farka and Iba with Ndroq stations, have a higher similarity coefficient than the other stations, reaching 27.77%. The lowest coefficients of similarity (5%) were observed between Vora and Ndroq and between Farka and Ndroq stations, showing a similarity of the ecological factors between these stations, which means a similarity between these habitats. Most of the species belonged to the Mediterranean zoogeographic region, with 9 species and a frequency of 33.33%.

THE DIET COMPOSITION OF BONELLI'S EAGLE *AQUILA FASCIATA* DETERMINED FROM DIFFERENT STUDY METHODS

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The knowledge of diet in birds of prey is considered fundamental for understanding their requirements for conservation, and is particularly important for those raptors that are facing extensive population declines in their distributional range, such as Bonelli's Eagle (*Aquila fasciata*) in Europe. In this study, our aims were to quantify the diet composition of the species and to evaluate biases raised by different diet sampling methods. We collected diet data using three different methods, namely pellets, prey remains and direct observations, in a Bonelli's Eagle population from Cyprus, during 1999-2001. Furthermore, we analyzed these data sets according to their percentage of abundance [%N: (number of prey i / total number of prey items) × 100] and to their percentage of biomass [%B: (biomass of prey i / total biomass of prey items) × 100]. The Chukar Partridge (*Alectoris chukar*) was generally the most common prey species in Bonelli's Eagle diet in pellets and prey remains analyses, both for %N and %B. The Black Rat (*Rattus rattus*) was the second prey species in the diet according to the latter study methods, but predominated in numbers in direct observations. Other prey species detected in high percentages and biomass were the Woodpigeon (*Columba palumbus*), the doves (*Columba* spp.), the Starred Agama (*Laudakia stellio*) and the European Brown Hare (*Lepus europaeus*). Direct observations provided the lowest number of prey species (n=6) in comparison with prey remains analysis (n=15) and pellets analysis (n=16). In addition, it was the most time-consuming method and provided the highest number of unidentified prey species (9.1%). Prey remains overestimated birds due to their more conspicuous nature. Pellets analysis overestimated the small-sized prey, such as the Black Rat and the Starred Agama, but resulted in higher number of prey species identified in the diet. This analysis is achieved with little field effort and

disturbance to nests, and covered larger periods of Bonelli's Eagle nesting stage. In addition, it showed the highest overlap (Pianka: O=0.949, Renkonen: P=79.66%) with the direct observations method, and therefore we suggest that pellets could be effectively used for monitoring long-term dietary trends in Bonelli's Eagle population in Cyprus.

WOLF (*CANIS LUPUS*) ACTIVITY PATTERNS IN CENTRAL AND NORTHERN GREECE STUDIED WITH SATELLITE TELEMETRY

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Wolf (*Canis lupus* L.) circadian and seasonal activity may be related to several factors like availability and distribution of forage, human disturbance, sociality and reproductive status. The aim of the study was to reveal basic knowledge on activity patterns of Greek wolves. Four wolves (3 female, 1 male), were equipped with satellite collars (90 minutes inter-location interval, 24hr/ 7 days per week in northern (2008-2009) and central Greece (2010-2011). For each wolf we estimated 3 activity indexes: DMD (daily movement distance totally travelled), DMCP (daily minimum convex-polygon area covered) and Ivlev's electivity-nocturnality index. Average DMD did not significantly differ between females (range=12.738-14.968m, n=3) but was significantly lower for male wolf (9.368m). Average monthly DMD significantly varied (range: 5-17km) for all 3 wolves studied >8 months. Common patterns on wolf monthly activity appeared: DMD and DMCP lower values were recorded mainly during February related to low food availability. Wolves reduced their spatiotemporal activity in the most profitable territory parts minimizing energetic costs. DMD and DMCP peaks appeared in autumn related to higher vulnerability of livestock and subsequently to increased predation. All wolves were mainly nocturnal as total distance travelled distributed equally to approximately 70% during night and crepuscular hours. Nevertheless, average nocturnality index significantly fluctuated between months (range = 0.2-0.9) for all wolves but was not related to any changes on DMD's. Number of diurnal activity days peaked in spring. Wolves modified their nocturnal behavior according to daylight length without altering their travel needs while compromising for limitations related to human disturbance.

ABUNDANCE, DIVERSITY AND ECOLOGICAL STRUCTURE OF HERPETOFAUNA IN A MOUNTAINOUS PROTECTED AREA OF GREECE

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Many reptile and amphibian species are in decline worldwide. This situation is further exacerbated in Europe where long-standing excessive anthropogenic activities have degraded natural habitats with deleterious effects for the herpetofauna. National Parks function as conservation pockets, providing the required undisturbed habitat for the survival of many threatened species. Since reptiles and amphibians are increasingly used as bioindicators, the monitoring of their populations offers valuable information regarding the status of conservation areas. The mountainous region of Tzoumerka, known for its scenic beauty and rich biodiversity, was recently declared National Park. The knowledge on population status and even distribution of Greek herpetofauna remains impressively understudied in the mainland country. Our aim was to assess abundance and diversity patterns and also the ecological structure of reptiles and amphibians at the Tzoumerka Mountains National Park. In time constrained visits we surveyed 20 sites by random transects and recorded a total of 20 reptile and six amphibian species, five of which are protected. The toad *Bufo bufo*, the lizard *Podarcis tauricus*, and three snake species, *Platyceps najadum*, *Elaphe quatuorlineata* and *Typhlops vermicularis*, were recorded for the first time in the area. Mediterranean shrublands supported the highest reptile diversity, while amphibian species richness appeared to be related to the diversity of water habitats. However, species richness and composition of the herpetofauna differed between sampling sites of the same habitat type, suggesting that vegetation type is not the main determining factor. The ecological structure of the herpetofauna was influenced by altitude. No specific habitat type was found to

be exclusively representative of reptile and amphibian diversity in the study area. It seems that different habitat types act complementarily and contribute to the diversity of the herpetofauna. According to our results Tzoumerka mountains host an important herpetofauna that should be integrated in any future management plans of the area.

DETERMINATION OF SYMPATRY AND HYBRIDIZATION BETWEEN TWO PINE PROCESSINARY MOTH SPECIES, *THAUMETOPOEA PITYOCAMPA* AND *T. WILKINSONI*

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Two of the most dangerous lepidopteran defoliators in the Mediterranean pine forests, *Thaumetopoea pityocampa* and its eastern vicariant *T. wilkinsoni* (pine processionary moths - PPMs) were investigated to figure out their distribution in Turkey. By using this distribution data, we aimed to look for traces of natural hybridization between the two species regarding their similar reproductive ecology and previous studies which showed a successful hybridization between allopatric populations under laboratory conditions. We sampled a total of 290 larvae from 28 localities in Turkey and a locality in Cyprus. We extracted DNA and amplified and sequenced three gene regions (COI – mitochondrial; ITS-1 and photolyase – nuclear). After checking the sequence data in Bioedit software, we analyzed the data phylogenetically. We constructed maximum likelihood, neighbourhood joining and maximum parsimony trees by MEGA5 software. Additionally, we used BEAST software to construct haplotype phylogeny trees with Bayesian based coalescence methods and to calculate divergence time. This study is the first to show existence of the two PPM species in sympatry. We found a natural contact zone in western Turkey and an asymmetrical introgression in mtDNA which suggests a hybridization. We could not find any trace to show an ongoing hybridization which made us think about the possibility of an ancient hybridization and a later developed reproductive isolation. Divergence time calculations of the three gene regions used in this study were inconsistent with each other but each one pointed to a major palaeogeological event such as the Messinian salinity crisis or the last glacial ice age.

CANOPIES OF MEDITERRANEAN TREES AS ARTHROPOD HABITATS

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This work approached and compared the arthropod community of five tree species. Into the canopies of cypresses, olive trees, almond trees, fig trees and lemon trees were put yellow sticky traps and pots filled with trapping liquids (glycol or soapy water), during spring and autumn. The Shannon index was calculated and all statistical analyses were performed using SPSS software v.17.0. A total of 23 arthropod taxa were collected. The most abundant taxa were six insect orders (Diptera, Homoptera, Hymenoptera, Thysanoptera, Coleoptera, Psocoptera) and spiders. The dipteran species are attracted to the yellow traps. The results of liquid traps were combined and compared to the results of the yellow sticky traps in order to remove this bias. Heteropteran captures in olive trees were significantly higher than in all the other examined plant species, according to ANOVA and all non parametric indices (Duncan, Tukey, Scheffe and LSD). There was also significant difference in spiders' captures between fig and lemon trees, with intermediate values for the other three plant species. Generally, the liquid traps with soapy water were the most effective for the total of Arachnida (spiders, harvestmen, mites, pseudoscorpions), but glycol showed excellent results in the cypress canopy. According to the Duncan and LSD indices, significantly more Hymenoptera were captured in the canopy of fig trees than in the other three species (olive tree, lemon tree and cypress). Cypress canopy biodiversity was the highest, followed by those of the lemon tree, while the olive tree was ranked last.

GENETIC STRUCTURE AND PHYLOGENETIC RELATIONSHIPS INCONGRUENT WITH PALAEOGEOGRAPHY AND CURRENT TAXONOMY IN HYGROPHILOUS ISOPODS OF GREECE

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The genus *Trachelipus* comprises stenoecious animals living in humid habitats, such as dense forests and around inland waters, which are generally threatened by human activities and the fast rates of climatic change. Species–level taxonomy has been under debate after the application of molecular markers for phylogeny reconstruction. Herein we investigate the phylogenetic relationships and the genetic structure of a large number of both endemic and European *Trachelipus* populations from both mainland and insular Greece (i.e. Greek endemic species: *T. kytherensis*, *T. aegaeus*, *T. cavaticus*, and *T*. n.sp.; European species: *T. camerani* and *T. squamuliger*). We employ one nuclear and two mtDNA markers, aiming to identify possible geographic structure in their divergence and to evaluate the consequences of habitat fragmentation due to climate change and other anthropogenic activities on the genetic structure of such stenoecious animal species. The results reveal very large amounts of genetic differentiation even among neighboring populations, and a geographic pattern that is largely incongruent with current taxonomy, but also with established palaeogeography. Some populations that are considered conspecific exhibit large genetic distances and cluster in different clades. The occurrence of more than one clade in mainland Greece raises the possibility of repeated episodes of clade expansion/contraction during Pleistocene glaciations. In any case, it is evident that in these relatively sedentary animals, habitat fragmentation promotes population divergence at a very high rate. In fact, the genetic distances recorded herein among closely related populations are comparable with those reported for different genera in other isopods and arthropods.

MORPHOMETRIC ANALYSIS ON GREEK POPULATIONS OF THE UNDERGROUND THOMAS' VOLE *MICROTUS* (*TERRICOLA*) *THOMASI* (MAMMALIA: RODENTIA)

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The taxonomy of the Balkan endemic Thomas' vole troubled systematists for several decades and morphological, biochemical and karyological approaches have been employed for its clarification. What all the previous studies undoubtedly revealed was that Thomas' vole is a highly polymorphic species. In the present work we applied morphometric methods in order to study the patterns of variation in certain morphological characters of these rodents. Specifically, we applied twenty two (22) landmarks on the dorsal side of the skull, sixteen (16) landmarks on the left half of the mandible and fourteen (14) landmarks on the first left upper molar using specimens from several localities in Greece. Geometric morphometrics and partial least squares analyses are used to investigate possible geographical and/or ecological signals in the shape of these three morphological skeletal materials used for this species.

PRELIMINARY TIME SERIES AND ZOOGEOGRAPHICAL EVALUATION OF THE REGIONAL ENDEMIC BUSH CRICKET *ISOPHYA RIZEENSIS*

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The purpose of this study is to identify the distribution range and ecological niche preference of *Isophya rizeensis*, one of Anatolia's regional endemic species. *I. rizeensis* ranges from the lowlands (between 300-1000 m) to the subalpine highlands (between 1000-2000 m) of Kackar Mountains in the Eastern Black Sea Region. Ecological niche modeling is a powerful tool that helps in determining suitable habitats for species. Ecological niche modeling assumes that the parameters related with species distribution are related with limiting factors; therefore, the target parameters are the minimum habitat requirements for species' existence in a habitat. In present day, environmental parameters can be created digitally and spatially as layers by using Remote Sensing and Geographical Information System tools. These tools enable the use of GIS-based multivariate niche modeling techniques. To predict the potential distribution range for *I. rizeensis*, Maximum Entropy modeling approach is applied by MaXent software. The presence records are determined by field studies performed in Kackar Mountains. 19 Bioclimatic variables are obtained from WorldClim database (30 arc-seconds resolution) for the Last Inter-Glacial (~120,000 - 140,000), the Last Glacial Maximum (~21000), current and for years 2050 and 2080. By using these data and Maximum Entropy Modeling, potential distribution maps are created. The results that will be obtained from ecological niche modeling will provide important information about the species' past, today and future distribution. When the biodiversity of Anatolia is considered, this study will set an important example for determining distributions and habitat requirements of species in Anatolia.

THE HELLENIC BEAR, MONK SEAL AND WOLF REGISTERS: PAVING NEW WAYS FOR LARGE CARNIVORE CONSERVATION IN GREECE THROUGH GENETIC MONITORING

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Genetic monitoring, non-invasive in particular, has been recognized as a sensitive, reliable and time- and cost-efficient tool for studying rare, elusive, and often endangered animals. However the full potential of this methodology has not been used yet in the conservation of endangered species in Greece. We present an overview of the first systematic efforts in the country to assess the status of endangered brown bears (*Ursus arctos*), Mediterranean monk seals (*Monachus monachus*) and wolfs (*Canis lupus*) through genetic monitoring, and provide background information on the structure of the Hellenic Bear, Monk Seal and Wolf Registers. Genetic monitoring of brown bears was based on the analysis of >1000 samples at 20 polymorphic loci. It detected 360 different individuals in Greece, Albania, FYROM and Serbia and an increased genetic diversity and population structure for the species in Greece. Genetic monitoring of Mediterranean monk seals aimed at preparing a laboratory protocol for the genetic study of the species using mitochondrial and nuclear DNA which was based on the analysis of more than 140 samples from Greece and additional samples from Croatia, Madeira and Spanish Sahara. The analysis revealed low genetic diversity for the species. Genetic monitoring of wolfs was based on samples from more than 40 individuals and was carried out using polymorphic microsatellite loci and Single Nucleotide

Polymorphisms. In light of the important new information for all three species in the country we discuss conservation implications and future fields of application in the country.

MONITORING THE EFFECTS OF THE HIGHWAY SIATISTA - KRYSTALLOPYGI (K45) ON WILDLIFE IN GREECE

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Vehicle collisions have become an important mortality factor for wildlife in Greece. Since 1998 when the non-governmental organization ARCTUROS recorded the first fatal bear-vehicle collision, more than 30 bears have died.

In 2009 we initiated efforts to study this new mortality source by monitoring the effects of the highway Siatista – Krystallopygi (K45 – a vertical axis of the "Egnatia" highway) on wildlife in northern Greece. During the study we focused mainly on bears and wolves and used three different methodological approaches: satellite telemetry in order to monitor animal movements, genetic tagging in order to evaluate the genetic status and camera trapping. Within the framework of the study 7 bears and 1 wolf have been fitted with satellite collars, while at the same time genetic monitoring efforts have identified 40 different bears in the area and a genetically diverse wolf population. Camera trapping and satellite telemetry revealed that the mitigation structures are used mainly during the evening hours. These research efforts have been carried out concurrently with efforts to genetically monitor brown bears throughout Greece that indicate that the wider region is the converging point of two genetically distinct populations. In view of the urgency of the situation ARCTUROS has drafted management recommendations towards Egnatia Odos S.A. and the relevant state authorities – based also on the results of this study. Urgent efforts are currently underway so that the "bear-proof" exclosure fence at the sides of the highway is completed as soon as possible.

SOCIAL STRUCTURE AND BEHAVIOR OF THE UNIQUE MEDITERRANEAN MONK SEAL COLONY OF THE ISLAND OF GYAROS

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The Mediterranean monk seal (*Monachus monachus*) is considered to be nowadays one of the most critically endangered marine mammals on earth. Fewer than 600 individuals of the species are thought to survive – the main part of the population, estimated to number 250 – 300 individuals, is found in Greece, and identifying and effectively protecting all remaining populations has been identified as a conservation priority. Following short-term monitoring efforts in 2002 – 2010 that identified the island of Gyaros in the northern Cyclades Islands as one of the most important strongholds of the species in the country we initiated in 2011 systematic efforts to monitor the local population during the pupping season (September 2011 – January 2012). Automatic infrared cameras were installed in the main pupping cave and the two main resting beaches and regular field surveys were carried out. Based on the evaluation of more than 50000 images of seals and the field visits we conclude that the species has retained at the island of Gyaros a colonial population structure that evolves around the presence of a small number of dominant males and the reproductive females – this is only the second time and the first one in the Mediterranean Sea that this has been recorded for the species. The use also of open beaches for resting is also noteworthy. The results of the study confirm the importance of Gyaros as one of the most important areas for the critically endangered Mediterranean monk seal worldwide and urge for the implementation of effective conservation measures.

TAIL REGENERATION INDUCES CHANGES IN THE DIGESTIVE EFFICIENCY OF A MEDITERRANEAN LIZARD

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Body condition changes and/or ecological interactions trigger appropriate adjustments in a suite of physiological traits such as digestion. The latter represents a measure of the successful survival of animals. Apparent digestive efficiency (ADE) is defined as the ability to absorb energy through food and depends on gastrointestinal motility, enzymatic activity and gut passage time (GPT).

Caudal autotomy is a typical defensive tactic among many lizard families. Regeneration follows rapidly and within a short period that varies depending on the species, the tail regains its initial length. Tail regeneration is an expensive procedure in terms of energy, that implies new energy allocation at the organism level, depriving thus resources from other functions such as body growth.

In this study we aimed to clarify if and how tail autotomy affects digestive efficiency in the Aegean wall lizard (*Podarcis erhardii*). We presumed that tail regeneration would induce shifts in ADE and GPT as a result of the increased energy requirements for tissue build-up. ADEs of the three major nutrient components (proteins, lipids and sugars) were examined in 30 individuals with intact tail in two phases: first, prior to tail shedding and second, post-autotomy. Caudal autotomy occurred following predation simulation in the lab. Two digestive features underwent significant modifications: ADE for proteins and GPT increased considerably. On the contrary, ADE^{lipids} and ADE^{sugars} remained stable. We believe that $ADE^{proteins}$ augmentation should be attributed to the high demand for proteins in order to regenerate tail tissues. Higher GPT ensures the more effective energy absorbance from the digestive track.

