

Fauna Pannonica 2007

Symposium on Conservation and Genesis
of the Fauna of the Carpathian Basin

Kecskemét, Hungary • 29 November – 1 December 2007



ABSTRACTS

Hungarian Natural History Museum

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Abstracts

Hungarian Natural History Museum
Budapest, 2007

The FAUNA PANNONICA 2007 symposium is organised by the Department of Zoology, Hungarian Natural History Museum, the Directorate of the Kiskunság National Park and Öko Co. Ltd. It aims to bring together scientists interested in and working on the taxonomy, faunistics and phylogeography of animal taxa in the Carpathian Basin, conservation and ecology of threatened taxa, analysing biodiversity of various habitats and its changes. The conference promotes better contacts among zoologists and ecologists dealing with the above topics in the Carpathian Basin and in Europe and provides a discussion forum, also for future development of these researches.

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QUANTITATIVE ECOLOGICAL STUDIES OF PLANTS,
ARTHROPODS AND BIRDS
IN THREE MAJOR PANNONIAN GRASSLAND TYPES

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Grassland is probably the most important habitat type for nature conservation in the Pannonian biogeographic region. During the millennia of extensive human land use, a unique and highly diverse flora and fauna evolved. In the 20th century, however, the intensification of human land use, e.g. drainage, melioration, and in the last two decades the intensification of management (conversion to arable fields, fertilization) on the one hand, and ceasing of grazing on the other hand resulted in large scale changes of grassland use. To conserve grassland biodiversity, we need to have quantitative knowledge on the ecology of assemblages dependent on grassland areas. In this study we surveyed vascular plants, arthropods (bees, carabids, heteropterans, homopterans, leaf-beetles, orthopterans, spiders, weevils) and birds in solonetz alkali grasslands, meadows and solonchaks alkali grasslands in Hungary. These grasslands are characteristic and widespread in the Pannonian region. A paired field approach was used to compare extensively (0.5 cows/ha) and intensively (>1 cows/ha) grazed pastures in 42 areas, 7 pairs in each grassland type. Grasslands were grazed at high or low stocking densities and no fertilisers or chemicals were applied.

We recorded 348 plant species, 748 territories of 43 bird species, and around 52000 individuals of 800 arthropod species; there were considerably higher numbers than those sampled with the same sampling protocol in farmlands in Germany, the Netherlands, Spain, Switzerland and the U.K. Grazing intensity had no effect on species richness of any of the ten examined taxa, but it affected abundance of different taxa, both positively, negatively or the effects varied between grassland types. Multivariate analysis revealed differences among grazing and grassland types, suggesting that the assemblages had different species composition.

Therefore, both grazing intensity and the three grassland types have high biodiversity, which suggests that the maintenance of both grazing regimes is worthy management objective in Hungarian grasslands. The recently introduced grassland management scheme of the agri-environment programme in Hungary should be accordingly modified. Such schemes should be flexible enough to deal with the sometimes contrasting species or taxon specific effects of prescriptions.

This research was supported by the National R&D Programme (contract no.: 3B023–04).

CURRENT STATE OF MAMMAL FAUNA OF THE TRANSCARPATHIAN REGION (UKRAINE)

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The geographical situation of the Transcarpathian region is the result of a combination of various physical-geographical conditions in the territory: the dry climate of the Pannonian plain caused by the influence of a warm and dry Mediterranean climate, connected with the steep high-altitude change of vegetative zones and natural conditions in hypsometric aspect. It has given rise to a high diversity and abundance of plants and animals, resulting in one of the most species rich regions in the Ukraine.

Currently the Transcarpathian region has 79 species of mammals, about 65% of mammal species in the Ukraine. There are 9 insectivore, 23 bats, 1 hare, 24 rodents, 17 predators and 5 artiodactyls. Included in this list, there are species that have been observed in the region during the last 50 years, among them species not observed here in the last 10–40 years (*Mustela eversmanni*, *Miniopterus schreibersii*, *Eliomys quercinus* etc.).

Special investigations during the 2002–2006 years showed that the mammalian fauna of the region included four new species: *Canis aureus*, *Castor fiber*, *Bison bonasus* and *Alces alces*. Occurrence of *Spermophilus citellus* and *Nyctereutes procyonoides*, which had not recorded during the last 30 years, is confirmed. This is because the condition and size of populations in frontier regions of neighbouring countries (Slovakia, Hungary, Romania), provide a significant opportunity for new records of these species in the Ukraine in the near future.

Attempts were made in the second half of the 20th century to “enrich” the local fauna thorough introduction of mammals such as *Lepus timidus*, *Oryctolagus cuniculus* and *Ovis musimon* but these actions were unsuccessful for various reasons and these species are also not included in the list of current mammaliofauna of the Transcarpathian region.

The Carpathian mountain system acts as a channel of penetration for boreal species from the south and Alpine ones – from east Europe, and also acts as an isolation barrier for the distribution of Pannonian and Balkan faunas. The geographical situation and the fact that several boreal and Mediterranean faunal elements have their distribution limits in the region have resulted in the occurrence of a large number of rare and protected mammals. The protection status comes from a variety of sources: the Red Book of Ukraine, Bern and Bonn Conventions, Habitat Directive etc. These are the important legal framework for the protection of fauna and flora in Europe and internationally. 55 species are included to the Ukrainian Red Data Book (4 amphibians, 2 reptilians, 25 birds, 24 mammals). It is 45.5% of rare animals of Ukraine.

WITHIN HABITAT NICHE SEGREGATION OF TWO SYMPATRIC *MACULINEA* BUTTERFLIES

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An important consequence of habitat fragmentation is the increase of edge habitats. Environmental factors are different in the edges from those in the interiors, which cause change in the distribution of plant and animal species. This phenomenon is known as edge effect.

We aimed to study the effect of distance from edge and edge type effect (road edge vs. tree line edge) on two sympatric large blue species (*Maculinea teleius* and *M. nausithous*). Further we investigated the relationship between butterfly species' density and microenvironmental factors and foodplant density.

Both study species are endangered throughout Europe and show declining population trends in the whole continent. Habitat loss and habitat degradation due to agriculture intensification and abandonment of traditional management threaten the species in Hungary as well. Both species occupy wet meadows and lay their eggs in the flowerheads of their common foodplant, Great Burnet (*Sanguisorba officinalis*). Both species are obligatory myrmecophiles and follow the predator strategy, after developing on the foodplant, caterpillars are adopted by given *Myrmica* host ants and then they live in their nests as social parasites preying on ant broods.

Ten meadows were chosen for sampling with four 50 m long transects in each. One transect pair was situated at the tree line edge and the other transect pair at the road edge. Butterflies were counted daily, microenvironmental factors were measured during each count. Foodplant density was measured once.

Linear mixed models showed that edge type has contrasting effects on the two species – *M. teleius* favoured both interiors and road edges, while *M. nausithous* was more common at the tree line edges. In the case of the latter species a strong positive edge effect was also found. This kind of within habitat niche segregation is probably related to the different microenvironmental conditions at the edges. Foodplant density does not seem to limit the distribution of these species at least in the study sites. Our results suggest that habitat fragmentation has contrasting effect on the two species: interiors of meadows are important for *M. teleius*, while tree line edges are important in maintaining the habitats of the regionally rarer butterfly, *M. nausithous*.

This research was supported by the National R&D Programme (contract no.: 3B023–04).

EGG-LAYING PREFERENCES OF THE SOUTHERN FESTOON (*ZERYNTHIA POLYXENA*)

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Egg-laying is one of the most important process from ecological point of view, which could take place between insects and plants. In the case of butterflies, females could have egg-laying preferences and specificity among plant species, plant individuals of foodplant population and different parts of the foodplant.