THE EFFECT OF VEGETATION STRUCTURE ON GROUND-DWELLING COLEOPTERA ALONG A GRADIENT FROM UNBURNT AND BURNT FOREST TO OPEN HABITATS

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Changes in the composition and structure of vegetation lead to corresponding changes in the structure and composition of animal communities. Coleopteran communities are very sensitive to these changes, especially when the forest areas change to open habitats. The present study examined changes in the structure of Coleopteran communities (Carabidae and Tenebrionidae at the species level and the rest at family level) 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 area 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. Coleoptera were collected using pitfall traps every two weeks in each season.

At the class level, the highest values of abundance were observed during spring while the lowest during autumn. The two areas showed a different pattern of abundance as far the whole class is concerned. The burnt area had lower abundances in relation to the respective forest and the ecotone, while the subalpine meadows and the ecotones had significantly higher abundance values of Coleoptera in relation to the adjacent forest. However, the various families presented different patterns of abundance which are related to the ecological characteristics of each group, and especially to their feeding habits. The largest differences in the composition of Carabidae and Tenebrionidae species were observed between the two different areas as a response to altitude, while within the same area, the pattern of change of the structure of the communities followed the respective pattern of the vegetation structure

SHORT – TERM EFFECTS OF WILDFIRES ON STREAM BENTHIC COMMUNITIES IN AN INTERMITTENT MEDITERRANEAN STREAM

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The impact of fire on macroinvertebrate communities in intermittent streams has received limited attention. Following the severe wildfires of August 2007, which engulfed 173,000 hectares of rural land in the Peloponnese peninsula, Greece, the effects of wildfire on benthic macroinvertebrate assemblages were evaluated for 2 successive years in an intermittent Mediterranean stream (Oinountas stream, main tributary of the Evrotas River). Two sites downstream the burned-catchment stream were evaluated by comparing pre- and post-fire faunal assemblages and metrics. Macroinvertebrates were collected with the STAR-AQEM methodology, physicochemical parameters were recorded in situ, while nutrient and major ions were analyzed in the laboratory. Overall, taxa richness and total abundance was lower in burned than in reference streams. Specific taxa responded differently to the effects of fire. For example, densities of disturbance-adapted forms (e.g. Chironomidae, *Baetis*) increased after the fire. Many other taxa showed the opposite response. Adverse effects of wildfire on the biotic community were largely the result of physical changes in habitat due to increased runoff and suspended matter and clogging of river sediment pore space by ash, and possibly, to an over 10-fold increase of ammonium shortly after the fire, compared to pre- and post-fire periods. The ecological status of the sites prior to the wildfire was classified as high, whereas after the wildfire the status had declined to moderate. The ecological status of the site further downstream the burned area, recovered faster than the one near the affected area.

THE MEDITERRANEAN TEMPORARY PONDS OF CRETE, GREECE: BIODIVERSITY, STATUS, THREATS AND CONSERVATION

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Mediterranean Temporary Ponds (MTPs) are a priority freshwater habitat type (3170*, NATURA 2000) and are characterized by their variability in size, hydroperiod (the number of days a pond maintains water), habitat complexity and by their unique fauna and flora. In Greece, 48 MTPs have been recorded, 5 of which are located in Western Crete. This work presents the characteristics, the threats and the current ecological status of the MTPs of Crete as well as some major conservation and management activities for their long term preservation. The threats were identified and recorded with site visits and GIS techniques. Hydrologic, ecological and water quality monitoring was conducted for 3 years in which the hydroperiod, macroinvertebrate and amphibian fauna and physicochemical parameters were recorded. The main threats in the selected sites were water overexploitation, overgrazing, water pollution, solid waste disposal and finally public ignorance since the characteristics of the ponds are not always visibly attractive. The results of the ecological study revealed a unique macroinvertebrate fauna adapted to conditions of each MTP. The fauna was mainly represented by Odonata, Coleoptera and Diptera while the green toad *Bufo viridis* was frequently recorded. All the ponds presented dramatic temporal fluctuations in nutrient concentration; the main problem being ammonia due to fertilizers and animal waste. For the protection and conservation of the MTPs a habitat management plan was produced and scientific knowledge was transferred to local stakeholders and institutions for continuing the conservation efforts.

EFFECTS OF ABIOTIC FACTORS ON EGGS' DIMENSIONS OF CORY'S SHEARWATER IN A SOUTHERN IONIAN COLONY

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Numerous studies of the factors affecting egg size in Procellariiformes have been conducted and have proved to be very informative about their breeding ecology. Here we present the first results concerning the correlations between abiotic factors (orientation of nest entrance, type of nest, humidity and temperature in the nest) with egg dimensions (length, width and weight) of Cory's Shearwaters (*Calonectris diomedea diomedea*) colony on Stamfani Island. Fieldwork was carried out in June 2011, during the early stages of laying so as to minimize the bias on the egg weight measurements. A total sample of 30 eggs laid in different sub-colonies of the island was examined; length, width and weight scores (mean ± s.d.) were estimated at 6.75 ± 0.19 cm, 4.55 ± 0.14 cm and 76.40 ± 4.70 g, respectively. The aforementioned results enhance previous findings that support morphometric differences between the Atlantic and the Mediterranean Cory's Shearwater subspecies. In addition, significant correlations between weight and both egg length and width have been observed, but not between length and width. Moreover the study of possible effects of abiotic factors on egg dimensions revealed a significant negative correlation between temperature and both egg weight and width, whereas a significant positive correlation was found between humidity and egg width. No significant correlations between the egg dimensions and the nest type as well as the orientation of nest entrance were found, even when those abiotic factors influence the microclimate of the nests.

SEX DETERMINATION OF CORY'S SHEAWATERS OFFSPRINGS ON THE STROFADES ISLANDS COLONY (IONIAN SEA, GREECE): A COMBINED MOLECULAR AND MORPHOMETRIC APPROACH

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Information about an individual's sex is important in avian ecology and conservation. In birds, the absence of juvenile sexual dimorphism often impedes sex determination using external morphology. Moreover, since there is not a universally applicable technique for sex identification a species-specific examination using different approaches is necessary. We examined sex ratio variation in 135 Cory's Shearwaters (*Calonectris diomedea diomedea*) fledglings from the Strofades colony (Southern Ionian Sea) between 2007 and 2011. A PCR based methodology using blood samples was followed for the identification of sex. The molecular technique revealed a slightly male-biased sex ratio (52.8%) during the five consecutive breeding seasons. The significance of this finding is discussed considering random variation and ecological correlates in sub-colonies within the colony. In addition, we performed a discriminant analysis for predicting sex to fledglings by using a set of five morphometric variables (bill length, bill depth, nalopsi, head-bill length, tarsus length) and body weight. The results showed that males were significantly larger than females for all the tested variables. The combined use of those variables correctly classified 97.1% of known-sex fledglings. Moreover, the canonical discriminant analysis pointed out that bill-head length was the most discriminating variable between the sexes, followed by tarsus length, bill length, bill depth, weight and nalopsi. Therefore, bill-head length is a sufficient sex-determination measurement. As a consequence, the collection of more body measurements for a slight improvement of sex prediction is not encouraged since this will increase the

disturbance of fledglings and may have negative effects on the breeding performance.

DIET ANALYSIS OF THE MEDITERRANEAN SHAG (*PHALACROCORAX ARISTOTELIS DESMARETSII*) USING CONVENTIONAL TECHNIQUES AND NEXT GENERATION SEQUENCING

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The recent development of next generation sequencing technologies allows the molecular identification of a species' diet from prey remains by the direct characterization of dozens of samples with several thousand sequences per sample, and has the potential to reveal many consumed species simultaneously (DNA metabarcoding). The Mediterranean shag is a subspecies of high conservation concern, with global population of less than 10,000 pairs, 10% of which lives in the Greek islands of the Aegean and the Ionian Sea. Within the frame of the EU LIFE project "ConShagAudMIBAGR", a diet analysis is carried out using both conventional prey identification and next generation sequencing. Regurgitates (undigested prey remains) and feces have been collected from a large colony of the species in the N. Aegean Sea. A conventional prey analysis has been carried out in the regurgitates, by identifying indigestible part remains, mainly fish otoliths. The regurgitates as well as fecal samples are been subjected to amplicon sequencing using the 454 GS-FLX platform. By analyzing the same samples (i.e. regurgitates) both by conventional and molecular techniques, we will be able to check whether molecular approaches perform better for prey identification at the species level and if they can give reliable quantitative estimations. Moreover, the analysis of fecal samples will show whether there are prey items that were not detected in the regurgitates. Finally, it will be estimated which approach is more cost effective for determining the diet of the Mediterranean shag.

PRELIMINARY DATA ON THE MACROZOOBENTHOS OF ROCKY AREAS OF THE ALBANIAN ADRIATIC COAST

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Four coastal areas of hard bottoms are situated along the Adriatic coast in Albania. As these areas are very small and fragmented, the benthic communities associated to these habitats are sensitive and endangered. The aim of the present study was to make a preliminary assessment of the species composition, abundance and environmental state of the macrozoobenthic populations of these rocky coastal fragments along the Adriatic coast of Albania. Benthic samples have been taken during April-May 2011 in four rocky coastal areas: Shen Pjeter, Kallm, Spille and Triport, in very shallow water in the supralittoral, the mediolittoral and the upper limit of the infralittoral. The samples were taken using standard methods for benthic sampling in hard bottoms, within a frame 50 × 50cm for the quantitative assessment. One hundred and ten species of benthic macroinvertebrates were found in the study area, of which gastropods had the highest number of species. The highest species number was found in Triport (68), while the lowest in Spille (31). The abundance was relatively low in all areas, especially in Spille. Patellidae and Trochidae had the highest abundance in all areas. It is worthy to note the considerable difference in species composition between the four areas, the presence of *Rapana venosa* and *Cellana rota* as alien species for the Mediterranean and the record of *Ocinebrina aciculata* for the first time for Albania. The benthic populations in the studied areas seem to be threatened by human impact mainly through the alteration of natural habitats related to uncontrolled tourism development, water pollution and illegal fishing.

INVENTORY AND TAXONOMIC REVISION ON THE MARINE GASTROPODA AND BIVALVIA OF VLORA BAY (ALBANIA)

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In the recent years, the malacofauna of Vlora bay has been continuously studied in the framework of several studies related to the assessment of benthos and marine biodiversity in general for this area. Some existing species lists were not referring to each-other and sometimes one species was present more than once with different names in the same list, due to synonymic mistakes. This study aims to make an inventory and a taxonomic revision of the marine gastropods and bivalves of Vlora bay, in order to compile the most updated species list for this area.

All existing publications with data on gastropods and bivalves of Vlora bay until 2011 have been investigated. The taxonomic revision was based on the CLEMAM Checklist of European Marine Mollusca (MNHN Paris) and the WoRMS World Register of Marine Species. The new updated list includes accepted names only, trying to avoid the improper use of synonyms.

The updated list includes a total of 210 species, of which 119 are gastropods and 87 are bivalves. This is a relatively high number, which shows the importance of Vlora bay in the marine biodiversity aspect. It is worthy to note the presence of 3 alien species for the Mediterranean: the gastropod *Cellana rota* and the bivalves *Brachidontes ustulatus* and *Crassostrea gigas*.

PHYLOGEOGRAPHY OF *ANTERASTES* (ORTHOPTERA, TETTIGONIIDAE): 16S rDNA AND COI SUGGEST INCONSISTENT SPECIATION PATTERNS

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Twelve species of *Anterastes* Brunner (Orthoptera, Tettigoniidae) show insular distribution in mountain meadows of Anatolia and the Balkans. Radiation within the genus is assumed to be due to climatic fluctuations of the Quaternary. Here we specifically examined, using 16S rDNA and COI sequences, the evolutionary relationships, species boundaries and phylogeography of the *Anterastes* species. For this aim we obtained 328 16S rDNA sequences (one belongs to *Sureyaella bella* and the other to *Anterastes*) which represent 86 different haplotypes. Similarly, 121 samples were sequenced and 63 haplotypes of COI were defined. After analyses and evaluations of these sequences in respect to phylogeny, phylogeography and population genetics, the following conclusions were made: (1) Phylogenetic and population genetics data support species status of the nine morphospecies other than *A. sebicus*, *A. burri* and *A. antitauricus*. (2) The *A. serbicus* group seems to be a complex of morphologically cryptic species complex which is especially prominent for the Usak Murat Mt. (3) There is a significant geographic genetic structuring in *Anterastes* populations. There are no two geographic populations. Additionally, fixation indices per population are extremely high. (4) Molecular clock estimations, though that for 16S rDNA suggest the half durations of that suggested by COI, suggest that radiation within *Anterastes* started prior to last four glacial periods. But, there is no correlation between dates of nodes and climatic shifts. (6) Genetic diversity indices are zero in 8 geographic populations and below 0.5 in 13 of total 25 geographic populations, indicating genetic homogenization.

CHARACTERISTICS AND CONSERVATION OF HERONRIES IN GREECE

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During the last decade all heronries in Greece were surveyed once or twice in order to record nesting species and numbers. Herons (Ardeidae), Cormorants (Phalacrocoracidae), Spoonbill *Platalea leucorodia* and Glossy ibis *Plegadis falcinellus* (Threskiornithidae) nested in 49 heronries. Most of these (26) were monospecifics mostly with Grey heron *Ardea cinerea* (17) while mixed heronries included two to nine species. The majority of heronries were distributed in central and northern Greece and five were on islands all close to the mainland. At least 26 heronries including 13,145 pairs (87.5% of the total breeding population) were distributed in Special Protection Areas (SPAs). Heronries were situated on trees (30), reedbeds (9) and bushes (9). The trees were mostly poplar *Populus* sp., pine tree *Pinus* sp., alder *Alnus glutinosa*, plane tree *Platanus orientalis* and willow *Salix* sp. Bushes consisted mostly of tamarisks *Tamarix* spp. while reedbeds of common reed *Phragmites australis*. At least 13 additional bird species were recorded nesting within or very close to 16 heronries. These were passerines (seven species), waterbirds (two), Kestrel *Falco tinnunculus*, Yellow-legged gull *Larus michahellis*, Long-eared owl *Asio otus* and Little bittern *Ixobrychus minutus*. At least 28 heronries had a nesting population less than 100 pairs, twelve between 100 and 1000, three between 1001 and 2000 and one more than 5000. The maintenance of extensive reedbeds in lakes and tree stands in agricultural land close to wetlands and in SPAs will contribute to the conservation of heronries.

FLUCTUATIONS AND TRENDS OF WATERFOWL POPULATIONS WINTERING IN GREECE DURING THE PERIOD 1968-2006

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Midwinter Waterfowl Counts in Greece started in 1968, interrupted in 1974, resumed again in 1982 and since then have run continuously. The present study summarizes the results of the analysis of the midwinter populations of waterfowl (Anatidae) and the Coot *Fulica atra* from 19 wetlands, for the period 1968-2006. The most numerous species was Coot, followed by Teal *Anas crecca* and Wigeon *Anas penelope*. The numbers of seven species (Mute Swan *Cygnus olor*, Red-breasted Goose *Branta ruficollis*, Shelduck *Tadorna tadorna*, Teal, Ferruginous Duck *Aythya nyroca*, Goldeneye *Bucephala clangula* and Red-breasted Merganser *Mergus serrator*) show a clear increase, while two more (Whooper Swan *Cygnus cygnus* and Smew *Mergellus albellus*) indicate a slightly increasing trend. Four species (Greylag Goose *Anser anser*, Wigeon, Pintail *Anas acuta* and Red-crested Pochard *Netta rufina*) are clearly declining, while Coot also shows some evidence of decline. For seven species (White-fronted Goose *Anser albifrons*, Lesser White-fronted Goose *Anser erythropus*, Gadwall *Anas strepera*, Mallard *Anas platyrhynchos*, Shoveler *Anas clypeata*, Pochard *Aythya ferina* and Tufted Duck *Aythya fuligula*), numbers are fluctuating without a clear trend.

PROCESSES THAT SHAPED *ZONITES* DISTRIBUTION: A COMBINED PHYLOGENETIC AND NICHE-MODELING APPROACH

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Zonites is a landsnail distributed in the circum-Aegean region, i.e. western Turkey, several Aegean islands and in SE continental Greece (Peloponnisos and Evvoia). The genus has a patchy and disjunct distribution, and some of its species are only found as fossils or characterized as 'rare' and 'in the process of extinction'. Recent phylogenetic analyses indicated that its diversification dates back to the Neogene and it was influenced by the palaeogeographic events in the Aegean archipelago. In this study we focus on its continental distribution, and we examine the impact of processes, such as vicariance, dispersal and, especially, extinction which seems to have played an important role on its evolution and present distribution. We combine molecular phylogenetic analyses with a niche-modeling technique, Maxent. Maxent predicts the actual or potential distribution of a target group over a geographical region of interest from a sample of localities of known occurrence and spatially explicit environmental conditions. Species distribution models can further corroborate or even elucidate the phylogeny within a taxon by depicting environmental differences among the resulting clades. Mitochondrial markers reveal three distinct lineages within continental Greece: one in central Evvoia, a second one comprising species from west and north Peloponnisos and a third that includes the remaining Peloponnese and south Evvoia. The genus' absence from Sterea Ellada that "connects" Peloponnisos and Evvoia, combined with the revealed phylogeographical pattern, the estimated divergence-times and its predicted distribution based on the Maxent models, reflect the impact of past and present climatic conditions on *Zonites* diversification.

LAKE MIKRI PRESPA : THE SOLE BREEDING PLACE OF WILD MUTE SWANS (*CYGNUS OLOR* GMELIN, 1789) IN GREECE

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In Greece, the last known wild population of mute swans *Cygnus olor* bred up to the mid '70s in the Evros Delta. In 1967 a few birds from the Netherlands were introduced into Lake Kastoria and –artificial- Lake Agras in W. Macedonia and they have since established feral populations there. Up to the early '80s, breeding was taking place only at those two wetlands. Evidence for nesting of one pair of mute swans in Lake Mikri Prespa was first collected in 1982, and since then monitoring revealed that nesting was repeated in 1983, 1984, 1985 and after that annually in 2002-2012. Brood size varied between 0 and 7. Eggs hatch consistently during the second week of May. Estimated fledging success varied also between 0 and 7 young with an average of 3 ± 2.41 (N=12), but actual fledging success is assumed lower. Between 2009 and 2012 there were 3 breeding pairs which nested at the marshes of the northern part of the lake in distances ca 1200 meters away from each other. During 2011, the observation in Prespa of two birds ringed at Kastoria added substance to the suspected origin of breeders from individuals from Lake Kastoria, situated 36 km away. Mute swans are present in the area all year round, while maximum numbers of adult and immature birds, up to 11 individuals, occur in March. Thus, this small population seems to have established itself and is the only really wild breeding population of mute swans in Greece the last 30 years.