In the present study we aimed to study environmental factors structured hierarchically determining the egg density/distribution of Southern Festoon (*Zerynthia polyxena*) in a *Robinia* plantation complex disrupted by hummocks and clearings, which were covered by a large number of its foodplant (*Aristolochia clematidis*).

We chose 4–4 foodplant patches in the three available habitat types, i.e. in robinia plantation, in clearing and in hummock. In each foodplant patch, which was covered by several hundreds or thousands of foodplants, we randomly selected ten points, where we checked all foodplants for eggs in a five-meter radius circle. Around every foodplants with eggs several environmental variables were measured, which could potentially affect the egg distribution. We grouped the environmental variables according spatial scales. The patch level variables were habitat type and foodplant patch size. In the microenvironment of the selected foodplants we counted the number and measured the mean height of foodplants in a 1 m radius. In the case of the selected foodplant we also measured the height and counted the number of leaves. From the deviation of height of selected foodplant and mean height of foodplants we composed a new variable, the conspicuousness. At the foodplant level two variables were used: the number of foodplant leaves and the egg place. The latter is a ratio – the number of leave counted from the bottom, where the eggs are, per the total number of leaves.

We registered 597 eggs of Southern Festoon on 98 foodplants. The patch type significantly affected the distribution of eggs. There were more eggs on foodplants of robinia plantation and hummocks than of clearings. In the microenvironment level foodplant conspicuousness affected the egg distribution, the relatively higher foodplants hosted more eggs. At the foodplant level the number of eggs increased significantly with the number of foodplant leaves. Finally the egg place affected significantly the number of eggs too, there were more eggs on the lower part of the foodplants than upward.

As a conclusion we call the attention to that spatially correlated data in egg-distribution studies should be analysed considering the intrinsic hierarchical structure.

This research was supported by the National R&D Programme (contract no.: 3B023–04).

EXPLORATION OF THE ENDANGERING FACTORS
OF THE NEWLY DISCOVERED
CASPIAN WHIPSNAKE POPULATIONS IN HUNGARY

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The Caspian Whipsnake (*Hierophis caspius* Gmelin, 1789) is a strictly protected snake species in Hungary, reaching the northern- and westernmost distribution limit of its Southeast European range. In the past 5 years, following the recommendations of the species protection action plan and some laic reports in need of confirmation, a detailed survey began on the series of loess walls along the western shore of the River Danube. Several new Whipsnake habitats have been discovered and newly described in 2007. The zoogeographical and nature conservation importance of the newly outlined distribution of the Caspian Whipsnake in Hungary is momentous. We explored the human and natural endangering facts in every recent populations and tried to give a solution to eliminate them for a long time artless subsistence.

This research was supported by the National R&D Programme (contract no.: 3B023-04).

TAXONOMIC AND LIFE HISTORY STUDIES OF SOME ENDANGERED HUNGARIAN LEPIDOPTERA SPECIES

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The Pannonian Region harbours numerous species with great nature conservation value, and a considerable part of them can be considered as “Hungaricum” species. Within the framework of a National Office for Research and Technology project a group of these taxa was selected as target species for more intensive classical and modern taxonomic and life history studies, including the new molecular methods. This presentation provides the results of these investigations on the populations of *Phyllometra culminaria* and *Chersotis fimbriola*.

Phyllometra culminaria is one of the famous Hungarian moths, known from the sensu stricto Europe only from the Carpathian Basin. Despite this fact, its proper distribution, life history and the taxonomic relationship of the fairly isolated European and western Asian populations have remained practically unknown. Our investigations led to the discovery of new Hungarian population fragments, the early stages and the larval foodplant and the surprising homogeneity of the populations from a taxonomic point of view (both in morphology and the molecular constitution).

The distribution of the second species, *Chersotis fimbriola*, is far better known but certain problems concerning with the taxonomic evaluation of the isolated populations, especially the eastern European and western Asian ones, are to be solved. Our molecular taxonomic studies resulted in the supporting arguments for the existence of another species within the *Ch. fimbriola* species complex, but on the other hand, led to further complications in the interpretation of the Transdanubian and north-east Hungarian subspecies.

This research was supported by the National R&D Programme (contract no.: 3B023–04).

BIOGEOGRAPHY, GENETIC VARIABILITY
AND NATURE CONSERVATION SIGNIFICANCE
OF *CARABUS HUNGARICUS* IN THE CARPATHIAN BASIN

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Carabus hungaricus F. is a species listed in the Habitat Directive and it is a characteristic species of the Pannonian biogeographic region, inhabiting sandy and dolomitic grasslands in Hungary. The occurrences of *Carabus hungaricus* are comprehensively listed based on literature data, personal communication and all available museum specimens in Hungary. All the published and unpublished data, and the several new localities found in our investigations, were processed with GIS to clear the current distribution of the beetle. The most numerous populations live in Pannonian sandy steppe biotopes. Genetic variability was investigated for three subspecies of *Carabus hungaricus* (ssp. *hungaricus*; ssp. *viennensis* and ssp. *frivaldszkyanus*) on the sequences of mitochondrial Cytochrome c oxidase gene. Sequences showed very low level of variation within and among populations. No interpretable pattern was found among the (Serbian, Hungarian and Czech) populations, with a single exception. Individuals of *C. hungaricus* ssp. *frivaldszkyanus* (Serbia) form a separate unit differing consequently from the rest of the populations. In Hungary *Carabus hungaricus* is a potentially endangered species according to the IUCN criteria. Known habitat types, habitat preferences, endangering environmental factors are discussed.

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THE POPULATION SIZE AND SEASONAL ACTIVITY
OF *CARABUS HUNGARICUS*

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An extensive mark-recapture study of *C. hungaricus* was performed on a pannonic sand steppe 30 kilometres north of Budapest. Beetles were collected using 270 baited live-catching pitfall traps placed in a 4×4 m grid network. The fieldwork was carried out during the autumn of 2005 from August to November (26 trapping occasion) and from May to December 2006 (48 trapping occasion). In total, 2578 adults were captured and individually marked (1595 in 2005, 983 in 2006); furthermore 160 larvae were also detected in 2006. Recapture rate were about 30% in both years. The average estimated population size was calculated for the period from mid August to the end of October in both years using the Jolly-Seber formula (466.81 (SE=46.04) in 2005 and 573.90 (SE=62.21) in 2006). Surface activity of *Carabus hungaricus* is presented.

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GENETIC DIFFERENTIATION AND PHYLOGEOGRAPHY
OF AN INQUILINE GALLWASP: *SYNERGUS UMBRACULUS*
(HYMENOPTERA: CYNIPIDAE: SYNERGINI)

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The vast majority of gall wasps (Hymenoptera: Cynipidae) induce galls mainly on *Quercus* species (Cynipidae), however, around 10–15% of known species have lost their ability to induce galls (Synergini), and they develop as inquilines inside galls of other cynipids. *Synergus umbraculus* is the representative of the latter group and has been reared from oak galls of more than 30 gall wasp species associated with section *Quercus* oaks.

In contrast to the gall inducers, we know little about inquilines. Our aim was to (i) estimate the genetic diversity within the species; (ii) assess the degree of genetic differentiation between populations, considering the possible effects of their hosts; and (iii) investigate the large-scale phylogeographic pattern in Western Palearctic.

We sequenced parts of three different mitochondrial and nuclear loci of 250 individuals.

Remarkable degree of genetic differentiation was detected. Considering the analogous sequences of other *Synergus* species, *Synergus umbraculus* can not be regarded as one uniform species. At least four cryptic species was found. Within the “typical umbraculus clade”, no pattern has been detected in variability related to hosts, which suggests that *S. umbraculus* does not depend on a particular host association. The phylogeographic pattern seems to be different from that of the gall inducers, but shows similarities to the pattern found in parasitoid wasps.

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A GIS AIDED SPATIAL ANALYSIS
OF THE GEOGRAPHICAL DISTRIBUTION OF WETLANDS
IN THE 18–20TH CENTURIES
IN THE GREAT HUNGARIAN PLAIN

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We carried out a comparative mapping of the wetlands of the 18–20th centuries on four sampling sites. The investigated sites were on the western, southeastern and eastern part of the Great Hungarian Plain. Each of these sites had a different hydrological history, history of land usage and represented different land coverage and hydrological situation at the time.

Two types of material was used in the investigation: archive maps, namely the First Military Map (made in 1782–1785, 1: 28 800 scale), and Third Military Map (made in 1869–1884, 1: 25 000 scale), and aerial photos taken in 2005 and 2006.

The mapping of the wetlands was carried out with manual digitising on the screen based on georeferenced maps, photographs and field experiences. We used ESRI ArcMap 9.2 GIS software for this process.

We found that the surface area of wetlands had been declining up to 10–40%, depending on the hydrological and land usage situation on the different investigated areas. In addition, intensive fragmentation was occurring, especially between the 19–20th centuries.

This significant wetland drainage caused the well-known landscape changes in Hungary during the last two centuries. Biodiversity was negatively influenced by these changes. However, the current wetland ecosystem is still an important refuge of the protected and endemic species of the Pannonian fauna.

The GIS database of current wetlands, small pools and pans was used in the investigation of microcrustacean populations. This GIS database can also be useful for nature conservation and environmental management efforts, because climate change may also trigger more wetland degradation in the Carpathian Basin during the next few decades.

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PROTECTED AND ENDEMIC SPECIES OF HERPETOFAUNA IN MONTENEGRO

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Compared with other biodiversity centers on Balkan Peninsula, Montenegro is the richest region. There are 15 species of amphibian and 39 species of reptiles. In Montenegro 8 species of amphibians and 24 species of reptiles are protected by the law. When we talk about IUCN categories there are 32 VU taxa, 12 EN, 3 CR, 2 EX, 4 DD, 1 CD and 1 LR taxa. Four species of amphibians are endemic species of Balkan, one species of amphibians and four species of reptiles are subendemic species of Balkan, tree species of amphibians and eight species of reptiles are subendemic species of former states of Yugoslavia and tree species of amphibians are endemic species of Yugoslav former states. In this paper the list of amphibians and reptiles protected in Montenegro is presented. There are 7 new protected species in that lists (*Salamanda salamandra*, *Salamandra atra*, *Rana ridibunda*, *Rana graeca*, *Rana sqiperica*, *Caretta caretta* and *Chelonia mydas*).

DISTRIBUTION, HABITAT PREFERENCE AND CONSERVATION
STATUS OF THE LOWLAND *ZOOTOCA VIVIPARA* POPULATIONS
IN NORTH-WESTERN ROMANIA

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In the North-Western part of Romania (the Western Plains) 78 localities were identified with *Zootoca vivipara* populations. The species is present especially in the plain sectors of the Tur, Somes, Crasna, Ier and Barcau Rivers' hydrographic basins, reaching the lower limit of the surrounding hills. In the hilly regions, it ascends only alongside the main water-flows, populating wetlands, areas with a plane relief from the wide meadows. These kinds of situations were encountered at Somes, Crasna and Ier Rivers. In the North-Western part of Romania, the *Zootoca vivipara* populations from the plain are present at altitudes between 89–127 m at the southern limit (Ier and Crasna Valleys), and 198 m in the north near the Oaş Mountains. The distribution of the viviparous lizard in this area is restricted to regions where the temperature's yearly average is lower than 10 °C.

In the northern part of the Western Plains, the *Zootoca vivipara* populations from the plain are separated by no more than 30 km from the ones from the Oaş Mountains. It is likely that not long ago, before the profound human activities in the Oaş Depression, the plain and mountain populations may have come in direct contact. This link is possible due to the fact that the Oaş Mountains are not bordered by hills, the wet, plain habitats coming into contact with those from the mountains.

The *Zootoca vivipara* populations from the Western Plains are located in very humid biotopes. They inhabit both forested and cleared wetlands, occupying marshes or the areas around plashes.

The great majority of biotopes inhabited by the *Zootoca vivipara* plain populations are isolated from one-another, separated by agricultural fields or even localities. Many populations are limited to the small space represented by the ditches from alongside the roads. Their original habitat was destroyed after the dyking and draining works, which strongly affected the area. The populations that do not live in forests are also threatened by regular burning of the vegetation. Little affected by humans and with a numerous effective are the populations from the afforested areas and the ones from the Carei Plains (the Crasna Valley). Here the human activities are rare due to the sandy soil, not favourable for agriculture.

POSSIBILITIES OF PROTECTING HUNGARIAN
LESSER BLIND MOLE-RATS (*SPALAX LEUCODON*)
BASED ON THE LATEST SCIENTIFIC RESULTS

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Known from only five localities and with only approximately 800 individuals estimated the lesser blind mole-rat is on the verge of extinction in Hungary. Its food and microhabitat preferences, details of breeding, daily and yearly activity patterns, social interactions are all basically unknown, thus the information necessary to appropriate conservation measures is very limited.

The chromosomal speciation typical for the species of subfamily Spalacinae resulted also different karyological forms – therefore separate evolutionary units – in the territory of Hungary, which differ from the other populations studied near our borders. The evolutionary background and taxonomic significance of this chromosome polymorphism still need to be investigated but in the light of this finding it is clear that the different and isolated populations should be treated as separate units in the management plans. Further aspects must also be addressed:

- different karyological types may have different ecological requirements therefore they would need distinct conservation biological measures;
- only individuals with the very same karyological features can be resettled a) in case of a critically low population number and/or inextricable in situ protection when the relocation of specimens is taken into consideration b) when a population should be strengthened by individuals from an other population.

Similarly, there was no information available on the acoustic behaviour of *Spalax leucodon*. Mole-rat's seismic communication signals were successfully recorded by geophones in the field and from a specimen kept under laboratory conditions. Activity and resting periods of the specimen in captivity were well manifested in the sonograms. Based on these investigations a system is now under development which without the slightest disturbance

- could be securely applied for detecting animals in their potential locations or where extremely low population densities hinder the detection of the individuals presence;
- makes possible the determination of population size;
- monitoring of populations;
- gathering of behavioural information in the natural habitats of mole rats.

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THE EARTHWORM FAUNA OF THE CARPATHIAN BASIN

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The earthworm fauna of the Carpathian Basin is one of the best known in Europe. This is the only region where continuous earthworm research has been carried out since the end of the 18th century. The first data on the earthworm fauna of this region goes back to Örley (1881, 1885), who made the first overview of the fauna as well. Since then Szüts (1911), Pop (1943), Zicsi (1968, 1991), and Csuzdi and Zicsi (2003) among others published valuable new data on the earthworm fauna of this region. The present list of earthworm species recorded for the Carpathian Basin contains 96 species (including three, recently discovered still undescribed ones). A larger part of these species (40 spp., 41.7%) is endemic to the region. This high level of endemism is extraordinary even among the other slowly dispersing animal groups such as harvestmen (28%) or millipedes (20.8%). The centre of earthworm endemism is the Transylvanian Islands Mountain where an insular-like speciation of the large (60–80 cm long) *Octodrilus* species occurred due to the Tertiary volcanisms. These large species are closely related to that of in the Dinara Mts, which denote a possible common origin.

The Island Mountains have continuously been mainland during the last 60 million years and was repeatedly separated from the Carpathian Arch by the intruding Parathetys arms. These processes resulted in the formation of several Transylvanian-Carpathian species/sub-species pairs such as *Dendrobaena alpina alteclitellata*-*Dendrobaena clujensis*. There are several true Carpathian endemism as well such as *Aporrectodea carpathica* in the North-Eastern Carpathian, *Lumbricus improvisus* in the Eastern Carpathian and *Fitzingeria annectens* in the Southern Carpathian.