THE PRESPA LAKES AS A WINTERING SITE FOR WATERBIRDS: RESULTS OF 25 YEARS OF UNINTERRUPTED MONITORING

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The Prespa lakes are shared by Greece, Albania and the FYR of Macedonia and although situated at high altitudes and with very low temperatures in winter, do host important numbers of wintering waterbirds. Those wintering at the Greek part were counted each January for the last 25 years within the framework of the International Midwinter Waterfowl Census. The average number of wintering waterbirds were 10,138 (range 3,676 to 19,431). No significant increasing or decreasing trends were observed, but numbers varied much more in 1988-2000 than in 2001-2012, a fact attributed to the consistently milder successive winters of the latter period. Birds move from one lake to the other according to environmental conditions, but Mikri Prespa hosted on the average low numbers of birds (1,153, range 0-3,936) as it was frequently covered partly or entirely with ice. Bird species regularly occurring in winter were 30, while 5 more were observed rarely. The six more common species were *Podiceps cristatus*, *Fulica atra*, *Aythya fuligula*, *Larus ridibundus*, *Podiceps nigricollis* and *Aythya ferina*. The three first make up on the average more than 87% of all wintering birds. Because counting birds separately in each one of the littoral countries may compromise the conclusions that can be drawn from the results, between 2010 and 2012 counts were fully synchronised to give unbiased estimations of the birds present on the entire area of the lakes. Total numbers of wintering birds present in the lakes for this period ranged from 35,368-45,415, and were strongly dominated by *Fulica atra*.

NON-INDIGENOUS FISH SPECIES IN GREECE: RESULTS OF A HYDROGRAPHIC BASIN SURVEY

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Non-indigenous fish species are considered one of the major pressures disrupting the ecological integrity and biodiversity of inland waters worldwide. Here we explore their distribution patterns in river basins throughout Greece. We explore each species' attributes relating to biogeographical patterns, origin, establishment, vector, and history of introduction.

The non-indigenous ichthyofauna of 117 river basins is catalogued for the first time. The inventory derives from unpublished sampling surveys, a recent review of all bibliography and other available information resources. Database quality control procedures strive to present only the river basins where a presumably complete knowledge of all current alien introductions exists. Geographic analyses are then applied at the national and ecoregional scale.

Non-indigenous species are divided into so-called translocated species and aliens. The recent concept of translocated is applied at the national scale to expose anthropogenic species introductions of otherwise native fish into water bodies where they are known to be non-indigenous. We review distribution patterns of 53 non-indigenous species; 27 of these are translocated species. Geographic patterns of the most widespread non-indigenous species are demonstrated. Species such as *Gambusia holbrooki, Oncorhynchus mykiss* and *Carassius gibelio* are the most widespread aliens. It is clearly documented that during the last three decades an increase in translocations and alien introductions has occurred.

THE INFLUENCE OF HABITAT FEATURES ON AMPHIBIAN DISTRIBUTION IN NORTHEASTERN GREECE

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There is a global decline of amphibian populations and a growing urgency for the implementation of effective strategies based on detailed knowledge of amphibian habitat preferences. Environmental and isolation variables relating to abundance of breeding amphibians, species richness and patterns of community structure at different spatial scales were examined in the Dadia-Lefkimi-Soufli Forest National Park, Evros, Greece. The logistic regression and the generalized linear model were used to relate several habitat characteristics to species occurrence and species richness. The community structure responses to breeding-pond features were examined at four spatial scales using Canonical Correspondence Analysis (CCA). The richest communities live in low altitude ponds, with stony or clay bottoms, high solar exposure and abundant submerged and floating vegetation. The CCA models were significant ($p<0.005$) and revealed the influence of environmental variables like altitude, percentage of field and broadleaves forest coverage, and isolation variables like number of wetlands, on amphibian species assemblages at all four spatial scales. At smaller spatial scales *Pelobates syriacus* was positively affected by homogenous oak and mixed forest, whereas at a larger scale the species was associated with cultivated landscape. The pattern of forest type selection also changed in the cases of *Salamandra salamandra* and *Bombina bombina* from mixed and broadleaves preference at small scale, to only broadleaves at larger scales. There is a specific need for a holistic management of amphibians that will consider habitat connectivity, particularly between aquatic and terrestrial habitats, at a larger, more interconnected scale.

BREEDING SUCCESS OF THE EGYPTIAN VULTURE (NEOPHRON PERCNOPTERUS) IN THRACE AND TEMPORAL VARIATION OF ITS USE IN THE DADIA FEEDING STATION

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Egyptian vulture (*Neophron percnopterus*) populations have recently decreased dramatically over a large part of their European and African range, including Greece. The species is currently classified as globally endangered (EN) and in Greece as critically endangered (CR). The prefectures of Evros and Rhodope include at least 30% of its national population. In 2010-2011 we looked for changes in the local population and determined its breeding performance and success. Moreover, the species' Dadia feeding station use was monitored, recording temporal variation in the number of birds and age classes (only in 2011). Out of around 18 possible Egyptian vulture territories, ten in 2010 and nine in 2011 were occupied. Productivity differed significantly between the two years rising from 0.57 fledglings/breeding pair in 2010 to 1.2 in 2011, due to the increased number of twins fledging. There was no statistically significant difference in the overall number of birds observed at the feeding station. In 2010 the highest concentration at the feeding station occurred in late August (9 birds), in the pre-migratory phase, and in 2011 in late July and August (10 birds). The use of the feeding station seemed to be more frequent in the morning and early afternoon. These initial results highlight the need for intensive/systematic monitoring of the Egyptian vulture populations so as to explain the observed annual differences in productivity and also as a tool for future conservation projects and management schemes necessary to address the recent population decrease of the species.

CAN HUMIDITY AND SEASONALITY EXPLAIN BODY SIZE VARIATION IN MALES OF THE COLOR POLYMORPHIC BUSH CRICKET *ISOPHYA RIZEENSIS*? AN INFORMATION THEORETIC APPROACH

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Two primary patterns of body size variation have been recorded in ectotherms in relation with latitudinal/altitudinal gradients. In some cases, body size shows positive correlation with latitude/altitude whereas, in other cases, body size shows negative correlation with latitude/altitude. This clinal variation is generally assumed to be caused by local adaptation to environmental conditions; however, underlying selective variables (temperature, humidity, diet quality etc) are still heavily debated. Here we investigate the geographic variation in body size of dark and pale color morphs of males of the bush-cricket *Isophya rizeensis* collected from 15 locations along an elevation gradient ranging from 350 to 2500 meters. Using an information theoretical approach we evaluate the relative support for four different hypotheses (temperature, seasonality, desiccation resistance and primary productivity) explaining body size variation along the altitudinal gradient. Body size variation in pale color morphs showed a curvilinear relationship with altitude while dark color morphs showed no variation in body size. Body size variation in pale color morphs was highly correlated with precipitation and temperature seasonality values thus giving strong support for the desiccation resistance and seasonality hypothesis. Our results reinforce the importance of gradients in humidity and seasonality over temperature in the forming of the altitudinal body size clines and the role of selection for resistance to stress factors in the establishment of these clines. Observation of a body size cline might also be related with other phenotypic properties like coloration (melanism).

DIFFERENCES IN THE DESIGN OF THE NATURA 2000 NETWORK BETWEEN NORTH AND SOUTH EUROPE REFLECTED IN PROTECTED BIRD SPECIES INCLUSION PROBABILITY

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There are major differences in the implementation of the European Habitats and Birds Directive among EU Member States regarding the design of the Natura 2000 network of protected areas. In this work we examine how the above differences affect the species turnover patterns among sites. To this end, we measure the probability to include new bird species of conservation interest as the network is expanded. We used Natura 2000 sites of 11 European countries. Following a randomization procedure, we start with a randomly drawn site of each country and sampling expands iteratively until all sites are included. From those data we calculated cumulative species richness, and mean alpha diversity and we estimated the probability (pN) of finding a new species of conservation interest among the species of the next site. pN declines with the number of sites included in the network. The rate of pN decrease was in general higher in the Southern that the Northern Europe. The slow decline rate of pN in Northern Europe indicates that bird species of conservation interest are spread over a large number of sites while the inverse is observed in Southern Europe. In the south (e.g. Greece and Bulgaria), sites are large with high alpha diversity, while in the north (e.g. Estonia and Finland), the average surface area and alpha diversity is much lower.

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CEPHALOPOD FAUNA OVER THE EASTERN IONIAN SLOPE: NEW INFORMATION FROM PREDATION BY LONG-LINE CAUGHT BONY FISH

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The stomach content analyses of marine predators is a unique source of information for the documentation of prey species distribution and particularly of pelagic cephalopod species rarely caught by conventional fishing gears and sampling devices. A total of 153 cephalopod beaks were identified from the stomach and intestine content of 12 bony fish species, which were caught during the two surveys of experimental long-line fishing in June and October 2010, at depths 365 – 750 m off the coasts of Cefalonia island. The examined predator species were *Brama brama*, *Conger conger*, *Helicolenus dactylopterus, Epigonus telescopus, Lepidopus caudatus, Mora moro, Pagelus bogaraveo, Phycis blennoides, Polyprion americanus, Schedophilus ovalis, Scorpaena elongata*, and *Xiphias gladius*. Calibrated digital images of lower and upper beaks were obtained to enable measurement of standard beak dimensions and calculation of prey species size. Sixteen cephalopod species, belonging to 10 families have been identified, including 10 oegopsid squids, 3 sepiolids and 3 octopods. Pelagic species comprised the vast majority of preyed cephalopods, among which *Heteroteuthis dispar* dominated, followed by the small sized enoploteuthid squids, supposed to participate to a hyper-benthic community at the boundary shelf-slope zone. Benthic sepiolids of the Rossinae subfamily were only preyed by *Conger conger*, whereas the large pelagic squid *Thysanoteuthis rhombus* and the epipelagic octopods *Argonauta argo* and *Ocythoe tuberculata* only by swordfish. Remains of larger-sized *Todarodes sagittatus, Octopoteuthis sicula*, Histioteuthids and Onychoteuthids have been also identified from the stomach content of *X. gladius* as well as from big specimens of *C. conger*, *E. telescopus*, *P. americanus* and *P. bogaraveo*.

FISH ASSEMBLAGE VARIATION AT BOAT SEINE FISHING GROUNDS

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Spatio-temporal variation in fish communities as well as in fisheries catches in coastal waters has been usually reported, indicating the importance of monitoring for the management of fisheries and other human activities at the coastal zone. In this study, the fish assemblages at 3 coastal areas of the eastern Ionian are investigated based on boat seine catches during the period October 2008-March 2009. Catch per unit of effort (CPUE, in number of individuals per haul) was obtained for 92 species from 66 hauls of boat seine, which were monitored during a study on the gear effects to fish stocks carried out within the framework of the Operational Program of Fisheries 2000-2006 of the Hellenic Ministry of Rural Development and Food. Multivariate analysis, based on Bray-Curtis similarity indices, was applied to the log transformed data matrix of the 58 most frequently caught species, in order to identify variations in the structure of the fish assemblage. Season was the main factor for the boat-seine catches distinction, with *Spicara smaris*, *Boops boops* and *Chromis chromis* dominating catches during autumn, and *Sardina pilchardus* during winter. Geographic variation was also detected within seasons. Spatial dissimilarity among hauls was higher during winter with varying rank of most abundant species, while that detected in autumn was due mainly to the number of species contributing in the 90% of the total abundance.

GENETIC DIVERSITY OF ALBANIAN *SQUALIUS* POPULATIONS

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Chubs of the genus *Squalius* (Cyprinidae) are widespread in Albania, although the taxonomic status and evolutionary relationships of most of the populations are still unknown. Comparison of the genetic diversity of *Squalius* populations from all main Albanian drainages was conducted. Mitochondrial gene cytochrome b was sequenced from more than 100 specimens, revealing three clearly distinct haplo-groups. The most divergent lineage was *S. pamvoticus* (southernmost drainage around Butrint lagoon, Ionian Sea basin). The uncorrected genetic distance of this species to the other two lineages inhabiting Adriatic Sea slope drainages was 3.85–3.95 % and 4–4.4 %. Adriatic lineage I comprises populations from drainages of Lake Prespa, rivers Shkumbin, Seman, Vjosa, and the Ohrid-Drin-Skadar system. Intra-lineage divergence in this group does not exceed 0.44 %, while the divergence from Adriatic lineage II (Erzen, Ishem, Mat and in the Ohrid-Drin-Skadar system) ranged from 1.3–1.7 %. Intralineage divergence in the Adriatic lineage II did not exceed 0.3 %. The closest lineage to Adriatic lineages I and II was that comprising populations of *S. cf. squalus* from the Neretva river basin (1.95–2.3 % and 1.5–1.7 %, respectively). These results suggest that the taxonomy of Albanian *Squalius* requires revision. *S. prespensis*, supposed to be endemic to the Prespa lake, is probably much more widespread. Moreover, the validity of recently described *S. platyceps* from the Ohrid-Drin-Skadar system remains unclear, as specimens with haplotypes of both Adriatic lineages were present in this system. Finally, the existence of the undescribed species in the Vjosa river basin is unlikely.

EFFECTS OF FERAL CATS ON THE EVOLUTION OF ANTIPREDATOR BEHAVIORS IN THE AEGEAN ISLAND LIZARD *PODARCIS ERHARDII*

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Island endemics appear to be exceptionally susceptible to invasive predators because of small population size and lack of anti-predator defenses. Our goal here is to determine the impacts of feral cats (*Felis catus*) on the resident populations of Aegean Wall lizards (*Podarcis erhardii*, Lacertidae) in relationship to the expression of anti-predator behaviors. We estimated lizard population densities and anti-predator behavior including flight initiation distance (FID) and autotomy rate in areas with low cat density sites (LCD) versus high cat density (HCD) sites by conducting 100-m transect along drystone walls, on the island of Naxos, and its surrounding islets (Cyclades, Greece). We also staged controlled encounters with mounted cat decoys and quantified escaping responses. Our result shows that lizard densities at LCD sites were 110.8% higher than at HCD sites. Lizards had adapted their anti-predator behaviors in response to cat predation by extending their FID, increasing their capacity for tail autotomy, and by staying closer to refugia. In laboratory predation simulations, lizards from cat-free islets had significantly shorter FIDs than LCD lizards and in particular HCD lizards. However, a number of unique small islet behaviors, presumably evolved in response to lack of predators and to ameliorate chronic conditions of food shortage, appear to render islet lizards strongly susceptible to cat predation. These behaviors include reluctance to use refugia, and investigatory movements towards cats. Nonetheless, we found that repeated exposures over three trials led to significant increases in FID for all populations, indicating at least some behavioral plasticity.

BIOLOGY OF *SYNGNATHUS ABASTER* IN THE EASTERN IONIAN SEA, GREECE

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Syngnathid fishes have evolved pronounced adaptations for male parental care. The literature on the syngnathids in Greece is limited. The aim of the present study was to provide information on the biology of *Syngnathus abaster* of the Eastern Ionian Sea. Samples were collected on a monthly basis from July 2008 to March 2010 in two locations of different types of habitat in the sublittoral zone of the E. Ionian Sea, using a beach seine. Population structure, length-weight relationship, gonadosomatic (GSI) and hepatosomatic (HIS) indices of the population were estimated. Of the 431 collected specimens, 100 (23.2%) were male, 160 (37.1%) female and 171 (39.67%) juvenile and unsexed specimens; sex ratio was F:M = 1.6:1. The population composed of specimens from 2.3 cm (juvenile) to 22.9 cm (female). The growth pattern of the population was positive allometric (b = 3.22; 95% c.i = 3.15-3.29). The highest values of GSI were recorded in July and June for females and males respectively, while the peak of the brooding period was in August. HSI showed the highest values in the same months as GSI and the lowest in winter months for both sexes. The present study is the first record on the biology of *S. abaster* in Greece.

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A COMPARATIVE STUDY OF THE MATING CALL OF *PELOPHYLAX RIDIBUNDUS* (PALLAS, 1771) AND *PELOPHYLAX KURTMUELLERI* (GAYDA, 1940) FROM SYNTOPIC AND ALLOTOPIC POPULATIONS

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The marsh frog (*Pelophylax ridibundus*) and the Balkan frog (*P. kurtmuelleri*) are two closely related parapatric species. *P. kurtmuelleri* occurs in Greece and in the southern parts of the adjacent Balkan countries, where it often is in sympatry and syntopy with *P. ridibundus*. Although the mating call was used to distinguish between the two species, there are few studies on its characteristics in sympatric regions. In this regard we recorded and analyzed 418 mating calls of marsh and Balkan frogs from three syntopic populations from South-West Bulgaria and five allotopic populations from North and South-East Bulgaria. All recordings were made during the mating season. We tested the hypothesis that the call of *P. ridibundus* from allotopic populations would differ from those in syntopic populations with *P. kurtmuelleri*. For the comparative analysis we used uni- and multivariate statistical methods and the following characteristics: call duration, pulse group duration, pulse group interval, pulse group period, pulse group number, minimum, maximum and dominant frequency and pulse energy. Analyses reveal a trait divergence in most of the studied characteristics of the signals, with stronger differentiation between *P. kurtmuelleri* and *P. ridibundus* in syntopic populations than between the two species in allotopic ones. The possible evolutionary implications of this divergence are discussed.

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MEDITERRANEAN MONK SEALS: NOW A GRAVE DANGER FOR LOGGERHEAD TURTLES AT ZAKYNTHOS

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Laganas Bay in Zakynthos Island holds the largest nesting aggregation of the loggerhead turtle (*Caretta caretta*) in the Mediterranean. Turtles of both genders typically begin to arrive in the Bay in April, while nesting occurs from late May to early August. Zakynthos is also home to a resident population of the Critically Endangered Mediterranean monk seal (*Monachus monachus*). It was first noted in 1994 that monk seals predate on loggerhead turtles by snapping off the posterior plastral scutes and feeding on the entrails. This unique behavior, not documented anywhere else in the world, was thought to have been triggered by depleted levels of local fish resources. Similar incidents were noted in subsequent years, but these were considered occasional and infrequent. However, during the 2010 nesting season 21 adult turtles were found dead with injuries attributed to monk seals, i.e. opened body cavities, teeth marks, entrails missing. Most of these turtles (85.7%) were nesting females. It was also noted that monk seals have changed their predation technique; now they open the body cavity by tearing the soft tissue behind the turtle's flippers. Predation continued during 2011 with 16 dead turtles, all of them nesting females. Delayed maturity in marine turtles renders adult individuals as exceptionally valuable to the population. The annual loss of reproductively active females, estimated at about 4% of the nesting population, may prove non-sustainable in the long run. It is therefore urgent that the Management Body of the National Marine Park of Zakynthos takes the necessary initiatives to mitigate this serious danger.