Among the endemic earthworm species the Vindobonic endemisms represents a very special group occurring only in the northeastern part of the Carpathian Basin from the Morava Plain through the Vienna Basin to the Vág Valley.

An other peculiarity of the earthworm fauna of the Carpathian Basin is the lack of the endemisms from the Pannonian lowland. This could be connected to the palaeogeography of this region. The transgressions of the Parathetys in the last 15 million years repeatedly flooded the flat regions eradicating the earthworm fauna. After the final regression of the sea (8 Mya) the repopulations of the region has taken place from the nearby mountains. This is the reason why we found so much Dacian species in the eastern part of the Great Hungarian Plain.

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SPRINGTAILS (COLLEMBOLA) OF HUNGARY

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Springtails are a rather underrepresented group in the research of Hexapoda, but there are nevertheless about 7 500 species of them described. The number of all existing Collembola species is estimated to be at least 50 000, and even in Europe there are several species, which are new to the science discovered every year. The knowledge of the springtails' faunistics is still rather poor, which is true if we look at the whole world as well as if we look within the countries. For being able to make a zoogeographical analysis at any higher geographical level distributional patterns need to be studied in detail, for which checklists are a useful tool. In Europe there are several countries, which have an up-to-date checklist on Collembola published in the recent years. In contrast to these, the latest work compiled on the Hungarian springtail fauna was published in 1929. That early work dealt with the whole territory of Historical Hungary, which means that after the changes of the political boundaries only a few of its data refer to the present day country. Thus a comprehensive work on the springtails of Hungary as it is now was never published. In an attempt to remedy this lack of knowledge, we give a complete checklist of the Collembola species recorded from the country up to now.

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BREEDING ECOLOGY OF THE SKYLARK,
A CHARACTERISTIC SPECIES OF PANNONIAN GRASSLANDS

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Farmland birds are seriously declining across West Europe. The intensive agriculture and the human landscape modifications seem to be responsible for these declines. Skylark (*Alauda arvensis*) is one of the most important farmland birds, which is the dominant species of the large open habitats as Hungarian “puszta” grasslands. On these grasslands, the widely used agriculture activity is the traditional grazing. However, grazing might affect the reproduction success through alteration of vegetation structure and landscape.

The aims of our study were to examine the nest site selection and the breeding success of the Skylark. This study was conducted in the Kiskunság, Böszörpuszta in 2004 and 2005.

In the two years we found 50 nests altogether. The clutch size was 4.13 and the reproductive success was 30 percent. These results were similar to West European data. When we examined the nest site selection, we found that the Skylark avoided the most disturbed areas (near farm buildings). The vegetation may also affect the breeding success, because there was a tendency, that survived nests had both higher grass and larger vegetation cover. The difference between mean grass height and vegetation cover of predated versus intact nests was largest within the 25 cm sample circle around the nest, suggesting that nest success mainly depends on local vegetation heterogeneity.

Therefore, the conservation of Skylark in Hungary needs undisturbed extensively grazed grasslands, where vegetation structure is heterogeneous. In spite of the fertilised and intensively managed West European grasslands, the Hungarian “puszta” grasslands may be key areas for the conservation of Skylark, and probably other farmland birds.

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BIRD COMMUNITY STRUCTURE IN SOUTHERN HUNGARIAN GRASSLANDS AND ARABLE FIELDS

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In Hungary, more than 50 percent of the country is plough-land and 12 per cent is grass-land. Many rare bird species breed on these fields (e.g. farmland birds), but our knowledge is very deficient on their ecology. In spite of that the range of plough-lands are much larger than the grasslands, most of the studies originate from grasslands. In this study we try to make up for this deficiency.

Our primary goal was to examine the habitat preference of birds in a typical Hungarian agricultural landscape, South of Lake Balaton. Our examination had two different studies.

First, we made bird census two times in spring in 2006 by point census technique. We censused birds on 105 points in extensive (22 points) and intensive (10) grasslands and extensive (25) and intensive (48) arable fields. We analysed the community structure by Discriminant Function Analyses. Our results show that bird assemblages are different between grasslands and arable fields. The extensive and intensive grasslands also differed, but the extensive and intensive arable fields largely overlapped. It suggests that the management on the arable fields is less affects the birds, than on the grasslands.

Second, altogether 234 nest-boxes were placed out at the edge of the extensive and intensive pastures, meadows and arable fields. Tree Sparrows (*Passer montanus*) and Great Tits (*Parus major*) occupied the nest boxes. The farmland bird species (Tree Sparrow) preferred the extensive pasture to nest in the boxes, while no preference was found for the generalist forest species (Great Tit). Our results showed that the extensive grasslands have great importance for the conservation of farmland birds. On the arable fields, the tree-lines mean the key for the protection of bird, so the maintenance of these trees is very important for birds (e.g. the generalist Great Tit).

The biodiversity in Hungary is unique for Europe, but in the recent changing of agriculture its conservation is very questionable. We suggest that we need more information of the habitat usage of birds for their protection on the Hungarian farmlands.

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ASSOCIATION OF THE SKYLARK, THE TREE SPARROW
AND THE CORN BUNTING WITH FARMLAND HABITATS
AND LANDSCAPES IN HUNGARY

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Many farmland bird populations, including Skylark (*Alauda arvensis*), Tree Sparrow (*Passer montanus*) and Corn Bunting (*Miliaria calandra*) have widespread decline across large areas of Europe. Several studies suggested that the intensive agriculture and the decrease of landscape heterogeneity are responsible for these declines. However, recently agriculture is less intensive in Hungary than in West Europe, due to the collapse of former socialist agriculture in the 1990s. Therefore, we expect some differences of the habitat selection and the population trends of farmland birds. Studies on large scale habitat preferences of farmland birds are missing in Hungary, and in other Central European countries, in spite of the need for such evidences to understand their ecology, and to guide their conservation. In our study, we examined the effect of landscape on the habitat preference of three species of farmland birds in Hungary. In 1998, a common breeding bird monitoring program (MMM) was started in Hungary, of which data were used in this study. Censuses were made in 2.5×2.5 km² quadrates. Data were available for the Skylark in 515, for the Tree Sparrow in 513 and for the Corn Bunting in 436 quadrates. We used the CORINE Land Cover 50,000 maps for the landscape analysis. We examined the effects of landscape composition (percent of land cover types), and landscape heterogeneity (number of patches and total length of edges, and Shannon-diversity of the land cover types) on the abundance of birds in the 2.5×2.5 km² quadrates, and also in larger, 5×5 km² quadrates. The results show that the species respond differently to landscape composition and heterogeneity. The landscape composition affected the Skylark. The density of this species was negatively correlated with the number of patches and the total length of the edges. It confirms that Skylarks prefer large patches of suitable habitats. Beside this, Skylark preferred the “large arable fields”, and the “permanently irrigated arable farmlands”; this latter however, may be an arte fact due to its very small coverage. The density of Corn Bunting positively correlated with the cover of “semi-natural grasslands without tree and scrub patches”. The Tree Sparrow preferred “small scale vineyards”, and the “large arable fields”. In spite of that the habitat preference was different among these three farmland bird species, all of them are declining in West Europe. We suggest that further information on the habitat preferences of these species and comparative analyses with other European regions are needed for their effective protection on farmland in Hungary.

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PHYLOGENETIC AND PHYLOGEOGRAPHIC STUDY
OF THE *LOZEKIA* / *KOVACSIA* SPECIES GROUP
(MOLLUSCA: HYGROMIIDAE)

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The *Lozekia* / *Kovacsia* species group comprises of three endemic species with relatively small ranges in the Carpathic-Pannonian region. In spite of their conservation biological concern, the accurate boundaries of the species' distribution, the biogeographical past and the systematic relations of the species group are quite unclear. The aim of our study was (i) to clear up more precisely the three species' ranges, (ii) to verify our assumption on the Carpathian origin and recent Transylvanian occurrence of *K. kovacsi*, (iii) to study the molecular diversity of the group, and (iv) to infer their biogeographical past and distribution history with special regard to the Hungarian *L. transsylvanica* and *K. kovacsi* populations.

According to our findings, *L. deubeli* and *L. transsylvanica* are distributed allopatrically in the Southern Carpathians. *L. deubeli* has a much larger area than it was thought before (from the Calimani Mountains to the Făgăraș Mts.), while *L. transsylvanica* occurs only west of the Olt River valley. Formerly, Apușeni Mts. and northern Hungary was believed to be inhabited only by *L. transsylvanica*, but we found *K. kovacsi* in both areas too.

Based on mt COI gene, the three species are reciprocally monophyletic, moreover, each of them are split to two deeply diverged clades. This gene, however, was awkward to reveal the deeper phylogeny of the group as well as to approve the monophyly of *Lozekia* genus.

We suppose that the common ancestor of the three species has been evolved in the Southern Carpathians. The three species as well as their divergent intraspecific lineages could be developed by multiple fragmentation events. The present-day distribution patterns were formed by range expansions and retractions, combined with long distance colonizations and extinctions. The presence of the same *K. kovacsi* haplotype in the Apușeni Mts and in Hungary suggests that its range expansion is a recent, most probably a Holocene event. As for *L. transsylvanica*, it seems reasonable, that the eastern part of the Apușeni Mountains was colonized by ancestors from the Southern Carpathians, and one of these Apușeni populations could be the ancestor of the northeastern Hungarian ones. We could not exclude totally that recent northeastern Hungarian populations are Riss-Würm interglacial relicts, however, it appears more likely to the molecular diversity data that following a Würm extinction, this area was recolonized in the Holocene.

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EUTROPHICATION OF FOREST FLOOR AND DECLINES OF THE WOODLAND BROWN BUTTERFLY (*LOPINGA ACHINE*)

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The Woodland Brown, *Lopinga achine*, is a Habitat Directive species, critically endangered in the Czech Republic. It used to be relatively widely distributed in lowland woodlands just 2–3 decades ago, but gradually became restricted to a single Pannonian lowland wood. Surveys its population size and structure showed that the populations still consists of several thousands of individuals. It is restricted to woodland tracks with relatively sparse canopy (mean: 60%), some shrubs in understorey and forb-rich herb layer. Comparing the ground layer composition of forest tracks occupied and unoccupied by the butterfly showed that occupied sites contained a higher proportion of poorly competitive, short herbs and grasses. Ellenberg-Borhidi values of the plants also suggested that occupied patches were drier, warmer, and contained less nitrogen than unoccupied ones. Such conditions evidently favour the species host plants, short sedges such as *Carex fritschii* and *C. michelii*.

The butterfly thus requires a combination of open canopy and nutrient-poor herb layer. However, opening up canopy via litter harvest mobilises nutrients, threatening the ground conditions. This has occurred at several historical sites. To preserve the butterfly, it is necessary to provide periodical exports of nutrients, which can be done only by reestablishment of historical management methods, such as woodland grazing or litter harvest.

MICROSATELLITE ANALYSIS OF HUNGARIAN ROOT VOLE
POPULATIONS (*MICROTUS OECONOMUS MEHELYI*)

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The study was carried out between 2005–2007, hair samples of root voles were collected from different regions (Tóköz, Kis-Balaton, Szigetköz, Kisbajcs, Csallóköz) of Carpathian Basin. Six published primers were used in microsatellite analysis. Based on the genotyping of microsatellite loci the heterozygosity showed extremely high level in the case of samples of Tóköz and Szigetköz (Barbacsí-tó $I = 0.48$ and Lipót I. $I = 0.77$, respectively). Maximum numbers of alleles per locus were also remarkable (25), which refers to a considerable genetic variability within and between populations. After calculating genetic distance matrices a three-dimensional principal coordinate analyses was applied to present the differences among the populations. According to our results the investigated populations are fairly separated. Samples of *M. oeconomus* originated from reedbeds in Csallóköz (a dead-arm of River Danube) show a remarkable distinction from other individuals.

In conclusion, the fragmentation of suitable habitats in the last two century seems to be a sufficient period for segregation of alleles, which is manifested in number and frequency of them.

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DEVELOPMENT AND APPLICATION
OF THE AUTOMATIC RADIOTELEMETRY SYSTEM (ARS)
– AN OVERVIEW OF RADIOTELEMETRY

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The architecture of the receiver system of ARS shows a modular structure containing special antennas, controllers, measuring-receivers, digital signal processors, storage and communication units providing a flexible configuration for different ecological studies. Transmitter's signals are intercepted by a complex antenna system for further so-called vector based measurements. Base-band signal processing can use a new, improved version of Impulse Pack Code (IPC) using correlation estimation, neural network and heuristic evaluation based calibration. In the case of this new IPC method base-band bandwidth is enlarged, compared to traditional radio telemetry, and consequently receiver bandwidth is also higher (about 300 kHz). This phenomenon could ensure simultaneous and parallel treatment at about 30 signals provided by different transmitters in the same frequency range. Thus ARS methodology can monitor several moving individuals at one time with a high scale. There is no need for further tuning of receivers and slipping of frequency used by transmitters or receivers does not generate any errors during the measuring process.

Data obtained as a results of signal processing show information about the potential of antenna-units generated by interactions between an "antenna's arm" and electro-magnetic field arisen from transmitter(s). Based on these datasets, identification of temporary positions of marked animals is possible using complex mathematical algorithms, which are developed on PC computers under Visual Basic language. Computation of positioning can run in real-time mode in a notebook computer or subsequently based on the recorded and processed antenna-signals.

Main characteristic of transmitters designed for small mammals are the followings: low power consumption rate, operated by programmable microcontrollers, using the harmonized frequency band, complex base-band (modulating) signal. Specially constructed transmitters could provide information on temperature, voice and activity of animals, illumination level, distance from other marked specimens, battery status etc. In the case of larger animals (voles, dormice, raptors etc.) the release of transmitter is also a built-in function controlled by the researcher. Adaptive behaviour of animals can be also monitored using a special software application.

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CONSERVATION OF DAMON BLUE BUTTERFLY
(*POLYOMMATUS DAMON*) – EXTINCTION AND THREAT
OF LAST PANNONIAN LOWLAND POPULATIONS

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We studied critically endangered Damon Blue butterfly, *Polyommatus* (*Agrodiaetus*) *damon*, in Moravia, Czech Republic. This species was recorded historically from at least 42 Moravian places and now is known from 6 places (forming two metapopulations). In the Bohemian part, there are two other surviving metapopulations. All Czech populations occupy lowland habitats.

Main foodplant of *P. damon* in Moravia is *Onobrychis arenaria*. Historical records of this species are known from proximity of introduced and cultivated *O. viciifolia* fields. On all recent *P. damon* localities, however, growth both *Onobrychis* species together. We suppose that main factor influencing presence or absence of *P. damon* populations is the density of foodplants. *P. damon* survives only on places with very dense growth of foodplants and wherever the population of *Onobrychis* drops down, *P. damon* goes to extinction immediately. The break point of the *Onobrychis* density remains still unknown.

Both Moravian metapopulations are very small (± 300 individuals). Males prefer growths of foodplants on the beginning of the season or *Anthericum* – *Onobrychis* growths in later season. Females are much more sedentary than males.