AN INCREASING SEA TURTLE POPULATION FOLLOWING 15 YEARS OF NEST PROTECTION

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The 44-km beach of Kyparissia Bay, western Peloponnesus, hosts the second largest loggerhead turtle nesting aggregation in Greece and in the Mediterranean. An 8-km beach section, concentrating 62% of all nests in the Bay, has been monitored unfailingly since 1984, including tagging of turtles at night. Turtles without tags or scars attributed to lost tags are considered as neophytes. As nests were subject to high rates of mammal predation and inundation by seawater, in-situ fencing and relocation of nests have been gradually applied, and since 1992 this covered the majority of nests. Over the 28-year period (1984-2011), the annual nesting effort ranged from 174 to 741 nests. However, in the last 6 years (2006-2011) there has been a considerable increase in nest numbers, almost doubling the annual population growth rate. Furthermore, the annual percentage of neophyte turtles has increased from 30-40% in the period 1993-2003 to 50-60% in the last 6 years. The elapsed number of years from the onset of massive nest protection (1992) to the first appearance of these increases (2006) coincides with the minimum maturation period of Mediterranean loggerheads (15 years). Our data tentatively indicate that the recent increases in nest numbers and neophyte turtles are associated with long-term nest protection efforts. The noted positive population trend, potentially resulting from ARCHELON's conservation efforts in Kyparissia Bay, make us hopeful that similar protection measures carried out since early 1990s at the nesting areas of Rethymno and Chania, on the island of Crete, may reverse the population declines recorded there.

SUITABILITY OF WETLAND STOPOVERS FOR MIGRATORY BIRDS ALONG THE 'IONIAN FLYWAY'

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Twice a year migratory birds cover intercontinental trajectories, facing numerous challenges en route. The integrity of migratory routes with adequate stopover opportunities is critical for survival, especially for birds strictly depending on wetlands. The Balkan peninsula is very important for Palaearctic migratory wetland birds. Greece particularly, extends deep into the Mediterranean Sea as a bridgehead from and towards Africa. However, 73% of Greece's coastal marshes were lost or degraded in the 20th century, threatening the integrity of migratory routes. With its Birds and Habitat Directives, the EU has established a unique tool for the effective protection of fauna, flora and biotopes with possible stopover habitats. Whether field conditions at stopover sites match legal status is often not known. We studied the actual suitability of wetland stopover sites for nine migratory bird species with different habitat requirements, in western Greece. Satellite imagery was used to accurately classify all wetland sites for vegetation, assigning bird habitats through expert-knowledge. A field campaign during the peak spring migration of these focal species included validation of site suitability by bird sightings and assessment of human disturbance. Reported and actual field conditions of Natura 2000 wetland sites were compared. Migratory connectivity and expected climate-driven shifts of site utilization by birds were not foreseen in the EU Natura 2000 policy. Also, the political complexity and jurisdictional EU/non-EU boundaries which migratory birds cross along their route, cause additional challenges that we must reduce, not only on paper, but also in the field. We wish to add a critical assessment.

SPECIES DELIMITATION IN THE ROCK-DWELLING GECKOS OF THE *PTYODACTYLUS HASSELQUISTII* COMPLEX (REPTILIA:GEKKOTA) UNDER AN INTEGRATIVE APPROACH

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In order to understand the evolutionary processes, study the biogeographical patterns and conduct conservation planning, it is of fundamental importance to identify independent evolutionary units. From morphology-based classical approaches to modern molecular systematics, there exists nowadays a variety of species delimitation methods. In this context, the concept of Integrative taxonomy advocates the combined use of multiple independent sets of characters for species diagnosis. The geckos of the genus *Ptyodactylus* are specialized rock dwellers distributed across North Africa and Arabia. Among its seven currently described species, *P. hasselquistii*, with type locality in El Cairo, Egypt, is considered a species complex whose members are found in eastern North Africa and the Arabian Peninsula. In this work, we investigate the systematics of this group using an integrative approach. We examined the phylogenetic relationships of the genus based on a dataset of 103 samples and six molecular markers (two mitochondrial: 12S, cytb, and four nuclear: C mos, ACM4, MC1R, RAG 2, totaling 2709bp). Species delimitation methods were applied in order to investigate the speciation history of *j* based on the molecular evidence. Additionally, a morphological analysis was carried out using multivariate methods. The distribution of *P. hasselquistii* is shown to be wider that previously documented. The existence of numerous deep lineages within the complex is uncovered and morphologically distinguishable units are defined. Results among the different methods are highly congruent and point toward the

existence of several undescribed species. This conclusion is added to a body of growing evidence of underestimated reptile biodiversity in the arid environments.

THE EFFICACY OF PATTERN MAPPING FOR THE PHOTOGRAPHIC IDENTIFICATION OF INDIVIDUALS IN NEWTS

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The ability to identify individual animals is crucial for the application of many modern mark-recapture methods that allow the estimation of various demographic parameters, such as population size, birth, death, immigration, emigration, survival and individual growth rate. Individual identification of animals also provides valuable information on their behaviour, distribution, habitat use, and home range. Natural marks, such as the spots and colour patterns of some amphibians that vary among individuals, can be used for photo-identification and constitute a non-invasive technique for identifying individuals. Pattern mapping has no negative effects on animals, thus it can be applied on species that are endangered or of conservation interest. As part of an ongoing mark-recapture study, where we already use Passive Integrated Transponders (PIT) tags, we examine additionally the use of photo-identification in two newt species, *Ichthyosaura alpestris veluchiensis* and *Lissotriton vulgaris graecus* living syntopically in a temporary pond on Mt. Helmos. Using digital photographs of each individual we investigate whether this method is efficient to successfully discriminate between individuals based on their spot patterns. To simplify the task of comparing a large number of photographs, we use the program I3S Manta that compares each individual's photograph with all photographs in a digital photograph database and locates the best-matching individuals, allowing the researcher to make the final decision for the correct match. An evaluation of this method as applied on the two newt species is presented and discussed in comparison to the available PIT-based results, along with its possible applicability on other taxa.

APPLICATION OF SPECIES RICHNESS ESTIMATORS FOR THE ASSESSMENT OF EARTHWORM DIVERSITY

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This paper includes the current knowledge of earthworm distribution and richness in the central part of the Balkans, in the State of Serbia. The work is based on the data obtained with fieldwork in the western part of Serbia during the 2007-2011. The investigations were carried out in 15 localities, ranging in altitude from 750 to 1850m a.s.l. The distribution of richness was affected by the location of sampling points in forest, meadows and pastures. We used our database (288 samples included 761 individuals in 29 species) to evaluate species richness. Different estimators (EstimateS 8.2) were used to extrapolate species richness beyond our own data. These estimators are ACE, ICE, Chao 1, Chao 2, Jackknife 1, Jackknife 2, Bootstrap and Michaelis-Menten richness estimator. We evaluated the efficiency of these methods for sampling earthworm species richness and relative abundance. Species richness was described with diversity indices and species-accumulation curves. The ICE and Chao 2 richness estimator were considered most appropriate to predict the number of earthworm species at the investigation site if sampling was continued. The methods used here for earthworms may be applied to any other biological group.

THREAT STATUS AND DISTRIBUTION OF ENDEMIC SPECIES *ALLOLOBOPHORA KOSOWENSIS KOSOWENSIS* KARAMAN, 1968 (OLIGOCHAETA, LUMBRICIDAE) ON THE BALKANS

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Allolobophora kosowensis kosowensis Karaman, 1968 is an exclusively endemic earthworm species for the State of Serbia (central part of the Balkans). Although it was described over half a century ago, there are less than twenty known locations. *A. kosowensis kosowensis* was discovered in Kosovo (Pristina, 1968), and after 20 years, it was recorded again in only few localities in southern Serbia and recently in central Serbia with a low number of individuals. The aim of this paper is to present the data from our own collecting and, by analyzing the whole list of records, to trace a synthetic outline of distribution and threat status of *A. kosowensis kosowensis* in the Balkans. Additional data on its distribution are presented, based on fieldwork conducted in the last ten years. In spite of intensive faunistic investigation in Serbia, only one exemplar has been registered (Pancevo, Voivodina Province - 5 years ago). Nevertheless, this represents a considerable range extension for this species, while this is the northernmost point of occurrence in the Balkans. Its known area of occupancy is around 100 km^2. The analysis based on the IUCN (2011) Red List Categories shows that *A. kosowensis kosowensis* belongs to the Endangered category [B2b(ii–v)c(ii–iv)] in the Balkans.

THE WORLD SPECIES OF *CAENOCREPIS* THOMSON (HYMENOPTERA: PTEROMALIDAE), EGG PARASITOIDS OF CURCULIONIDAE (COLEOPTERA)

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The genus *Caenocrepis* Thomson has two known species, both occurring in the Palaearctic region: *C. arenicola* (Thomson, 1878) and *C. bothynoderi* Gromakov, 1940. The distribution of the first species includes mainly the Southern and Central Europe, reaching North Africa, Caucasus and Kazakhstan, while the latter is confined mainly in South-Eastern Europe, and Western and Central Asia. Both species are rather rare or local and develop as egg parasitoids of Curculionidae (Coleoptera), an unusual condition for Pteromalidae. *C. arenicola* attacks the eggs of *Pachycerus madidus* (Olivier, 1807), while *C. bothynoderi* the eggs of *Asproparthenis punctiventris* (Germar, 1824) and *Pachycerus segnis* (Germar, 1824). The aim of this paper is to review our knowledge about this genus, including the description of new species and the updating of the faunistical and biological data. Specimens from the Natural History Museum London, the Royal Museum for Central Africa Tervuren, the Musée d'Histoire Naturelle Paris and the personal collection have been examined and species hypotheses have been inferred. The distinction between the Palaearctic species is reevaluated and two other species are described as new from the Afrotropical region (Zimbabwe and Mozambique). The two new species show some interesting morphological features i.e. enlarged clypeal lobes and unusually wide temples. A surprise has been the discovery of a specimen morphologically indistinguishable from *C. arenicola* in Zimbabwe and possible explanations for this are discussed. Distributional maps, illustrations, and an identification key for both males and females are provided for all species.

CHECKLIST OF GREEK FRESHWATER AMPHIPODA (CRUSTACEA, PERACARIDA) WITH ZOOGEOGRAPHICAL NOTES

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Freshwater Amphipoda, a peracaridan crustacean group with epigean and subterranean representatives, constitutes an important part of freshwater fauna, both in terms of species number and biomass. As such, data on its distribution could be valuable for the bionomy of the inland aquatic ecosystems. The aim of the present study is to give an annotated checklist of the freshwater amphipods of Greece. The detailed review of the relevant literature, scattered in many publications, followed the examination of material attained from museum collections, and own samples from different zoogeographical regions of Greece. So far, 33 species from nine genera and six families (Bogidiellidae, Gammaridae, Hadziidae, Ingolfiellidae, Niphargidae and Salentinellidae) were found in Greek freshwaters. Three troglobitic species are new for science. Troglobitic fauna is more diverse at all taxonomic ranks. The corresponding fauna of different zoogeographical regions of Greece is analyzed, presented and discussed along with wider zoogeographical comparisons to the fauna of the adjacent regions.

THE IMPORTANCE OF THE AXIOS-LOUDIAS-ALIAKMONAS WETLAND COMPLEX FOR NESTING OF THREATENED SPECIES OF GULLS AND TERNS

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Several protected species of gulls and terns have undergone severe breeding population declines in Greece. Sandwich tern *Sterna sandvicensis*, Gull-billed tern *Gelochelidon nilotica* and Slender-billed gull *Larus genei* are all listed as Vulnerable species in the Greek Red Data Book while Mediterranean gull *Larus melanocephalus* is listed as Endangered. All four species are known to breed in no more than 1 - 5 wetlands in Greece. Recent surveys by boat in the islets of Aliakmonas Delta (Thermaikos Gulf), have revealed the existence of larger breeding populations from the ones known so far. The colony of Slender-billed gull, the only known in Greece, numbers approximately 260 pairs compared to the known size of 100 - 130 pairs. The colonies of Sandwich tern, Gull-billed tern and Mediterranean gull were counted to have 532, 380 and 1175 pairs respectively, where as the total known population for these species in Greece was 30 – 50, 180 – 270 and max. 1950 pairs, respectively. Our findings for Sandwich tern and Gull-billed tern are well over the known total breeding population for these species in Greece. The Mediterranean gull colony at Aliakmon with another one at the Axios delta represents >90 % of the total Greek breeding population. The systematic monitoring of nesting populations of the aforementioned species of gulls and terns in the Axios-Loudias-Aliakmonas wetland complex could contribute essentially to their conservation.

REVISITING THE BIOGEOGRAPHIC PATTERNS OF THE AEGEAN TENEBRIONID BEETLES: NEW DATA AND NEW INSIGHTS

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The Aegean darkling beetles (Coleoptera: Tenebrionidae) have been long regarded as a particularly exciting system for island biogeography and numerous relevant studies have been published during the last decade. However, the majority of these studies have been based on museum collections and literature data, which might be biased in favour of some of the islands that have been traditionally studied more extensively by taxonomists.

We selected 16 of the central Aegean Islands to perform a systematic survey of species richness using pitfall traps and hand collecting. The collected specimens were identified to species level using morphological characters, while we also employed molecular phylogenies as a tool to aid with certain taxonomic difficulties. Additionally, we obtained new unpublished records from the collections of the Natural History Museum of Crete.

The newly compiled dataset increases greatly (50-160%) the existing records of species richness for nine islands, while it includes four islands that had not been studied ever before. The increase in species numbers was lower (5-30%) for the islands of Naxos, Kos and Milos that have been traditionally visited more frequently by taxonomists. The new species richness data for the 16 central Aegean islands, provide a much stronger correlation with island size than the previously published estimates and a steeper curve of the species-area relationship. We show that this imbalance in the existing records may have introduced certain biases in previously published studies. We also demonstrate the utility of molecular data for improving the existing taxonomic knowledge and providing new insights into the biogeographic patterns of the Aegean tenebrionids.

DIEL RESOURCE UTILIZATION IN *DIPLODUS SARGUS* BENTHIC LARVAE

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Foraging studies provide fundamental knowledge on the ecology of settlement and post-settlement processes, which in turn are crucial for the replenishment of natural fish populations. In the present work, the foraging ecology of *Diplodus sargus* settlers was studied in an estuarine area in the Ionian Sea, in May 2010. Settlers' diet composition was studied on fish captured every three hours along a 24hour period. Fishes were collected at depths down to 1.5m using handnets and scuba gear. Settlers were subdivided into successive ontogenetic stages and their stomach contents were analysed separately for each ontogenetic stage and sampling time. Harpacticoid copepods (copepodites and adults) were found to be the dominant prey item, while calanoids were also consumed. Other prey items which were consumed sporadically, regardless of ontogenetic stage, were polychaete larvae, amphipods (Gammaridae), tanaidaceans, isopods (*Gnathia*) and mysidaceans. Foraging intensity for all ontogenetic stages was found to be greatest during dusk hours and less during dawn, while it gradually decreased to cessation in the mid time intervals. *D. sargus* settlers tended to select prey items close to the bottom.

PHYLOGEOGRAPHY OF THE MARINE ISOPOD *SPHAEROMA SERRATUM* (CRUSTACEA, ISOPODA, SPHAEROMATIDAE) INFERRED FROM MITOCHONDRIAL AND NUCLEAR GENE SEGMENTS

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A phylogeographic analysis of the marine isopod *Sphaeroma serratum* Fabricius, 1787 was carried out to test for potential genetic differentiation among populations and geographical structure. The species is distributed widely in the shallows of the tidal zone and is characterized by low active dispersal ability and no early dispersal stages. The populations analysed were collected from western and central Greece and from the Aegean. Three molecular markers (two mitochondrial and one nuclear) were selected for PCR amplification and sequencing. The resulting sequences were used for statistical and phylogenetic analyses using three different algorithms (Neighbor Joining, Maximum Parsimony & Bayesian Inference). High levels of genetic divergence among *S. serratum* populations have been found, but no morphological variation. Divergence patterns do not show any clear geographical structure, but seem instead to relate to different salinity levels among sampling regions. Contrary to expectation, this cosmopolitan 'species' in fact seems to constitute a group of sibling species.

HABITAT ANALYSIS OF THE BALKAN CHAMOIS (*RUPICAPRA RUPICAPRA BALCANICA*) IN ITS SOUTHERNMOST LIMIT OF DISTRIBUTION IN EUROPE (MT. GKIONA, GREECE)

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During 2006 a systematic research (150 field days) of the presence of the Balkan chamois on Mt. Gkiona took place. Both indirect (tracks and droppings) and direct records of the species were taken into account. The total number of 1008 records were processed with GIS and correlated with 4 habitat environmental parameters (altitude, aspect, slope and Annex I habitat type/ Directive 92/43 EEC) in every season. The areas used by the species were calculated by the Kernel density estimator method (95% probability).The area used by chamois corresponds to 25% of the whole surface of the Natura 2000 site on Mt. Gkiona. This more expanded distribution is observed in spring, while the more puckered in summer. In winter the chamois frequent mainly the middle altitudinal zone (1001m-1500m) and in slopes of SW aspect, whereas in summer they occur mainly at the higher altitudinal zone (2001m – 2500m) and in slopes of NW aspect. There is no remarkable difference in inclination category selection; though the medium inclination slopes (20^o-30^o & 30^o-40^o) are used more than all other categories. Of the 13 Annex I and Hellenic habitat types occurring on Mt. Gkiona, chamois uses 9, of which, 3 almost exclusively. The Endemic oro- Mediterranean heaths with gorse (4090) are used mainly in summer and autumn, the forests of *Abies cephalonica* (951B) are used mainly in winter and spring, and the calcareous rocky slopes with chasmophytic vegetation (8210) are frequently used all the seasons.

GENETIC ANALYSIS OF STONE MARTEN (*MARTES FOINA*) GREEK POPULATIONS

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The stone marten (*Martes foina*) has a widespread distribution throughout much of Europe and central Asia. The distinction of the species into 11 subspecies has mostly been based on morphometrical and craniometrical evidence. In Greece, it is considered that three subspecies exist: *M. foina foina* in the mainland, *M. f. milleri* in Rhodes and *M. f. bunites* in Crete as well in other Aegean islands. The present work uses mitochondrial DNA markers in order to: i) identify possible genetic differentiation between Greek stone marten populations, ii) study their genetic variability, and iii) analyze the geographical distribution of the resulting genealogical lineages throughout Greece. DNA was extracted, so far, from 80 stone marten liver samples from Macedonia, Thrace, Thessaly, Peloponnese, Crete and other Aegean islands. Subsequently, PCR was used for amplification of two different mtDNA markers: cytochrome b (cytb) gene and the control region (D-loop). PCR products (around 1Kb each) were sequenced and all the sequences were aligned and examined for genetic polymorphisms. Preliminary results, mainly based on analyses of cytb-sequences, show only a few (nine) point mutations and do not favor either the existence of subspecies or the existence of a polymorphism characteristic for a specific Greek stone marten population. Analysis will continue based on more cytb and D-loop sequences.