The generally best and most often used management of xerothermic habitats is the sheep grazing which is, however, directly in conflict with conservation of populations of *P. damon*. Sheep prefer flowerheads of *Onobrychis*, which could be loaded with eggs of the butterfly. The only way how to combine the sheep grazing and *P. damon* conservation, is the autumn grazing (late September or October). During the autumn grazing the sheep avoids old dry plants of *Onobrychis*. It protects eggs or larvae of the blue butterfly and after grazing, the pasture area is nearly without vegetation, it is covered only with old dry *Onobrychis* plants. This is necessary for the *Onobrychis* regeneration and dense tufts. The autumn grazing should take place every three years, during the remaining periods the mosaic mowing (except main *Onobrychis* tufts) should be used. Such management is now running already two years in both of the Moravian metapopulations.

This study was supported by the Research plan No. MSM6215648905 “Biological and technological aspects of sustainability of controlled ecosystems and their adaptability to climate change”, which is financed by the Ministry of Education, Youth and Sports of the Czech Republic.

ECOLOGY OF THE JUMPING SPIDER *AFRAFLACILLA*
EPIBLIMOIDES (SALTICIDAE) – IMPLICATIONS FOR
CONSERVATION OF LOWLAND FORESTS

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Salticid spider *Afraflacilla epiblimoides* is one of endangered and unknown species of spiders in the Czech Republic. Only one male was recorded in 2001 and a population was found in Lednice castle park in 2006. This species strictly inhabits old oak (*Quercus robur*) trees with population of a basically Pannonian ant *Liometopum microcephalum*.

So far we knew only the distribution across Europe, furthermore it was known that this species mimics *Liometopum* ants and that it prefers old oak trees. We studied the species' life history, daily behavioural pattern and year-round phenology, as well as its prey and protection strategy against ants, spider species composition and preferences for particular trees (by ordination analyses).

Peak distribution of adult spiders was in June or July, according to spring temperature. Mature females overwinter in silk protective net on bark, but nothing is known about overwintering of males. The spider is diurnal, with activity from 11 a.m. to 2 p.m.

It was theorised that the spiders prey on *Liometopum* ant. However, we found, that the spider must protect itself against the ants and that it has special strategy against the aggressive ant species. Other species inhabiting the same habitat with this ant have different strategies – for instance, *Micaria sociabilis* is very mobile and faster than. As a prey *A. epiblimoides* uses everything what they can overpower – Diptera or Collembolla. Together with *A. epiblimoides* lives other rare spider species, e.g. *Micaria sociabilis*, *Midia midas* or *Philodromus rufus*.

Species prefers mainly solitary trees about 100 cm in diameter, with insolated bark, inhabited by rich population of *Liometopum* ant. For survival of the spider species (and for others as well) it is necessary to conserve all alive oak trees in Lednice castle park. However, as all the trees are old and majority of them is in reality dead, there are no available younger trees for further future. In the area there is a lack of trees in age category about 70 years.

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LIMESTONE QUARRIES AS REFUGES FOR PANNONIAN FAUNA ON ITS NORTHERN-MOST EDGE – CASE OF THE HÁDY HILL

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Pannonian nature on its northern limit is under very strong pressure – it is endangered by intensive agriculture (vineyards, crop production, mining etc.) in one hand and by abandonment of traditional management (e.g. in nature reserves) on the other hand. Because of space limitation, the nature conservation should not avoid such human-made biotopes, like brown-field, road verges and quarries. We have studied epigeal fauna of spiders of a limestone quarry on Hády Hill near Brno (Southern Moravia, Czech Republic). We used pitfall traps with 4% formaldehyd as fixation medium. We have studied several characteristics biotopes – 4 quarry benches without vegetation, 6 recultivated slopes (3 naturally and 3 human made) and 2 control plots near to the quarry (*Robinia* forest and abandoned field with steppe vegetation)

We found that the most diverse spider fauna is directly in recently deserted limestone quarry, where especially steppe spiders and forest steppe spiders exist. We collected more than 2500 individuals of spiders from 15 families. The most typical species were *Gnaphosa lucifuga*, *Pardosa alacris* and *Pardosa hortensis*. From typically pannonian species we found *Dysdera ninnii*, *Ozyptila rauda* or *Ozyptila pullata*. One of the most common species here was the invasive *Zodarion rubidum* – Ant eating spider, which was known only from 7 faunistic squares so far. Very interesting phenomena is the uncommon coexistence of three species of the family *Dysderidae* – *Harpactea erythrina*, *D. ninni* and *D. lantosquensis*.

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BIRD DIVERSITY ALONG AN ELEVATION GRADIENT IN THE EASTERN ALPS (NATIONAL PARK GESÄUSE)

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Most studies about changes of bird species diversity along elevation gradients were carried out in tropical mountain ranges, whereas quantitative information is scarce for temperate mountain ranges such as the Alps. We carried out a standardized bird survey using point censuses along an elevation gradient in the Eastern Alps to study changes of species richness, species composition, and the importance of elevation belts for Red List species. Additionally, we analyzed effects of changes of vegetation structure on bird communities.

Our study was conducted along three different elevation transects in the National Park Gesäuse (Styria, Austria) covering an altitudinal range from ca. 500 m (valley floor of Ennstal) to 2,035 m a.s.l. (summit of Tamischbachturm, 2 transects) and 1,928 m a.s.l. (Großer Buchstein, 1 transect), respectively. In total 87 census points were selected along the three transects. Birds were recorded between 3rd April and 25th July at each census point during three 10 min-observation units within a 50 m radius.

A total of 40 breeding bird species were recorded. Species richness did not decline linearly but showed a pronounced plateau between 500 and 1,100 m, where an average of 10 species per census point was recorded. From 1,100 m towards higher altitudes species numbers decreased continuously, reaching a minimum of 1–2 species per census point at the highest elevations. Considering birds in functional groups, in this case the relative abundance of feeding guilds per altitudinal zone, the distribution of feeding guilds along the elevation gradient mirrored the respective habitat type, e.g. insectivorous stem climbers disappeared at the timberline. A comparison of species composition between census points based on Bray-Curtis similarity indices demonstrated significant differences between most elevation belts. Beside the factor altitude, the habitat parameters, tree density and number of vegetation height classes were the best predictors for the number of bird species recorded per census point.

The total number of Red List species (“vulnerable”, “near threatened” and “least concern”) recorded in 100 m elevation belts showed a pronounced mid-elevation peak. Highest species richness (≥ 10 species per 100 m elevation belt) of Red List species was observed between 1000 and 1400 m. From a conservation perspective, these results have important implications for the management of mountain forests aiming to maintain high bird diversity in the Austrian Alps.

FREE LIVING MESOSTIGMATID MITES OF HUNGARY

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The free living Mesostigmatid mites are the typical predators of the mesofauna of the soil. Several families, genera and species belong to this large group. Some countries of Europe (e.g., Slovakia, Germany and Italy) are well-known but the other countries are poorly investigated.

The fauna of the Hungarian free living Mesostigmata is less-investigated. Only some short papers were published on them, so we have only some check-lists of Hungarian National Parks.

Only about two families (Zerconidae and Macrochelidae) have more published records.

Some species of the family Zerconidae have special distribution, for example mountain elements are the followings: *Prozercon verruciger* Mašán & Fenda, 2004, *Zercon carpathicus* Sellnick, 1958, *Zercon foveolatus* Halaškova, 1969 and *Zercon romagniolus* Sellnick, 1944 have typical Carpathian distribution. In Hungary they are recorded only in some parts of the Hungarian Northern Mountains.

In this poster I summarised the species, the occurrences and the references of Hungarian free living Mesostigmatid mites.

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UROPODINA MITES OF HUNGARY

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Uropodina mites live in the soil, leaf litter, moss, ant-nest and decayed tree in Europe. The countries of Central Europe (Germany, Slovakia, Poland, Romania and Hungary) are better investigated from this point of view than other parts of Europe.

According to the Uropodina fauna, Hungary belongs to the best-known countries in Europe. We have the most information about the Uropodina fauna from the national parks, from the Northern-Transdanubian Mountains and from the Northern Mountains, whereas the fauna of the largest part of the Hungarian Great Plain is absolutely unknown.

Recently we know 90 Uropodina species from Hungary. Most of them have a wide distribution in Europe, but several species have interesting occurrences from zoogeographical point of view. E.g. *Macrodinychus bregetovaae* Hirschmann, 1975 is only known from the South Transdanubian in Europe. *Uropoda hungarica* Kotschán, 2004 lives also in the South Transdanubian, but this species was recorded from North-Croatia too. *Uropoda orszaghi* Mašán, 1999 is a typical mountain species which occurs in the high altitudes of the Carpathians, was found only in the Western part of Hungary (Őrség).

In this poster I give a summary on the species, the occurrences and the references of the Hungarian Uropodina mites.

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RECIPE FOR GENOCIDE: RECENT STATE OF NATURA 2000 SITES IN CZECH PART OF PANNONIAN REGION

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Small as it is, the Pannonian region of the Czech Republic contains a dense network of protected areas, recently supplemented by proposed Sites of Community Interest within Natura 2000 network. Regarding terrestrial invertebrates, the N2K network was proposed boldly and generously. However, such lines on the maps may hardly contribute to preserving the biodiversity, if the sites are not properly managed or, in contrast, unsuitable management does not cease.

We will present two cases of inappropriate management. In the first case, too frequent conservation mowing of grasslands of the White Carpathians, led to disappearance of at least one continentally threatened species, the Danube Clouded Yellow (*Colias myrmidone*).

The other case is that of saproxylic organisms of lowland woods of the Lower Moravia Biosphere Reserve. The bulk of xylophagous diversity depends of a few hundreds of monumental trees that have survived there as remnants of traditional pasture woodlands and coppices with standards. The trees are now decaying: more than half is already dead, the rest will die in a few decades. As it takes centuries for a tree to become suitable for some saproxylic specialists, it is necessary to prepare new cohorts of old trees now, via opening-up canopy of surrounding commercial woods. Sadly, the commercial woods are now in harvest age and being clear-felled, and there is no political will to adapt the management in accord with Natura 2000 provisions.

The both examples illustrate that to preserve Pannonian diversity, business-as-usual is no longer permissible and it is necessary to apply innovative solutions to site management and restoration.

MOVEMENT PATTERN ANALYSIS
OF THE SOUTHERN FESTOON (*ZERYNTHIA POLYXENA*)
BUTTERFLY IN A HUMAN-DOMINATED LANDSCAPE

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Movement of individuals may have considerable influence on the long-term persistence of populations in fragmented landscapes. However, our knowledge on the behavioural background of movement is poor. Butterflies often serve as a model system for studying the structure and dynamics of populations occupying fragmented landscapes.

The Southern Festoon is a vulnerable species mostly occurring in human-dominated habitats, such as orchards, *Robinia* plantations and arable field margins, where its only food plant, Birthwort (*Aristolochia clematitis*) is present. Previously, we studied a population in a mosaic landscape consisting of four different habitat types: poplar and Robinia plantations, clearings and hummocks and we found the density of butterflies much smaller in the poplar patches, despite of that there was no difference in the abundance of food plant.

In the present study we investigated the movement pattern of the butterfly by tracking males in order to test whether the movement pattern is different in the four habitat types generating the uneven distribution of butterflies. Individuals were marked and carefully tracked by two persons until lost from view. Each landing point was marked and the behaviour was recorded. Direction and distance between consecutive landing points were measured, dissolving the continuous flight paths into series of connected straight moves. Each move was characterized by its length, duration and habitat type where it was performed.

A total of 45 flight paths were recorded. In the four habitat types, we compared the distribution of turning angles by Rayleigh-test, while the move length and velocity were compared by Tukey-test. Furthermore, we compared the observed net squared displacement with the values predicted by the random walk model. Move lengths were significantly higher in the woodland than in the open habitats, velocity was highest in the poplar plantation. Net squared displacement (R_n^2) was also much higher in the woodland, than in the open habitats, while duration of staying on the landing points was higher in the open habitats.

Although the assumptions of the random walk model were fulfilled, observed value of R_n^2 was higher than predicted in ~50% of the paths. These differences in the movement pattern can explain the different densities in the four habitat types. We hypothesize, that woodland habitats are less preferred by this butterfly due to overshadowing by the canopy. Some discrepancies from the random walk model can be explained by the particular shape of some habitat patches and by the male mate-locating behaviour.

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EGG-LAYING PREFERENCES
OF THE XEROPHILOUS ECOTYPE OF *MACULINEA ALCON*:
PATTERN- AND PROCESS-BASED APPROACHES

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Due to their special life cycle and endangered conservational status, *Maculinea* butterflies are flagship species of nature conservation in Europe. They are obligate social parasites of *Myrmica* ants: females lay eggs on special food plants, caterpillars feed upon the buds and flowers for two weeks, then descend to the ground and await for being discovered by host ant workers. Ants carry them into their nests, where caterpillars complete their development. In this study we aimed to identify the most important factors influencing egg-laying of the xerophilous ecotype of *Maculinea alcon*. Approaching from the pattern, we counted eggs on food plants (*Gentiana cruciata*), while the process of egg-laying was observed by tracking individuals. For egg counts, we randomly selected food plants and recorded several variables describing the structure and environment of the plants on two sampling sites in Hungary, 2004. In one of the sites, we tracked females in 2005. We marked all the plants where the observed female attempted to lay eggs and we recorded all the variables as in the 2004 study, complementing data with the number of eggs that had been previously laid on the shoots by conspecific females. In both studies, data were analysed by generalized linear models and classification trees.

Pattern analysis revealed that females laid eggs with higher probability on plants with higher proportion of floral nodes and fewer neighbouring gentians. At one site, we found higher egg density on shoots located on steeper slopes and surrounded by more bushes, while at the other site egg density was lower on plants surrounded by more bushes.

By tracking females, we found that they laid more eggs on shoots where the number of neighbouring gentians was fewer. In contrast to pattern analyses, females laid fewer eggs on plants with higher proportion of floral nodes. The high number of bushes surrounding the gentian shoots resulted in fewer eggs. The number of eggs previously laid on the shoots had an ambiguous effect: females laid more eggs on shoots where conspecific eggs were present in either very high or very low number.

Possible explanations of the results and solutions of a contradiction between the two studies are provided in the presentation.

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POSTGLACIAL HISTORY OF THE REPTILE FAUNA OF THE CARPATHIAN BASIN

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The herpetofauna of present-day Hungary consists of 18 amphibian and 15 reptile species. They all inhabit the central part of the Carpathian Basin, characterized by the Great Hungarian Plain, with two medium elevation (500–800 m in average above sea level) mountain ranges, and surrounded from the north and the east by the higher chain of the Carpathian Mountains. Focusing on three reptile species, two of them: *Ablepharus kitaibelii fitzingeri*, and *Hierophis caspius* represent the northern- and westernmost marginal populations of their distribution area, whereas the third, *Vipera berus*, occurs in three isolated patches different from the rest of Europe both in ecological and morphological respects.

During the last full-glaciation period, about 30–15 000 years ago, climate in the Basin was generally cold and arid. Permafrost did not exist; and the region remained unglaciated and vegetated by several tree species as pollen analyses show. This condition was, however, probably not favourable to support any reptile species, and they found refuges in the south, in the eastern Mediterranean Basin. As molecular analyses suggest, there were two colonization routes after the full-glaciation: one from the West Balkan to western Transdanubia, and another from the East Balkan to the Great Plain and the adjacent northern mountain range.