DIETARY GEOGRAPHICAL VARIATION OF THE STONE MARTEN (*MARTES FOINA*): A META-ANALYSIS APPROACH

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Understanding the biogeographical trophic patterns of generalist predators, such as the Stone Marten (*Martes foina*), is particularly challenging due to their wide distributions and the broad trophic spectrum. The geographical variation in food habits of the Stone Marten was reviewed. We collected data from 43 studies, from the available literature on food studies from locations which covered most of the Stone Marten's European range. We explored if there is a pattern in dietary composition of the species, related to geographical range. The original data were expressed as weight, percentage of numerical abundance (%N) and frequency of occurrence of the food items measured in stomachs and scats, in North and Central Greece, and we compared them using meta-analysis. We observed a clear latitudinal differentiation and heterogeneity in the main food categories (mammals, birds-eggs, insects, vegetation-fruits and reptiles-amphibians). Consequently, we concluded that variations in feeding habits of the Stone Marten could be associated to local climate and, therefore, the availability of alternative potential food. In a general geographical scale, the Stone Marten responds to varying food availability by adjusting its foraging strategy and should be considered as an opportunistic and flexible feeder.

PARVOCALANUS CRASSIROSTRIS IN THE AEGEAN SEA: A NEW INVASIVE COPEPOD SPECIES

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Parvocalanus crassirostris (F. Dahl, 1894), a small-sized copepod (0.5mm), was found in Kalloni Gulf, a productive, semi-enclosed and shallow ecosystem of Lesvos island in the NE Aegean Sea. Samples were collected monthly with a 90μm net from July 2009 till June 2010. *P. crassirostris* presented considerable temporal and spatial heterogeneity and constituted an important part of the zooplankton community within the gulf. Its total abundance showed a progressively increasing trend from the open sea towards the interior part of the gulf, particularly in the stations located near the river mouths. This is the first record for this species in the Aegean Sea.

ANCIENT SCORPIONS OF GREECE: DNA PHYLOGENY OF *EUSCORPIUS* (SCORPIONES, EUSCORPIIDAE)

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The scorpion genus *Euscorpius* Thorell, 1876 (Scorpiones: Euscorpiidae) includes a number of very common Mediterranean species. However, their systematics is inconclusive, and *Euscorpius* of Greece have been largely misidentified and misunderstood. We are presenting the first molecular phylogeny of the Greek *Euscorpius* species using sequence data from four genes, mtDNA (16S rRNA, COI, and COII) and nuclear ITS-1. Phylogeographic analysis of *Euscorpius* across the Eastern Mediterranean region and adjacent areas (over 100 populations), focusing on Greek fauna, revealed high variation, deep clade divergences, and cryptic species. At least 14 species of the genus *Euscorpius* are present in Greece, some of which are yet undescribed (including island and mainland endemics). We discuss phylogenetic relationships and biogeographic scenarios for *Euscorpius*, which follow ancient geological events in the Aegean basin. Most important is sympatric existence of two or three species, sometimes morphologically "cryptic" but belonging to distinct, old DNA lineages.

MAMMAL PREY OF THREE NOCTURNAL PREDATORS IN THE SOUTHERN REGION OF ALBANIA

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Over the 2004-2008 and 2010-2011 periods, 1115 barn owl (*Tyto alba*), long-eared owl (*Asio otus*) and little owl (*Athene noctua*) pellets were collected in the southern region of Albania (District of Gjirokastra and Delvinë area), from which 3025 individuals were selected belonging to Insectivora, Rodentia and Chiroptera orders. The pellets were collected in 19 stations in altitudes of 180-750m above sea level over various periods of the year. For the barn owl, the average number of individuals per pellet is 2.85, for the long-eared owl 1.24, whereas for the little owl 1.10. The mammal diet of barn owls consists of 16 species of small mammals, 5 of which are insectivores, 10 rodents and 1 chiropteran. The mammal diet of long-eared owls consists of 6 species (1 insectivore and 5 rodents) whereas that of little owls of 4 species (2 insectivores, 2 rodents). The dominant species for barn-owls are *Microtus thomasi* (F 32.3%), *Crocidura suaveolens* (F 20.2%) and *Mus macedonicus* (F 16%). For long-eared owls the dominant species are *M. thomasi* (F 77.3%), *M. macedonicus* (F 10%) and *C. suaveolens* (F 3.63%). Among the above predators, those with the greatest contribution to the biomass are *M. thomasi*, *M. macedonicus* and *Apodemus sylvaticus*. Where little owl is concerned, even though the number of the individuals selected is small, an obvious preference for *M. thomasi* is shown. The findings of our study suggest that the southern region of Albania, with its variety of habitats, constitutes a suitable environment for the populations of small terrestrial mammals.

DISTRIBUTIONAL PATTERNS OF TRIGGER BIRD SPECIES IN THE NATIONAL PARK OF LAKES KORONIA, VOLVI AND THE MACEDONIAN TEMPE

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Sixteen bird species were considered as trigger species for the characterization of the National Park of Lakes Koronia-Volvi and Macedonian Tempe as Special Protected Area (SPA). However, their annual distribution and their specific habitat preferences in the National Park are not so far known. In order to fill this gap, the Management Authority of Lakes Koronia-Volvi implemented a two year (2010-2011) monitoring project of the trigger bird species by: a) direct counting, b) territory mapping (for white-tailed eagle) and c) counting from nest to nest (for white stork) in the three main habitats (lakes, agricultural and mountainous districts) where the area of concerned was divided. Cluster Analysis based on the number of bird species recorded, revealed three different groups; Group I consisted of the agricultural and mountainous districts in the sub basin of Lake Koronia, that were preferred by the white and black stork, the roller, the long-legged buzzard, the lesser spotted eagle and the pygmy cormorant (average similarity 65%); Group II was formed by the same areas in the sub basin of Lake Volvi. Similarity within this group was almost exclusively due to the white stork (91%). Finally, the habitats of both lakes formed Group III, which was preferred by flamingos, the crested grebe and the Dalmatian pelican (56%). Generally, more trigger species were present in the sub basin of Lake Koronia, despite its ecological degradation.

GREEK WEEVIL *HYPERA* (*BOREOHYPERA*) *MOCZARSKII* PENECKE, 1936 (COLEOPTERA: CURCULIONOIDEA, CURCULIONIDAE) RECORDED IN CENTRAL SERBIA

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Hypera (*Boreohypera*) *moczarskii* Penecke, 1936 until recently was well-known only in Greece. In this study new localities from Central Serbia are given. Because of an unclear taxonomical position, this species is named in Fauna Europaea *Neoglanis* (*Neoglanis*) *moczarskii* (Penecke, 1936) (http://www.faunaeur.org/full_results.php?id=247363), in some earlier literature and in http://www.biolib.cz/en/taxonposition/id692484 as *Donus moczarskii* (Penecke, 1936), and recently as *H. (B.) moczarskii* Penecke, 1936 (Friedhelm, B., Winkelmann, H. & Bayer, C., 2011). During collecting of adult weevils in the 90s on Central Serbia territory, in the vicinity of Kragujevac, two males of *H. (B.) moczarskii* were collected by using the method of sweeping herbaceous plants. The first finding was on the 21st of March 1993, in Memorial park Šumarice, near Sušički stream (44°1'33.84" N and 20°53'17.64" E), at 198 m altitude. The second one was on the 21st of May 1994, on Žeželj hill (43°58'9.45" N and 20°57'18.79" E), in a meadow at approximately 470 m altitude. Initially, in lack of adequate keys for identification, these specimens were treated as *H. (B.) diversipunctata* (Schrank 1798) (= *elongatus* (Paykull, 1792), but finally H. Winkelman, Hyperini-specialist, identified them as *H. (B.) moczarskii*. These findings are important for the Serbian as well as for the Greek fauna, because neither in the museums of Greece nor in the Natural History Museum in London is there any specimen of this species which was considered as a Greek endemic. Except our discoveries, there are two other recent findings, collected in West Greece and in Central Macedonia by German colleagues.

REVIEW OF WEEVILS (COLEOPTERA, CURCULIONOIDEA) IN THE SPECIAL RESERVE OF NATURE ZASAVICA (SERBIA)

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The cosmopolitan beetle superfamily Curculionoidea (weevils) contains the most numerous animal family in the world, Curculionidae. It has a huge ecological importance, but in Serbia it is under-researched. This paper presents up-to-date known data on weevil fauna (Coleoptera, Curculionoidea) in the Special Reserve of Nature Zasavica, based on the adults' findings from 1996 to 2007 (except 1999, because of bombing). Adult weevils in the Reserve of Nature Zasavica were collected sporadically from 1996 to 2007, on 40 localities, by different collecting techniques (herbaceous plants sweeping, beating of tree branches and bushes, hand collecting, Malaise trap and soil sifting). In 55 field excursions, 371 specimen (180 males and 189 females), from 86 species, belonging to the 7 families - Anthribidae (2 species), Rhynchitidae (1), Apionidae (13), Nanophyidae (4), Erirhinidae (4), Dryophthoridae (2) and Curculionidae (60) were registered. Since the territory of Zasavica was declared as the Special Reserve of Nature in 1997 due to the presence of swamp and freshwater habitats, special attention in this study is given to the higro- and hidrophilous weevil species such as those from family Nanophyidae, or Erirhinidae, as well as three *Bagous* species, *Limnobaris dolorosa* (Goeze, 1777), *Thamiocolus viduatus* (Gyllenhal, 1813), *Mononychus punctumalbum* (Herbst, 1784), four *Pelenomus* and two *Rhinoncus* species from family Curculionidae. These results are modest. More complete picture of the weevil fauna of Nature Reserve Zasavica will be constructed after more systematic collecting, over many years, through all seasons.

NOTES ON BUPRESTIDAE BEETLES ON THE NORTHERN SPORADES ISLAND COMPLEX

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This work studies the species-area relationship (=SAR) of buprestid beetle occurrences on the islands of the Northern Sporadhes, Greece archipelago. The islands were also described in four sets of variables that were expected to provide the full spectrum of habitat type coverage. Geological, soil, vegetation, and climatic types were assembled in these four sets comprising the 'island variables'. These variables are used for the search of habitat fidelity of buprestids by applying redundancy analysis. When the stages of the 'taxon cycle hypothesis' (=TCH) were considered in order to doubly standardize buprestid occurrences on islands, the resulted presence values exhibited a highly significant SAR that explains a higher percentage of variance in the observed data (from 67.2% to 83.3%). Moreover, the inflation factor of the variable describing the Mediterranean vegetation (maquis) is 3340.23 and the inflation factor of the variable describing marble as a geological substrate is 6.59. Slope values of SAR curves increased with TCH stages. However slope values were found to be lower than that of other data sets. This may be due to the reduced dispersal abilities of buprestids, the higher affiliation of these insects to habitat types, the augmented feeding specialization of the taxonomic assemblage and the smaller scale of the archipelago in comparison to other studies. This finding may have important consequences in the size and designing of conservation areas.

MODELLING BETA DIVERSITY PATTERNS IN INSULAR SYSTEMS

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A number of studies have shown that taxa with poor dispersal ability tend to have higher beta diversity than taxa with good dispersal ability. However, this has not been investigated in insular systems and no comparisons have been made between continental shelf and oceanic insular systems that might exhibit different patterns due to the prevalence of different processes of community assembly in each system. We propose a method by which beta diversity patterns of taxa with different dispersal abilities and in different insular systems around the world can be modelled. We used presence-absence matrices from studies that report the distribution of reptiles and amphibians on islands and we calculated a beta diversity coefficient (Jaccard dissimilarity) between pairs of islands in each insular system. We applied a generalised mixed effects model (GLMM) to the data using the R package lme4. The GLMM applied to the data showed significant differences between beta diversity patterns in continental shelf and oceanic insular systems as well as among taxa (i.e. amphibians, lizards, snakes). This approach can be applied to a variety of data giving the opportunity to reveal further differences between taxa and/or insular systems, as well as effects of geography and other factors.

THE EFFECTS OF HUMAN SETTLEMENTS ON BIRD SPECIES RICHNESS IN LANDSCAPES OF DIFFERENT ALTITUDES

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Different species, even within the same taxonomic group, may exhibit different responses to factors affecting their ecology such as habitat deterioration. To assess whether human activity is a predictor of bird diversity loss we examined its effects on the total bird species richness and breeding density of eight priority bird species. We surveyed birds, using the point count method, at 12 lowland, 12 midland and 12 upland sites during the bird breeding season of 2009. We investigated the possible relationship between: (1) the estimated total bird species richness and altitudinal zone as it was affected by human presence, and (2) the breeding density of priority bird species and human settlements. A General Linear Model (GLM) was applied to explore the variables affecting total bird species richness and breeding density of priority bird species in the study area. Results suggest that there was a significant relationship between total bird species richness and altitude ($F=18.650$, d.f.=2, $P<0.0001$), as well as distance from farming buildings ($F=4.072$, d.f.=1, $P=0.045$), while no significant relationship with human population was detected. Regarding the priority bird species of the study area, a significant relationship between breeding density of *Dendrocopos medius* and *Milvus migrans* with distance from livestock buildings ($F=4.431$, d.f.=1, $P=0.036$ and $F=6.000$, d.f =1, $P=0.015$, respectively) was found. Thus, we concluded that livestock activity and human settlements may benefit some priority bird species such as *D. medius*, *M. migrans* and *Lanius collurio*.

FIRST REPORT OF *PAYSANDISIA ARCHON* (LEPIDOPTERA: CASTNIIDAE) ON *PHOENIX THEOPHRASTI*. A POSSIBLE ECOLOGICAL THREAT OF THE PALM TREE FOREST OF VAI, CRETE

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The Cretan Date Palm (*Phoenix theophrasti*) is a native species to the eastern Mediterranean. It is found mainly on Crete and southern Greece and in some Turkish coast. *Phoenix theophrasti* has a slow growing rate (much slower than *Ph. canariensis*), lower humidity levels in the trunk and many offshoots. Crete has probably the largest natural palm tree forest in Europe, the forest of Vai which covers an area of about 200 km^2. It consists mainly of *Ph. theophrasti* and it has a tremendous ecological value for Greece. Another, smaller, palm tree forest of Crete is the forest of Preveli, which also consists of *Ph. theophrasti*. *Paysandisia archon* (Burmeister, 1880) (Lepidoptera: Castniidae) that has been introduced accidentally to Europe (from Argentina), where it became a serious pest of palm trees. In the Mediterranean region, the pest has been reported in Greece, Cyprus, Spain, Italy, and France. It goes through 9 larval instars with the 9th (prepupal) being the most destructive for the palm. *Paysandisia archon* was found in a single palm tree of the *Ph. theophrastii* species in the vicinity of the Technological Education Institute of Crete (Lat. 35.31688, Long. 25.105305). Three offshoots of this palm were totally destroyed by the pest, while the larva itself was found in the fourth one. Only one 6th -7th instar larva was found between the fourth offshoot and the main trunk. Although this can be characterized as an isolated incident, the risk of an infection of the Palm Tree Forest of Vai and Preveli with the unique *Ph. theophrasti* species exists.

MOLECULAR PHYLOGENY AND PHYLOGEOGRAPHY OF THE TWO CLOSELY RELATED SNAIL GENERA *HELICIGONA* & *CAMPYLAEA* (GASTROPODA: PULMONATA) IN GREECE

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Land snails of the genera *Helicigona* and *Campylaea* are highly diversified in Greece with also high levels of endemism. The genus *Helicigona* consists of 17 species, 14 of them are endemic in Greece and three can be found also in Albania. *Campylaea* comprises eight species, of which four are Greek endemics. The species exhibit great morphological and ecological plasticity and inhabit many different habitats from calcareous rocks and maquis to conifer forests and alpine grasslands. This is the first phylogenetic study of these genera, based on partial mitochondrial DNA sequences of the 16S rRNA and COI genes. A total of 80 specimens, belonging to 21 species from 76 localities in Greece, were included. The phylogenetic analyses revealed several discrete lineages that render the necessity of taxonomic re-evaluation of these taxa.

MOLECULAR PHYLOGENY OF *HELIX CINCTA* (MÜLLER, 1774) AND *HELIX NUCULA* (MOUSSON, 1854) IN THE EASTERN MEDITERRANEAN

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This study aims to reveal the phylogenetic relationship between two species of the genus *Helix* in the Eastern Mediterranean, using fragments of two mtDNA genes. *Helix cincta* is a relatively big land snail that is generally distributed in the northeastern Mediterranean. In Greece, it is found in the southern and central mainland and islands, but it is absent from the Cyclades islands. This herbivorous species lives in various habitats, e.g. calcareous forests, shrub lands, etc. *Helix nucula* is a medium size land snail that occurs in Anafi, southern Crete and northern Africa. This species is also herbivorous and inhabits sandy coasts, phrygana, semi desert and desert areas. In certain Greek populations there is an overlap of morphological characters (shell and genitalia); as a result these populations cannot be classified with certainty. By examining intraspecific variability at two fragments of the mitochondrial genes, COI and 16S r RNA, it was found that these two species form a monophyletic group that differentiated as *Helix cincta* in northeastern Mediterranean, and as *Helix nucula* in southern Mediterranean and the Aegean. The validity of current "morphological" taxonomy will be re-evaluated under the present molecular findings.

LONG-TERM MONITORING OF A LOGGERHEAD TURTLE FORAGING ASSEMBLAGE IN AMVRAKIKOS GULF, NW GREECE

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At-sea studies on marine turtle populations are rare compared to nesting beach studies, especially in the Mediterranean. For this reason, they should be considered a priority for marine turtle research in this region. To address our lack of knowledge on this understudied segment of the population and obtain important information specific to the area, ARCHELON initiated a research programme in Amvrakikos Gulf in 2002. We recorded carapace and tail lengths of a sample of the population that is found in a limited region with water < 2 m deep, but have also undertaken satellite telemetry and tissue sampling. In a decade of research we have recorded 300 individuals with numerous inter- and intra-annual recaptures, from which we are able to derive important insights into the biology and ecology of Mediterranean loggerheads. Herein we present our most recent findings. Turtles of the gulf range in size from 46.2 to 91.5 cm SCL (mean = 67.6, SD = 8.1, N = 273) covering the range from large juvenile to adult size classes; this may indicate that Mediterranean loggerheads shift from pelagic to benthic existence at around 45-50 cm. Initial growth rate results (< 3 cm per year) show the expected decrease with size, but more data are needed before robust rates can be presented. Observations indicate the onset of sexual dimorphism at around 65 cm SCL and assurance of sex, judged on tail length, possible from around 75 cm SCL. We have detected an unexplained male bias in the population, which is contrary to sex ratios obtained from hatchling production.

COMBINING TELEMETRY TO FIELD OBSERVATIONS IN ORDER TO INVESTIGATE BROWN BEARS (*URSUS ARCTOS* L.) RESOURCE SELECTION IN PROXIMITY TO HUMAN SETTLEMENTS IN NW GREECE

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Bear telemetry data over the last decade and field-recorded data show that bear-human interference is becoming a pre-occupying issue in Greece. Range expansion and land use modification seem to be in the origin of this phenomenon. The aim of this study was to investigate the incentives that motivate brown bears to increasingly use the close proximity of human infrastructures. Telemetry data from 5 bears (2 males and 3 females) were collected in NW Pindos over a three month period in 2011. Telemetry locations where filtered within a threshold distance of ≤ 200 meters from human infrastructure. Selected fixes were crosschecked in situ, within a 15m radius, within 24 hours. Over 4,484 locations, 857 (19.1%) were found within a ≤ 200 meters distance. Ten (10) variables were defined for vegetation types and food items found and were used to design a priori a set of 15 "models" (variable combinations) to explain possible scenarios. Model inference was based on an Information Theoretic Approach (Akaike Information Criterion (AIC)), to find the best K-L model between the a priori created variable combinations, grouped for each type of infrastructure, and to calculate the relative importance of each variable. Bears are attracted to all three types of infrastructure mainly by garbage. Habitat variables do not seem to play a key role for humanized bear habitat selection within the distance of ≤ 200 meters. Garbage seems to be of utmost importance (26%), as it was included in all top ranked models while its weighted importance was also high (28.6%).

PARASITISM IN ISLAND POPULATIONS OF THE AEGEAN WALL LIZARD (*PODARCIS ERHARDII*)

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The Aegean Wall lizard *Podarcis erhardii* is one of the most widely distributed species of Aegean reptiles. While there has been a substantial amount of research into the ecology and evolution of *P. erhardii*, there have been comparatively few studies on the parasite communities of the species. This study analyzes helminth parasite loads from 8 populations of *P. erhardii* occurring on islands of varying size in the Cyclades (Aegean Sea, Greece). By comparing burdens of infection among the different populations, this study aims to elucidate how host population and habitat factors shape levels of parasitism. Helminth diversity was very low with only four nematode taxa identified in the samples collected (*Spauligodon* sp., *Skrjabinodon* sp., *Parapharyngodon* sp., and *Skrjabinelazia* sp.). Rarer species (the digenean *Paradistomum mutabile* and the cestode *Oochoristica* sp.) that have been encountered in Wall lizard populations from the N. Sporades were absent from this survey. We found that worm burden was positively correlated with island area and that parasite prevalence was negatively correlated with island age. This suggests that numbers of parasites are determined not only by host population size but also that loss of parasite genetic diversity following long-term population bottlenecks likely impacts parasitic organisms. Given that these populations constitute a reliable model for the long-term effects of habitat fragmentation on species, the study raises concerns about the long-term prospects of survival for many specialized parasite populations in the face of widespread anthropogenic habitat fragmentation.

POPULATION STRUCTURE OF TWO SYNTOPIC SPADEFOOT TOADS (GENUS *PELOBATES*) AT THE LIMIT OF THEIR RANGES

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The spadefoot toads (*Pelobates* spp.) are highly specialized burrowing and nocturnal species with a narrow ecological niche. Two related species occur in Southeastern Europe (*P. syriacus* and *P. fuscus*). While their ranges are mostly disjoint, they overlap in the Balkan Peninsula, along the lower course of the Danube and the western coast of the Black Sea. Both species reach the limits of their ranges here: southern limit for *P. fuscus* and northern limit for *P. syriacus*. We studied syntopic populations in the Danube Delta Biosphere Reserver (Romania), on Grindul Lupilor, a natural sand levee (44°37'N, 28°48'E), where *P. syriacus* populations are considerably larger and have a wider distribution than *P. fuscus* ones. The two populations differed significantly in size and body mass (ratio *fuscus*: *syriacus*: SVL females 0.7, males 0.63; Body mass females 0.26, males 0.21), and showed distinct sexual dimorphism with females significantly larger in *P. fuscus*, and males slightly larger than the females in *P. syriacus*. The animals differed also in age structure: *P. fuscus* had on average 2.7 years (range 2-4 years), while *P. syriacus* had on average 4.6 years (range 2-7 years). Both species reached sexual maturity at 2 years of age, suggesting important differences in growth rate and better competitive abilities in *P. syriacus*.

THE QUALITY OF THE MOLLUSC WATERS FOR THEIR GROWTH AND COMMERCIAL EXPLOITATION IN THE BLACK SEA ACCORDING TO THE EU LEGISLATION

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The EU Directive No. 97/923 "Shellfish Waters" was implemented in Romania based on Government Decision No. 201/2002, modified and completed with Government Decision No. 467/2006 consisting of technical methods regarding the water quality for molluscs. The initial Directive is repealed and replaced by Directive 2006/113/EC with its amendments. The evaluation of the quality of the marine environment and of marine molluscs was carried out in 2011 in the four designated areas by law for growth and commercial exploitation in the Romania Black Sea coast. Physical, chemical and biological factors (pH, temperature, salinity, dissolved oxygen, total hydrocarbons, organohalogenated substances, heavy metals, faecal coliforms) of the marine environment (water and sediment) in living molluscs were analyzed by the analytical methods set out in the Annex to the Directive. The main species monitored were the mussel *Mytilus galloprovincialis* and the snail *Rapana venosa*. Water and sediment quality along the Romanian coastline in 2011 was overall in conformity with the Shellfish Waters Directive. The level of conformity for salinity was 50% in areas 1 and 2 from the northern part of the Romanian coastline which are influenced by the Danube River freshwater (95% required). The level of conformity for lead in seawater was 66.70% in area 1, 60% in area 3 and 85.7% in area 4 (100% required). For chromium in sediments the level of conformity which was achieved was 66.67% in area 2 and 75% in area 3 (100% required). The levels of all parameters analyzed in mussels were in conformity with the EU Directive requirements.

MORPHOLOGY AND GENETICS OF THE NOSE-HORNED VIPER (*VIPERA AMMODYTES*) IN THE CYCLADES, GREECE

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The nose-horned viper is distributed throughout the Balkan Peninsula, and in Greece there are 14 insular populations in the Cyclades which were all connected at the end of the last glacial maximum. Combining morphometrics and genetic analyses allowed us to assess the evolutionary effects of insular isolation and fragmentation on these insular viper populations and consequently it supports that they be considered evolutionary significant units that need to be preserved and monitored especially on the smaller islands. Using multivariate statistics we analyzed seven taxonomically important morphological features from 744 adult specimens from across the species' range, to investigate the morphological variation between the three subspecies *V. a. ammodytes*, *V. a. montadoni*, *V. a. meridionalis* and the insular populations in the Cyclades. Preliminary analyses of genetic variation, using mitochondrial DNA from 35 insular specimens representing 11 islands, allowed us to assess relationships among the insular populations and to the mainland conspecifics. Our morphometric analyses show that the Cycladic individuals are dwarf forms, and they possess taller horns and snouts than the mainland conspecifics. Further studies of population genetics, morphology, and ecology of *V. ammodytes* are warranted to unveil more complex evolutionary effects of insular isolation and fragmentation of old world viperids.

TAXONOMICAL STATUS AND PHYLOGENETIC RELATIONS BETWEEN THE "ATTICUS" AND "THOMASI" CHROMOSOMAL RACES OF THE UNDERGROUND VOLE *MICROTUS THOMASI* (RODENTIA, ARVICOLIDAE).

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The phylogenetic relationships between the "atticus" and "thomasi" chromosomal races of the underground vole *Microtus thomasi* was investigated through cytogenetic analysis (C-banding, FISH with satellite and telomeric sequences), mtDNA molecular phylogeny (cytb, Dloop, ND2 genes) and inbreeding experiments. The "atticus" chromosomal race consists of three geographically distinct populations in North Peloponnesus, Attiki and Evia Island, while the "thomasi" consists of several populations in the Greek mainland. Our research work indicated that the "atticus" populations from Attiki and Evia Island are genetically distinct (2.9% divergence for cytb gene), geographically and reproductively isolated from the "atticus" of North Peloponnesus and the "thomasi" populations, resulting in two distinct lineages, which probably derived from different glacial refugia of Southern Greece. We suggest that the lineage, consisting of the populations from Attiki and Evia Island, should be considered as a valid species, named *Microtus atticus*, including two chromosomal races, "atticus" and "evia". On the contrary, the ex-"atticus" populations from North Peloponnesus, belonging to the same mitochondrial lineage with the other "thomasi" populations, should be considered as a distinct chromosomal race of *Microtus thomasi*, named "peloponnesiacus".

THE MOLECULAR COMPOSITION OF THE SEX CHROMOSOMES IN *MICROTUS THOMASI*: HOW DOES THE POLYMORPHIC X AND Y ORIGINATE?

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The karyotype of the rodent species *Microtus thomasi* is characterized by a wide sex chromosomes polymorphism. In fact, nine X and six Y chromosomal variants have been described, that differed in the morphology and/or in the amount of constitutive heterochromatin. Six X chromosomes are acrocentric (X0-X5) and three submetacentric (Xst0- Xst2), while four Y chromosome are acrocentric (Y0-Y3) and two metacentric (Ym0 and Ym1). This makes *M. thomasi* an interesting model to analyze the origin and evolution of sex chromosome polymorphism. To study the possible origin of this sex chromosome polymorphism we have compared the karyotype of individuals from several populations by fluorescent in situ hybridization with different repeated probes (retrotransposons, satellite DNAs, non satellite repeat DNAs and telomeric repeats), and with different sex chromosomes painting probes. The results indicated that *M. thomasi* variation in sex chromosomes is mainly due to differential accumulation of repeated DNA sequences that give rise to the differences in the amount of constitutive heterochromatin and in chromosome size. Chromosomal rearrangements such as pericentromeric inversions have been also implicated. Our results also demonstrated that Xst chromosomes could be divided in two groups according to the molecular composition of the heterochromatin, which suggests an independent origin to each group. Thus, one group (Xst0-Xst1) probably originated by a Robertsonian fusion between an acrocentric X chromosome and one small acrocentric Y chromosome, most likely the Y1 variant. However, the other group (Xst2) probably evolved through a pericentromeric inversion and repeated sequence amplification in an acrocentric X chromosome.

TESTING DIVERSIFICATION PROCESSES WITHIN ANATOLIA VIA STATISTICAL PHYLOGEOGRAPHY

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Anatolia has high levels of diversity for montane Orthopteran lineages. Studies indicate that numerous genera have evolved from native Anatolian forms and that the high amount of diversity is the result of rapid diversification/speciation via reinforcing selection caused by successive range shifts of montane species during glacial and interglacial cycles. Our objective is to test the above hypotheses using genetic and phenotypic data by evaluating divergence times, ancestral gene flow and patterns of character evolution within the Caucasus endemic bush cricket *Phonochorion* using Bayesian MCMC analysis and coalescent simulations. Divergence time estimates of lineages and species lie within the Pleistocene (700 ka – 90 ka years ago) and analyses revealed the presence of a demographic expansion 48 ka years ago during the last ice age. Estimated gene trees were paraphyletic and coalescent simulations revealed that haplotype mixing was due to incomplete lineage sorting rather than ancestral gene flow. Bayesian analysis of character evolution supports an Anatolia origin of lineages and a pattern of diversification in accordance with reproductive character displacement as sympatric populations showed a higher degree and faster rate of divergence than allopatric populations. The presence of paraphyly and haplotype mixing within gene trees and divergence time estimates give support to the assumption of recent diversification driven by glacial cycles while character evolution supports an Anatolian origin of species and rapid diversification via reinforcing selection. However, coalescent simulations indicate that haplotype mixing is a result of incomplete lineage sorting rather than gene flow, which would be expected under reinforcing selection.

EFFECTS OF MEDITERRANEAN WILD-FIRE ON SPIDER ASSEMBLAGES (ARACHNIDA: ARANEAE) IN *ABIES* FORESTS

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Wild-fires are an integral factor of regeneration in Mediterranean ecosystems. When these occur, the landscape changes dramatically, as well as the distribution of organisms. Spiders comprise an appropriate group of ecological indicators, because they are diverse, abundant and easy to sample. Our goal was to assess the effects of wild fire on the abundance, diversity, and composition of the epigeal spiders' community. Three study areas were used: unburned *Abies* forest, burned *Abies* forest and an unburned patch surrounded by burned forest. All sites were located at Mt. Parnitha in Attiki, Greece, a great part of which was burned in 2007. Pitfall traps were set over a period of one year in 2009. Pitfalls were changed monthly, followed by sorting and identification of spiders to family level. In total we identified 4196 specimens, belonging to 26 families. Gnaphosidae was the most abundant family, followed by Zodariidae and Lycosidae, while 10 families were rare, exhibiting less than 10 specimens each, in all sites. The number of families did not differ significantly among sampling sites, but their relative abundance did: in the unburned site as well as in the unburned patch the dominant family was Zodariidae (36.84% and 28.27% respectively), while in the burned site, Gnaphosidae dominated (33.58%). The total abundance was lowest at the burned site. However the abundance of Gnaphosidae was kept in similar levels at all sites, thus proving to be the most resistant family to the post-fire effects and coinciding with the perception that spiders are one of the first arthropod groups to colonize new uninhabited areas.

DIVERSITY AND DISTRIBUTION OF FRESHWATER FISHES IN ALBANIA

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Data on the distribution and diversity of Albanian freshwater fishes were obtained during sampling of more than 130 different localities, undertaken in all the main drainages in Albania during the period 2004–2011. Further ichthyofauna information was gathered by inspection of the catch of, and interviews with, local commercial fishermen. In addition, all available published data on the freshwater fishes of the country were studied and reviewed. The presence of a total of 58 different freshwater fish species was recorded. Furthermore, three euryhaline primary marine species were also recorded. Forty-eight of the 58 recorded taxa are considered native, while ten species are introduced. Six native fish—*Cottus gobio*, *Eudontomyzon graecus*, *Knipowitschia montenegrina*, *Pelasgus thesproticus*, *Scardinius knezevici* and *Telestes pleurobipunctatus*—, and one introduced—*Lepomis gibbosus*—were recorded in Albanian waters for the first time. Several species, considered endemic to particular areas, were recorded in other hydrological systems as well (e.g. *Pelasgus prespensis*, *P. thesproticus* or *Alburnus scoranza*). The most widespread native species or genera recorded were *Pachychilon pictum*, *A. scoranza*, *Cobitis ohridana*, *Anguilla anguilla*, and members of the genera *Alburnoides*, *Squalius*, *Chondrostoma* and *Gobio*. The taxonomic status of the majority of populations of those genera remains unclear.

SPRING RAPTOR MIGRATION IN DADIA NATIONAL PARK, NE-GREECE: WHERE DO THEY COME FROM, WHERE DO THEY GO?

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Migrating raptors and Black Storks (*Ciconia nigra*) were studied in Dadia National Park (Dadia NP), NE Greece, during spring 2003, 2004 and 2005. Vantage point surveys were used to record the flights of the migrating birds to evaluate 1) the numbers of individuals per species, 2) the migration phenology, 3) the best migration spotting points, and 4) the direction of migrating raptors. We observed 23 migrating species and 2030 migrating individuals, including among others 715 Common Buzzards (*Buteo buteo*), 547 Black Storks, 136 Short-toed Eagles (*Circaetus gallicus*), 124 Eurasian Sparrowhawks (*Accipiter nisus*), and 114 Honey Buzzards (*Pernis apivorus*). We found an overall decline from 739 individuals in 2003 to 629 in 2005 and detected species specific migration peaks starting at the second half of March, e.g. Common Buzzard, Short-toed Eagle, Black Stork and Sparrowhawk, and ending early May, e.g. Levant Sparrowhawk (*Accipiter brevipes*), Red-footed Falcon (*Falco vespertinus*), Honey Buzzard, and Hobby (*Falco subbuteo*). Most of the raptors were observed from vantage points close to the river Evros, which might function as an important migration route for several species. The mean direction of passing raptors was north (359°). We discuss how our results match with species' numbers, proportions and phenology at Bosphorus, Dardanelles and other entering points into the Balkan Peninsula. Not least because of the current wind farm development, a systematic migration monitoring should be established in Eastern Thrace and along the Greek side of the river Evros to determine the most important flyways and stopover areas in the region.

ISLAND BIOGEOGRAPHY USING MULTIPLE TAXA ON THE SAME SET OF ISLANDS

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Studies on island biogeography are usually based on distributional data for one taxon in an island group. Cross-taxon comparisons are scarce and usually different sets of islands for each taxon are used due to availability of data. Several island biogeography patterns are sensitive to the effects of the values of a few data points, e.g. island size, so the use of the same islands for comparisons among taxa is a much-needed addition to respective analyses. Aegean islands have been under intensive biogeographical study during the past three decades, resulting to the substantial knowledge of a quite variable set of taxa from a large number of islands. From a scrutiny of the respective literature, we were able to collect distributional data from the same 26 islands for 5 groups of organisms (isopods, snails, orthopterans, birds and reptiles, from 22 and 21 islands for 6 groups (adding either butterflies or plants), and from 19 islands for all these 7 groups together. We compared species-area relationships (SAR) among these taxa in order to test certain predictions of island biogeography theory. In particular, we checked for the best SAR model for each taxon, compared slopes and intercepts of the logarithmic power model, checked for correlations of slopes and intercepts with mean species richness, explored effects of habitat diversity, and compared species richness among taxa. Our results provide useful insights to the behavior of SAR and the biological significance of the constant parameters of its most common and widely applicable model.

DIVERSITY, DISTRIBUTION AND STATUS OF FISHES IN THE DEVOLL-OSUM-SEMAN RIVERS SYSTEM (ALBANIA)

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Based on various data of the last several years, the knowledge and understanding of the diversity and distribution patterns of freshwater fishes in most of the European Mediterranean has increased considerably. Nevertheless, the diversity, distribution, and conservation status of freshwater fish in some areas are still very poorly known, with the least known being in Albania.

Sound distribution and taxonomic status data are essential for successful conservation efforts: in their absence it is impossible to evaluate the conservation status of particular species and to prepare effective conservation management plans both regionally and more globally. The aim of the survey was to provide information on the distribution and diversity of the freshwater fishes of Devolli-Osumi-Semani basin, based on data obtained during detailed field work undertaken in the period of 2010-2012 where species and individuals per species were considered. A total of 19 fish species were recorded during electrofishing. One species (*Pseudorasbora parva*, "false harlequin" or pseudorasbora) is an introduced species to this region. Two species were recorded at most of sampling localities. These were barbel (*Barbus* sp.) and spirlin (*Alburnoides bipunctatus*). The barbel was also dominant or sub-dominant in terms of numbers on all localities. The Pindus stone loach (*Oxynoemacheilus pindus*) and chub (*Squalius cephalus*) were found to be common. The locality where these species were missing is a steep tributary with a substratum of boulders, which probably is an unsuitable habitat for many species.

DEMOGRAPHIC CHARACTERISTICS OF THE MEDITERRANEAN GORGONIAN *EUNICELLA* SPP. IN THE AEGEAN SEA

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Mediterranean coralligenous outcrops constitute important marine habitats of high ecological value, given their structural complexity and species diversity. *Eunicella* spp. is one of the most common gorgonian species dwelling the coralligenous communities of the Aegean Sea. As marine habitats suffer increasing anthropogenic pressures, scientific concern regarding the distribution and conservation status of coralligenous habitats necessitates the collection of baseline information that will enable monitoring of change over time. Demographic studies of characteristic species are paramount for the evaluation of ecological conditions, but are however scarce in the E. Mediterranean. In this context, six populations of *Eunicella* spp. were investigated at three geographic locations of the Aegean Sea, with the aim to quantify their demographic parameters, i.e. depth distribution, size structure, density, and extend of injuries. Gorgonian populations were found at depths ranging from 10 to +45m, density varied between 3-39 colonies/m^2, and maximum height was 54cm (±11.15). There was a significant negative correlation between height and density, which persists when examined in relation to depth and substrate inclination ($p<0.001$). Overall, injuries were observed on 27.1% of the colonies. From those, 2.2% of the colonies suffered severe injuries. Given the paucity of data concerning the present status of gorgonian populations of the Aegean Sea, it is suggested that a precautionary approach should be adopted at least regarding the shallow water populations. This work provides original information, in response to the need of enhancing our understanding regarding the ecological state of coralligenous communities at a regional scale.

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PHYLOGENETIC RELATIONSHIPS AND PHYLOGEOGRAPHY OF *ABLEPHARUS KITAIBELII* (SAURIA: SCINCIDAE) SPECIES COMPLEX IN EASTERN MEDITERRANEAN

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Sequence data derived from two mitochondrial markers, 16 S rRNA and cyt b, were used to infer the phylogenetic relationships within the snake-eyed skinks of the *Ablepharus kitaibelii* species complex (*A. kitaibelii, A. budaki, A. chernovi, A. rueppellii*) from eastern Mediterranean. The trees produced by Maximum Likelihood (ML) and Bayesian Inference (BI) support the monophyly of *A. kitaibelii* and *A. chernovi* while the case of *A. budaki* turned out to be more complicated. Even though the topology confirms the recently raised species status within the complex, the polyphyly of *A. budaki* suggests the necessity for taxonomic revision. The addition of five samples of *A. pannonicus* from Iran produced a topology that indicates the integration of this species in the same complex. Estimation of divergence times showed that several dispersal and vicarianistic events and perhaps climatic changes in the late Neogene and Quaternary have played a key role on the evolutionary and biogeographical history of the *A. kitaibelii* species complex.

THE ROLE OF BIRDS AS INDICATORS OF SUSTAINABLE MANAGEMENT IN OLIVE ORCHARDS OF CENTRAL GREECE

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Birds are considered good indicators of wider ecosystem health and therefore have the potential to serve as indicators of good farming practices. This study aimed at determining the differences in breeding bird species richness, density and alpha diversity indices (Shannon-Wiener, Fisher's alpha and evenness index) among olive orchards managed with different methods (organic, conventional and abandoned) and maquis. Also, it was examined which of the following variables: Heteroptera, Hymenoptera, Hemiptera, Coleoptera and Isopoda densities, woody plant density and cover, altitude, slope and manure, pesticide, inorganic fertilizer N and K application, would be best correlated with breeding bird species richness in the above farming systems. The bird, arthropod and woody plant surveys were carried out using the point count, pitfall trap and sampling plot methods respectively. The data revealed significantly higher values of breeding bird species richness ($F=9.96$, $P<0.001$), density ($F=8.81$, $P<0.001$), diversity and evenness ($P<0.05$) in the organic and abandoned olive groves and maquis than in the conventional ones. According to Principal Component Analysis, breeding bird species richness was positively correlated with manure application in the organic olive groves and Heteroptera, Hymenoptera, Hemiptera, Coleoptera and Isopoda densities, and woody plant density and cover in the organic olive groves and maquis, whereas it was negatively correlated with the pesticide and inorganic fertilizer application in the conventional ones. These results suggest a difference in bird communities as a result of different management schemes, and thus birds might serve as indicators of overall olive orchard health.

THE DEVELOPMENT OF A DIGITAL IDENTIFICATION KEY FOR THE ANTS (HYMENOPTERA: FORMICIDAE) OF GREECE WITH AN ANNOTATED ELECTRONIC CATALOGUE OF RELEVANT MATERIAL

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The development of this digital tool is a project that seeks to provide a user-friendly interactive identification guide to ants in Greece and their taxonomy, as part of a larger set of worldwide ant identification guides. This guide includes a taxonomic database of ants in Greece, an easy to use identification key and pictorial ant information. Linnaeus II, distributed by ETI, is a multifunctional software package for biodiversity researchers, that was developed for this purpose. Identification keys developed by several taxonomists such as Agosti, Collingwood and Kutter, along with the annotated catalogue of Greek ants (Legakis, 2011), were used to create a complete identification key. In addition, typical accompanying figures of ant subfamilies, genera and species included in these keys were added to the database files assisting the process of ant identification. Additional information and photos of ants stored in the global website AntWeb were used in order to create a functional research tool. As a result, the project contains text and multimedia information (descriptions, synonyms, common names, taxonomic information, literature references schematics and photographs) on the ants of Greece. Furthermore, it will be used as an online tool with the creation of a website. The objective of this project is to contribute to the biogeography of Greece and to be used as a useful tool for systematists and biodiversity researchers working in Greece and adjacent areas.

THE EVOLUTION OF DEXTRALITY WITHIN A SINISTRAL LAND-SNAIL GENUS

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Almost all *Albinaria* species coil sinistrally. The only dextral forms can be found restricted in southern Peloponnisos (Lakonia and Messinia), and according to their morphology they form a single species (*Albinaria voithii*). However, since phylogenetic studies are lacking it is not clear if all dextral forms constitute a monophyletic group and if dextrality has evolved once or it is the result of parallel evolution. Moreover, often dextral populations occur sympatrically with sinistral ones and it is interesting to examine whether dextrality has evolved as a means to reduce gene flow and the production of unfitted hybrids. We used 65 specimens from 14 localities in Peloponnisos. In 3 sites there were sympatric dextral and sinistral *Albinaria* populations, in 6 were sinistral and in 5 only dextral were found. Initially two mitochondrial markers (COI & 16S) were used and all phylogenetic analyses (Maximum Parsimony, Maximum Likelihood, Bayesian Inference) produced the same tree topology with 3 dextral and 3 sinistral clades with unresolved relationships among them. In order to define the relationship between those clades we additionally used a nuclear marker (ITS1). The analyses of the combined dataset produced a tree with 3 clades. The first clade consisted of dextral and sinistral populations, while the second and the third clade consisted of sinistral and dextral populations respectively. These results support that dextrality has evolved independently at least twice and that the evolution of dextrality is an old event since currently sympatric dextral and sinistral populations are not found to be close relatives.

THE REPRODUCTIVE CYCLE OF THE SEA URCHIN *PARACENTROTUS LIVIDUS* IN THE CENTRAL AEGEAN REGION

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Aspects of the reproductive biology in the common Atlanto-Mediterranean echinoid *Paracentrotus lividus* (Lamarck, 1816) where investigated in the Pagasitikos gulf. In order to monitor the reproduction of the local population, a two-year survey (November 2008 – November 2010) was conducted in two locations on the coastline of Pagasitikos gulf. 40 individuals were randomly collected on a monthly basis from each site by SCUBA diving. The Gonadosomatic Index (GSI) was compared with the Maturity Index (MI), water temperature and size classes of the population, whereas the Hematoxylin – Eosin regressive stain was used to identify the sex and maturity stage. The GSI and MI seem to have a negative correlation with water temperature, with a clear decline of both indices during the warmest months of the year. The highest values of the GSI were found at the size class 60-65 mm. The reproductive cycle was estimated according to the maturity of the females with a total of five development stages described. It appears that the species' reproductive cycle follows an annual pattern, with a single spawning event occurring in late spring or early summer (April – June).

COMPARATIVE STUDY OF ANT ASSEMBLAGES IN DIFFERENTIATED HABITATS RESULTING FROM MEDITERRANEAN FOREST FIRES ON MT. PARNITHA

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Although during the recent decades fires in the southern Mediterranean region are usually thought to be man-induced, for eons they were part of the natural processes taking place in typical forest and shrub ecosystems. The indigenous flora and fauna have developed ways of coping with this type of catastrophe and in many cases there have been documented process of obligatory evolution as part of their natural biological cycles. Ants have been known to overcome wild fires as they are typical hypogaeic animals, although the composition of their assemblages may change according to the effects the fire has on the available hypergaeic resources. In this experiment we tried to identify these changes in three different types of ecosystems by the use of pitfall trapping (monthly changes). They were located at Mt. Parnitha, a great part of which was burned in 2007. The ecosystems were: (1) unburned *Abies* forest, (2) burned *Abies* forest and (3) an unburned patch surrounded by burned forest. We pursued taxonomic identification to the species level. The specimens collected belong to 2 subfamilies and in overall 13 genera and approximately 40 species. We concluded that the patch assemblage combined elements from the burned and the unburned forest. The genus *Formica* dominated in the patch (34.06%) as well as in the unburned forest (54.17%), while the genus *Crematogaster* was abundant in the patch (20.56%) and in the burned forest (23.38%). The genus *Cataglyphis* presented the higher proportion with 28.47% in the burned area. The only genus abundant in all three ecosystems was *Tetramorium* (10.59% in the patch, 16.16% in the unburned and 28.19% in the burned forest). In all three areas, several other genera appear having minor populations and being represented by different species in each ecosystem, as well as rare genera with only 1 or 2 representatives. Our conclusions coincide with the concept that the genus *Formica* dominates undisturbed ecosystems, while the genus *Cataglyphis* proved that it is the most successful genus for colonizing open areas.

COMMON AGRICULTURAL LANDSCAPES IN CENTRAL GREECE - BESIDES NATURA 2000 AREAS – MUST BE CORE ELEMENTS OF THE EUROPEAN GREEN INFRASTRUCTURE

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The Natura 2000 network of protected natural sites is a unique tool developed by the EU, which now already sums up to almost one fifth of the EU surface area. Yet, the EU recognized that these areas alone will be inadequate to halt biodiversity loss. To counter this process the 'Green Infrastructure' policy has been called into life by the European Commission, a concept that emphasizes the importance of spatially connected healthy ecosystems serving the interests of both people and nature. Hence, for the Green Infrastructure, the EC opts for the reconnection of fragmented core natural areas and for maintaining healthy ecosystems in a broader landscape. We focused on a Mediterranean landscape in an agricultural area in central Greece, near the city of Elassona. This heterogeneous landscape does not enjoy any status of protection, yet offers a wide range of habitats to a diverse fauna. By repeated and systematic field observations we established that this area harbours (within a sampling area of 25 km²) a valuable herpetofauna, and a rich avifauna. Several groups showed to be linked to some degree to specific landscape elements. Through retrospective remote sensing we observed that many landscape features are being lost over a decadal scale, threatening the landscape integrity to serve as a Green Infrastructure connector. Since agricultural practices have reduced faunal populations thus far, we especially need to prevent long-term habitat losses in these high value agricultural areas while incorporating the short- and long-term needs of local people.

GENERAL MORPHOLOGY AND SPATIAL DISTRIBUTION OF BURROW ENTRANCES OF THE MICROTINE RODENT *MICROTUS GUENTHERI* (DANFORD & ALSTON, 1880) IN THE NATIONAL PARK OF DADIA - LEFKIMI - SOUFLI FOREST

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The present research investigated the spatial distribution and morphology of burrow entrances of the microtine rodent *Microtus guentheri* (Danford & Alston, 1880) in Greece. Five study areas (Livadi, Pessani 1, 2, 3, 4) in the National Park of Dadia - Lefkimi - Soufli Forest in Evros, Greece, were examined between 2004-2006. Depth until first angle, entrance diameter, inclination, and orientation of a total of 1621 burrow entrances was measured and their location in the study areas was determined. Regarding burrow metrics, no significant differences across sites were detected. Three of the study areas showed no correlation between the recorded parameters. However, significant correlations between inclination and depth and orientation were detected in Livadi, whereas in Pessani 1, depth correlated significantly with inclination and diameter. Mean burrow entrance diameter was 5.4 ± 1.0 cm, mean burrow depth 17.3 ± 7.9 cm, and mean burrow inclination 47.1 ± 17.9º. Mean entrance orientation was 163.3 ± 95.7º, facing mainly south-southeast. Finally, mean density was 0.82 burrows/m^2, and our dispersion analysis (Ripley's K-function) in each area showed that burrow entrances were mainly aggregated up to a distance of 4-7 m, beyond which they were randomly distributed. Burrow metrics and distributional patterns were similar to those recorded for other microtine species across Europe, and accorded with environmental factors, as in most semi-fossorial mammals in similar habitats. These results showed that analogous investigations may provide cost-effective and non-invasive ecological and population assessment for semi-fossorial rodent species.

FIRST RECORDS OF THE AMPHIBIAN AND REPTILIAN FAUNA IN THE PROTECTED AREA OF MOUNT PARNONAS AND MOUSTOS WETLAND

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The Project "Protection and conservation of the biodiversity of Mount Parnonas-Moustos Wetland" is part of the framework of the Axis 9, "Natural Environment Protection and Biodiversity" of the Operational Program "Environment and Sustainable Development 2007-2013". The Project implemented by the Management Body of Mount Parnonas-Moustos Wetland presupposes the execution of biomonitoring programs for faunal taxa. Main targets of these programs are the taxa listed in Directives 1992/43/EC (Annexes II, and IV) and 2009/147/EC (Annex I), but also on other important taxa, such as endemics or locally threatened species. The zoogeography of amphibian and reptilian species of the protected area is inadequately known since few studies provide such data. The personnel of the Management Body fulfilling the obligations of the Project, gathered data for various animal groups, including amphibian and reptilian records. Data will be utilized for concluding the faunistic evaluation of a study area and setting the baseline values for comparative evaluation of the habitats' conservation status and species' population trends in the future. Data gathered from April 2011 to May 2012 are presented here. The area of Mt. Parnonas and the adjacent areas include habitats such as forests, grasslands, wetlands, hills with maquis and shrub vegetation, agroecosystems with cultivated fields, and rural areas. Twenty nine different taxa have been recorded in these habitats so far: four amphibian and twenty five reptilian ones. The amphibians include one toad and three frogs, while the reptiles include three turtles and tortoises, twelve lizards and ten snakes. Data regarding the relative abundance were also estimated.

STUDY OF FAUNA COLLECTED FROM PITFALL TRAPS ON AN ORCHARD AND AN OLIVE GROVE IN HERAKLION, CRETE, GREECE

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Fauna collected from pitfall traps in two different locations was studied. The first one is an olive grove and the second one is an orchard adjacent to the grove. Both of them are located in the village Venerato, Crete. The aim of the study was to compare the fauna found in each site. Six pitfall traps containing ethylene glycol were placed on each location. The traps were active from April 13th until July 7th 2010 and insects were collected from them weekly. Statistical analysis of the results was carried out with pair t- test. A total of 7,524 animals were collected, 79% (5,974) of them were found in the olive grove and 21% (1,550) in the orchard. The majority of the collected animals were Coleoptera followed by Hymenoptera, Diptera, Acarina, Collembola and Opiliones. Insects from the family Formicidae were studied separately. The rest of the taxa found were grouped in the research as "Others". Shannon Index was 1.40 for the olive grove and 1.82 for the orchard. Although the majority of the animals collected were found in the olive grove, the orchard had a higher Shannon index. This was due to the dominance of one taxon, Coleoptera. The numbers of Acarina and Collembolla were higher in springtime than summertime, something expected due to low humidity levels during summer period. The fact that the olive tree is evergreen and the trees in the orchard (apple trees, pear trees and plumb trees) are not, did not seem to affect the results as expected.

NON INVASIVE GENETIC STUDY AND POPULATION MONITORING OF BROWN BEAR (*URSUS ARCTOS* L.) IN THE KASTORIA REGION, GREECE

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Population size and genetic diversity estimates are crucial for the conservation and the proper management of endangered species. Non invasive genetic sampling is used as a reliable alternative sampling method not only for the genetic study of rare or elusive animal species but for the estimation of their abundance as well.

The brown bear (*Ursus arctos*) population size in Greece appears to be generally stabilized, with positive trends at a local scale. Nevertheless, the species is still considered endangered and little is known about the genetic status and the exact size of local populations. The basic objectives of this study, which is part of an ongoing LIFE project (LIFE09 NAT/GR/000333), was to investigate the genetic diversity and genetic structure of the bear population in Kastoria region (NW Macedonia, Greece) and estimate its population size.

Samples were collected during field surveys in the study area from April to November 2011. The majority of samples were hairs (174 samples) that were collected with barbed wire attached to power poles. A permanent sampling network of 110 such hair traps was established in the study area and was revisited monthly from July to November. In addition, 46 scat samples were randomly collected and 15 tissue/blood samples from trapped/radio-tagged bears or bears victims of traffic accidents were also included in the present analysis. DNA from 76% of hair samples, 48% of scat samples and 80% of tissue/blood samples was successfully extracted. DNA samples were amplified for ten microsatellite loci. A complete genotype for 118 of these samples was obtained and the analysis indicated 63% of unique

genotypes. Further analyses will yield information on gene flow versus the K45 highway artificial barrier and overall population genetic variability.

MARINE ENVIRONMENTAL IMPACT OF LANDFILL LEACHATE: INVESTIGATION OF PREPATHOLOGICAL ALTERATIONS IN TISSUES OF BIOINDICATOR ORGANISM *MYTILUS GALLOPROVINCIALIS*

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Marine mussels, such as *Mytilus galloprovincialis*, possess a fundamental role in marine ecosystems and are commonly used as bioindicator organisms. Investigation of their physiological alterations, commonly caused by human- or natural-made contaminants, are of great importance, thus indicating alterations of natural populations as a result of deterioration of water bodies, pollution and environmental degradation. In this light, since landfill leachate is regarded as a major environmental problem, the aim of the present study was to investigate the impact of leachate as a pollutant of the marine environment, via the detection of alterations in tissues of the mussel *M. galloprovincialis*. The mortality test (96h), first performed for estimating the range of leachate concentration where no mortality occurs, showed that concentrations ranged from 0.01 to 0.1% v/v. It revealed no significant increase of mussel mortality and thus was used for the determination of pre-pathological alterations in tissues of mussels. According to the results, mussels exposed for 4 days to either 0.1 or 0.01% v/v of leachate showed significantly decreased levels of neutral red retention assay (NRR) time values in haemocytes, inhibition of acetylcholinesterase (AChE) activity in gills and digestive gland, as well as a significant increase of micronuclei frequency (MN) and DNA damage in haemolymph aemocytes and gills, compared with values measured in tissues of control mussels. The results of the present study showed that landfill leachate could induce deterioration of water bodies, pollution and environmental degradation, thus leading to pre-pathological alterations in marine organisms, before severe disturbances, such as disease, mortality, or population changes occur.

BLOOD PARASITES AND MIGRATION. STUDY OF BLOOD PARASITES IN FOUR BIRD SPECIES DURING THEIR SPRING MIGRATION IN ANTIKYTHERIAN BIRD OBSERVATORY

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Migratory birds are important reservoirs of blood parasites which transfer and distribute pathogen microorganisms in great distances around the world. The aim of this study was to enrich our knowledge about the blood parasites carried by birds migrating over Greece and to create bird – parasite catalogues. Additionally, we studied if there is any difference among the parasite diversity that every species of bird carries, as well as the prevalence, intensity and level of infection. Four bird species were chosen during their spring migration (*Acrocephalus schoenobaenus*, *Anthus trivialis*, *Oriolus oriolus*, *Sylvia borin*) and the collection of blood took place on the island of Antikythera. A drop of blood of each bird (100 individuals per species) was collected on microscopic slides. All slides were examined under the microscope in the laboratory. Parasites were observed in all four bird species. In descending order of abundance the genera that were found are *Haemoproteus*, *Plasmodium*, *Leucocytozoon*, *Trypanosoma*, *Hepatozoon* as well as very few nematodes. *A. schoenobaenus* had the highest intensity and level of infection. Regarding prevalence of infection, *A. schoenobaenus* and *O. oriolus* indicated the highest values of the four species. Examining each bird species separately, regarding arrival periods, no difference was observed in intensity or prevalence of infection. Neither inter nor intraspecific results indicate that parasites affect the time of arrival of the species studied. Preliminary comparisons with similar studies suggest that infected birds do not follow exactly the same migratory pattern as non infected ones.

DIVERSITY OF THE MACRO-PEDOFAUNA ON MEGANISI AND ITS SATELLITE ISLETS (CENTRAL IONIAN SEA, GREECE)

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The fauna of the Greek islands has always attracted ecologists' interest, mainly due to their particular geological history and topography. However, still little is known about the Ionian Islands' fauna contrary to that of the Aegean archipelago. Since the Ionian Islands have been isolated from the mainland rather recently (Late Pleistocene), no surprising differences from the mainland are expected in terms of species composition; however, the identification of special diversity patterns is of particular interest. The present study is a preliminary contribution to the qualitative composition of the macro-pedofauna of Meganisi Island and the satellite islets Kythros and Thilia, located in the Internal Ionian Archipelago, which is a Natura 2000 site (GR 2220003). We estimated and compared species diversity among different habitats between and within islands, and among different seasons during the year. We used pitfall traps to collect animal samples during autumn 2010 and spring and summer 2011. Statistical analysis of the faunal data didn't support a general pattern of species abundance and diversity among the different habitats, but on the other hand, revealed a clear seasonal pattern with a significant increase of abundance and richness during summer. The results probably reflect the relatively recent isolation of the islands and the short distances between them, as well as idiosyncratic responses of species in habitat variation.

AEGEAN MONKEYS: FROM A COMPREHENSIVE REVIEW TO A RE-INTERPRETATION

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This work presents an up-to-date evaluation of the representation of primates in Bronze Age Aegean civilizations. For these reasons, the relevant literature and their archaeological contexts were assessed. All available frescoes, pendants, rings, seals and figurines were fully re-examined in the literature and in situ in Crete and Thera. The current evidence certainly represents the first reported interface of a European civilization with nonhuman primates, belonging to at least two primate genera. Baboons (*Papio* spp.), identified by the reduced waist, short inguinal hair, upper position of the tail base, prognated face, limb configuration, and terrestriality, seem to be related with sacred contexts of flower gathering and/or offering in both Crete (Knossos) and Thera (Xeste 3). On the other hand, vervet monkeys (*Chlorocebus* spp.), identified by the short greyish muzzle, rounded cheeks and face, brownish band on forehead and variable non-terrestrial positional repertoire, appeared to be associated with a landscape context, in Thera (Complex Beta). This material provides evidence for extended contact and profound knowledge of these animals among Bronze Age Aegean civilizations. However, further field and laboratory investigations (e.g. zooarchaeological remains, material culture) are required in order to understand the scale of interactions between the Aegean civilizations and African primates.

CAN BLACK VULTURE FLIGHT CORRIDORS STAY FREE FROM PROPOSED WIND TURBINES?

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Large-scale plans for wind farm development (960MW) in Thrace (NE-Greece) threaten the last black vulture population of the Balkans. We obtained location data from six GPS-tagged vultures collected each 10, 45 or 60 minutes over 6-12 months, and used Brownian bridge movement model to estimate probability densities for the vultures' daily foraging flight corridors (n=232). We represented the daily flight corridors of each vulture as utilization distributions, and characterized the population-level corridor as the pooled probability density of all six vultures. We categorized this distribution into 25% quartiles and further split the lowest quartile into low-use (10%-25%) and very low-use (<10%). This analysis revealed that population-level corridors were characterized by several core areas that were connected by corridors through which vultures moved quickly. To gain further insight, we evaluated additionally an occurrence gradient applying as criterion the number of different individuals (out of the six tagged vultures) that used the area. In conclusion, we strongly suggest that only the very low-use area (0-10%) should be used for wind farm development and believe that the 960MW can be achieved by locating the turbines only in these areas where 474 turbines (exceeding 500MW) are pending in any case.

FISH AGGREGATION DEVICES (FADS) ASSOCIATED FAUNA IN EASTERN MEDITERRANEAN WATERS

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Man-made, anchored floating objects, known as fish aggregating devices (FADs) may provide research workers with a tool for collecting larval and juvenile fishes that are difficult to collect using conventional methods, providing also measures of recruitment to pelagic fisheries. Several mechanisms have been suggested to explain the association of fishes with floating objects. Four of the more accepted ones are: shelter from predators, food supply, schooling companions and substrate for species undergoing a change from a pelagic to other modes of existence. In Greek waters, ichthyoplankton surveys were carried out in summertime in order to study larval fish aggregations around FADs. Moreover, on a monthly basis experimental fishing took place by encircling the FAD area with a surrounding net, in order to collect fishes that might remain under the unit. In most cases a visual census of all the fishes within the range of visibility from the FADs, ranging between 15 and 30m, was undertaken by divers. The most abundant species in ichthyoplankton samples were *Nauctates ductor*, and *Chromis chromis*. As for FAD aggregations, although pelagic fishes, mainly Carangidae species (*Trachurus* sp., *Caranx crysos*) dominated, total fish abundance, number of species and length range of the species were significantly related to season (recruitment period), resulting in a sequential colonization of the FADs along the study period. This study aims to shed further light on fish aggregations associated with floating objects in order to evaluate the potential of this fishing technique to enhance catches of small scale fisheries.

PRELIMINARY RESULTS ON SEXUAL DIMORPHISM IN THE MEDITERRANEAN CHAMELEON (*CHAMAELEO CHAMAELEON*) (LAURENTI, 1768) ON SAMOS ISLAND, EAST AEGEAN

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Chamaeleo chamaeleon is a chameleon distributed in Africa and Europe. Samos in the eastern Aegean Sea is one of the last island refuges of the species in the Mediterranean. Morphometric reports in African populations have proved sexual dimorphism; males have larger tails than females. This study reports measurements from 194 individuals with average sizes (cm± SD): Snout-Vent Length (SVL)=9.1±3.7; Body Width (BW)=3.4±1.5; Head Height (HH)=2.8±1.2; Head Length (HL)=3.1±1.2; Crest Width (CW)=1.2±0.4; Crest Height (CH)=1.5±0.7; Mouth Length (ML)=2.1±0.8; Eye Length (EL)=0.8±0.3; Frontal Leg Length (FLL)=3.5±1.5; Hind Leg Length (HLL)=3.6±1.5; Frontal Foot Length (FFL)=1.7±0.7; Hind Foot Length (HFL)=1.7±0.7. The population did not show any gender bias (Mean Adult-Sex Ratio [ASR] = 49% males). Within both genders all morphometrics have a positive correlation with seasons, growing as temperature increases. We suggest there is sexual dimorphism within this population, as females have larger HL ($p=0.019$), CW ($p=0.046$), EL ($p=0.037$) and FFL ($p=0.031$) than males. In a Pearson's correlation matrix, all character sizes were directly linked to SVL except HFL and BW in both, males and females. Correlation between male's CH and all the other characters proved to be statistically significant; this is not true for females (SVL, ML, EL, HLL, FLL and HFL did not correlate). These preliminary results suggest that in Samos' *C. chamaeleon* population males have a smaller head which is directly related to other morphological characters. In contrast, females head is larger and not statistically related to most of the measured characters; therefore, there is potential sexual dimorphism within this subpopulation.

HOME RANGE SIZE AND FORAGING HABITAT USE BY BREEDING LESSER KESTRELS (*FALCO NAUMANNI*) IN AGROECOSYSTEMS OF CENTRAL GREECE

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Understanding the foraging habitat selection and the size of home range of a raptor could improve our knowledge for the conservation of a species particularly in relation to food supply. The Lesser Kestrel (*Falco naumanni*) is listed as a globally threatened species which suffered large population declines during the last decades. We studied the size of home range and the habitat use of 10 (5 adult males and 5 females) radio-tracked Lesser Kestrels in agroecosystems of Thessaly, central Greece, during the breeding season of 2009. In addition, we sampled four foraging habitat types (cotton fields, cereals, grasslands, and edges) to investigate the spatial and temporal variation of grasshopper densities (being a main prey) in fields within the Lesser Kestrel's home range. Mean 95% of Minimum Convex Polygon (MCP) home range estimates were 70.11 km^2 (S.E. = 0.20) and 49.21 km^2 (S.E. = 0.15) for males and females, respectively. The home-range size increased during the progress of the breeding season, but there were no significant differences among successive observations. Within the home range cotton fields and cereals were used by Lesser Kestrels intensively, while grasslands scarcely, as indicated by compositional analysis. Food availability was varied significantly both among different habitat types, and among periods during the breeding season ($p < 0.05$). Nevertheless grasshopper densities in the habitat types sampled did not conform to their pattern of use by the Kestrels suggesting other factors affecting their distribution in their home range.

COMBINED NETWORK OF BIODIVERSITY AND ACOUSTIC VALUE IN GREECE

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Biodiversity loss imposes the inclusion of ecosystem services in conservation planning to highlight the benefits of sustainable management, augment revenues and emerge the internationality of conservation. Our goal was to present a multi-functioning tool providing an added value, the Quietness, in the ecosystem services supplied by the NATURA 2000 protected areas. We identified Quiet Areas (QAs) that overlay in NATURA 2000 sites. We then focused on priority habitat types and selected mammals that are included in the QA network to investigate if high biodiversity areas coincide with QAs and if quietness could be considered as an indicator of species distribution, respectively. We also examined the potential relationship between human activities recorded within the protected sites and the percentage of each Natura site that could be considered as quiet. The last approach entailed the spatial distribution of the combined network. 71.76% of NATURA 2000 network overlaps with QAs. Forest and semi-natural areas prevail in the combined network. 46.20% of the existing priority habitat types form the combined network as well. Our results demonstrated significant differences between mammal distributions in NATURA 2000 network and the QAs. We also found that sites covering more than 30% of QAs support a significantly lower number of activities. In the combined network, the higher values of clustering are found in high biodiversity areas. The proposed combined network could preserve natural soundscapes and protect people from harmful noise effects, promise added revenues by the means of ecosystem services and fulfill Greece's obligations to the Noise Directive (2002/49/EC).

MONITORING FREQUENCY & BREEDING SUCCESS OF THE GRIFFON VULTURE (*GYPS FULVUS*) COLONIES IN CRETE

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Estimating the breeding population and the reproductive outcome of Griffon vultures (*Gyps fulvus*) depends greatly on the monitoring frequency of their colonies. We conducted nine complete annual surveys of griffon colonies in the island of Crete from December to May during the years 1998-2000. Then, we examined which combination out of four visits prior to fledging produces the maximum number of egg-laying pairs and assesses their breeding success with accuracy. Last, by considering the best survey dates we estimated the number of egg-laying pairs during ten years of monitoring (1996-2005). Overall early visits (mid December-January) are more precise as regards to the size of the breeding population but overestimate breeding success since they are based on the attempts of experienced breeders. On the contrary, late visits (mid or late March) generate poor results due to the high rate of nest failures that occur early in the breeding season and go by undetected. The most accurate and cost-effective breeding success rates are produced by two (1-15, 16-28 February) and three visits (15-31 January, 1-15 February, 1-15 March) respectively. However in both cases the number of egg-laying pairs are underestimated by 30-40% revealing that only a complete survey of four visits (mid January-mid March) can significantly assess the size of the breeding population (ca. 89%).

TRACE METALS ACCUMULATION IN ATLANTIC SALMON SMOLTS (*SALMO SALAR* L.) ORGANS FROM RIVER STORELVA CATCHMENT AREA, NORWAY

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We investigated the levels of trace metals (As, Cd, Co, Cr, Cu, Mn, Ni, Pb and Zn) in organs (gills, liver and kidney) of Atlantic salmon smolts (*Salmo salar* L.) from the River Storelva catchment area in Norway. The estimated age of the fish was two years. Furthermore, the smolts were divided in two groups according to their size. Increased metal mobilization from soils to run-off water could be expected as mining activity has been performed within the catchment of River Storelva. Therefore, the geology area was assumed to be enriched in metals and this load could be significant. Freshwater samples from different localities, where the fish in cages were placed prior to dissection, were collected for trace metals analysis. There were no significant differences between the concentrations of trace metals in the water. The results did not show a significant variation between the concentrations of metals in the analysed organs within the two groups of fish, either. However, the trace metal concentrations were higher in the organs than in the water. In addition, the bioconcentration factor (BCF) was calculated in order to determine the extent to which trace metals concentrated from water into fish. The data illustrated the link between "water quality, bioavailability of metals and uptake in fish".

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ESTIMATING GROUND BEETLE (COLEOPTERA: CARABIDAE) COMMUNITY COMPOSITION IN ABANDONED LAND IN THE AREA OF PINDOS MOUNTAINS: ARE BIOGEOGRAPHICAL OR HUMAN DRIVEN PARAMETERS MORE IMPORTANT?

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In this study we investigate the diversity patterns and community structure of the ground beetles in abandoned agricultural ecosystems of Pindos mountains. We randomly selected 20 sites of 1km^2 that represented four categories of land abandonment in terms of forest encroachment (5 sites per vegetation cover category: 0-25%, 25-50%, 50-75% and 75-100%), while grazing was taken into consideration. Additionally, in order to account for geographical variation, we grouped the study sites according to the mountain they were located (Chasia, Voio, Grammos and Central Pindos). Within each site we placed 15 pitfall traps, at 10–20m intervals, which remained active for 60 days, May to July 2011. A total of 13260 individuals of Coleoptera were captured, out of which 25% were carabids of 74 different species. Four genera out of 26 identified included almost 70% of the individuals captured (*Carabus, Harpalus, Brachinus* and *Pterostichus*). Species richness, as well as ground beetle abundance was significantly affected by the geographical location of the sites, with the area of Chasia being the most differential in terms of species composition. The succession stage was the second most important factor affecting ground beetle community within each defined geographical area. In conclusion, the community of ground beetles is strongly defined by long-term biogeographic processes and secondarily by human land use, such as agricultural use and grazing regimes.

INLAND FISHES IN CYPRUS: SITE-SPECIFIC ASSEMBLAGES AND DISTRIBUTIONS

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Cyprus has a long-term isolation from the Asian mainland and a 10,000 year history of human influence on its biota. Little is known about its freshwater fishes and no wide-ranging inland waters ichthyological survey has ever been executed in Cyprus. The anthropogenic pressures on rivers are especially widespread and intensive since Cyprus has over 108 dams, the highest density in Mediterranean Europe. The widespread impacts of anthropogenic degradation of the surface waters may have influenced fish assemblages in Cyprus' inland waters; initial insights arise through analysis of this survey's data.

Site-specific fish distributional data were gathered using electrofishing, fry-net seining, a literature review and expert interviews. Fifty three aquatic sites in rivers, reservoirs and wetlands were surveyed in 18 river basins of the southern and western part of the island between 2009 and 2011.

This study documents the first baseline freshwater fish distributions and assemblage patterns primarily in the southern and western part of the island. The survey confirms the existence of sixteen fish species, 12 of which are non-indigenous. Non-indigenous species are widespread: 24 surveyed sites sustained non-indigenous fish (45% occurrence in all sites, or 60% at all sites with fish present). Certain habitat types and several sites had no fish present. Reservoir dams were the most species-rich habitats although they hosted almost exclusively non-indigenous species. The survey provides evidence, which supports the hypothesis that the remarkable scarcity of native species in Cyprus' inland waters is probably directly attributed to extensive anthropogenic degradation of the natural riverine and coastal wetland habitats.

IMPORTANT FISH AREAS: DEVELOPING A METHOD FOR A RAPID ICHTHYOLOGICAL CONSERVATION EVALUATION IN INLAND WATERS IN GREECE

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The concept of Important Bird Areas (IBAs) and similar taxa-centered geographic applications to identify and assess outstanding areas for conservation have been successful for policy-relevant conservation planning. However this type of assessment has rarely been applied to inland water fishes. Here we utilize a large dataset of recent fish sampling data to explore threatened and protected species' distribution patterns in order help identify and assess important sites for inland fish conservation.

A total of 802 fish sampling events at 664 sites from inland waters throughout Greece provide an initial database for a conservation evaluation of sites of conservation interest. Species of conservation interest are identified using their status in Greece's 2009 Red Data Book, inclusion in the EU Habitats Directive Annexes and level of known range-restricted attributes. Criteria are developed and applied to attempt a conservation evaluation for each sampled site and its associated designated water body.

We reviewed distribution patterns of 137 fish species sampled throughout Greece. Several sites are identified as exceptionally important for species of conservation concern and these are initially identified in this first-screening conservation evaluation as potential Important Fish Areas (pIFAs). It is shown that many sites and water bodies with fish species of high conservation interest are located outside of protected areas. The gaps in distributional knowledge still hinder a complete state-wide conservation evaluation. Some generic habitat types are grossly under-represented in this survey since most samplings are from lotic waters. The concept of Important Fish Areas should be particularly useful for conservation planning in territories such a Greece, were there are many widely dispersed small bodies of water, with many small river basins and distinctive biogeographic barriers to fish dispersal.

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