This phylogeographic pattern is explained and illustrated by the morphological and molecular investigations of the three selected reptile species.

This research was supported by the National R&D Programme (contract no.: 3B023–04).

EDGE EFFECT AND THE INFLUENCE OF MANAGEMENT
INTENSITY ON ARTHROPOD ASSEMBLAGES
OF PANNONIAN GRASSLANDS

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Management like grazing and mowing and fertiliser use basically influence the biodiversity of grasslands. Consequently, the intensification of grassland management is a potential threat to its flora and fauna. The arthropod assemblages of Hungarian grasslands were investigated in Nagyberek close to Lake Balaton in 2006. Three grassland fields cultivated with different intensity (regarding presence of grazing, mowing frequency, fertiliser use) were compared. The first one was grazed once annually, the second one was mowed and the third one was fertilised (140 kg /ha urea) and mowed twice. We were interested in the effect of distance from the edge on arthropod assemblages. Five transects were designated: in the adjacent forest vegetation 10 meters from the grassland edge, in the edge of grassland and forest, and 10, 25 and 50 meters from the edge in the grassland. Funnel traps were opened during 2 two-week long sampling periods in May and June. Spiders and carabids were identified to the species level. The total species richness and abundance of them were tested against the intensity and distance with general linear models. The species richness and abundance of spiders was positively influenced by the intensity. The effect of distance from the edge had non-significant effect on species richness, however there was an increasing tendency to the grassland centre. The intensity had significant negative effect on the carabid species richness and abundance. There were significantly more carabid species and individuals near to the edge than in the interior parts of the grasslands. We did not find any differences in the species richness and abundance of spiders and carabids between the edge and the adjacent forest habitat. We conclude, that grazing and mowing may increase the number of spiders, while the species richness and abundance of carabids decreased. The spiders prefer the interior part of grasslands, carabids could be found in higher number near to the edge. We would like to investigate the forests-specialist, grassland-specialist and generalist species separately in the future to get more exact results.

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MONITORING GROUND-DWELLING BEETLES – DOES METHODOLOGY MATTER?

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Mark-release-recapture with individual marking and pitfall traps is an adequate method to obtain ecological information on ground-dwelling beetles. While estimating the population density, seasonal dynamics, survival probabilities and life-length of *Dorcadion fulvum cervae*, *D. pedestre* and *D. scopolii*, we investigated the intensity of sampling necessary for reliable estimates. The intensity of sampling is determined by the number and density of traps used and the number and frequency of sampling occasions. We used two trap grids, a sparse and a dense one, at each sampling sites. In most cases the data collected from the dense trap grid provided sufficiently precise estimates, in contrast to the sparse grid. The capture probability turned out to be the key factor that determined the goodness of sampling. If this value was higher than ~0.1–0.2 we got reliable estimates. A significant difference was found between the capture probabilities of the sexes. For all three species it was lower for females, so in some cases we could get a density estimate only for males.

We studied the effect of the number and frequency of sampling occasions on the accuracy of the estimates by manipulating real datasets consisting of 16–21 occasions. Virtual thinning out of the sampling occasions showed some smoothing effect, but in practice having longer intervals between the occasions would cause several problems. We generated the distribution of the traps, catching two or more beetles in a sampling period, according to the sexes of the beetles in a given trap. We found no evidence of bias caused by the sexual attraction on capture probabilities.

We also investigated the spatial distribution of the individuals. Although the habitats were rather homogeneous and the sample areas were small, the distribution of the beetles was pretty aggregated.

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GEOGRAPHIC VARIATION IN MORPHOLOGICAL
CHARACTERS IN HUNGARIAN POPULATIONS
OF THE ADDER (*VIPERA BERUS*)

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The Common adder (*Vipera berus*) occurs in three separated regions in Hungary: in the northeast in the Zemplén and Tokaj Hills, in east in the valley of Upper River Tisza and in southwest in Somogy and Zala Counties.

A number of 87 pholidotic, colour pattern and body proportion characters were recorded on 71 preserved specimens collected in the above mentioned regions of Hungary. These data were compared with ones of 218 specimens, preserved in different museum collections in Europe and USA, originating from different areas of Eastern Europe (i.e., Slovakia, Romania, Croatia, Bulgaria, Serbia, Bosnia and Herzegovina, Montenegro and Albania).

The individuals were grouped into OTUs, compiled based on collecting gaps, areas with similar biogeographical history, geographical proximity, and were all checked for homogeneity using UPGMA cluster analysis and ANCOVA. Size adjustment was performed and sexes were treated separately in the analysis. Principal component analysis and Canonical variate analysis was used to investigate the relationship between the OTUs.

The analysis revealed the existence of two different groups in Eastern Europe: Group I that contained the individuals from Romania, Slovakia and Bulgaria, and Group II formed by the specimens from the southern countries (i.e. Croatia, Serbia, Bosnia and Herzegovina, Montenegro and Albania). The Hungarian populations are morphologically separate from each other, the ones from Somogy and Zala Counties linked with Group II, whereas the populations from the northeastern part of the country (Zemplén and Tokaj Hill, valley of Upper River Tisza) with Group I. Remarks on the taxonomic rank of these groups are made.

DORCADION CERVAE (COLEOPTERA: CERAMBYCIDAE)
– A DISTINCT SPECIES OR SUBSPECIES?

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Dorcadion cervae has long been considered as a species of longhorn beetles (Cerambycidae) endemic to Hungary. It occurs exclusively in the saline grasslands of the Danube–Tisza Mid-region. It differs from the widely distributed *D. fulvum* in having completely black body (elytra brownish in *D. fulvum*), black legs and first antennomere (reddish in *D. fulvum*) and preference of sodic habitats (loessy grasslands in *D. fulvum*).

Populations containing individuals with entirely black body and/or black appendages (in various percent) were discovered in saline habitats of other regions of Hungary (e.g. the Sárrét in Transdanubia and the Jászság in the north-central part of the Great Hungarian Plain). However, these grasslands are of the solonietz type, which is in contrast to the solonchak soils typical to the „classical” localities of *D. cervae*.

Genetic variability was investigated for halophilic populations as well as populations of *D. fulvum* from non-saline loessy grasslands on the sequences of mitochondrial cytochrome c oxidase gene subunit I. The sequences showed no variation within and among the populations, while other Hungarian species of *Dorcadion* exhibited very distinct molecular patterns.

These analyses do not support the view that *D. cervae* and *D. fulvum* are distinct species. However, the facts that the individuals from the solonchak habitats are uniform in the completely black colour suggest an early stage of speciation.

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THE ROLE OF THE PARATETHYS IN THE DISTRIBUTION OF THE CARPATHIAN CAVE COLEOPTERA

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Subterranean beetles represent an excellent object of study for historical biogeography, because they are, in the Carpathians, the group with the best representation in the subterranean domain. In addition, species have reduced mobility, display different degrees of adaptations to life in caves and many specialists work on this group. Three processes have shaped the present distribution of the cave Coleoptera (which belong mainly to Leiodidae Cholevinae and Carabidae Trechinae) in the world: dispersal, vicariance, and extinction. Therefore, three successive stages can be established in their space-time evolution: (1) dispersal from a center of origin in the present area(s); (2) dispersal, extinction and vicariance among the present area(s); and (3) colonization and speciation in the subterranean domain.

The origin of Romanian cave Coleoptera is linked to dispersal of ancestral lineages that inhabited the Alpine Miocene chain and to the Paratethys evolution. Previous authors suggested a Dinaric origin for the Romanian Leptodirini and Trechini, based on morphological similarities, and especially on features of the male genitalia. When the different waves of colonization occurred is questionable, because direct Dinarides-Carpathians connection is either very old or too recent.

We analyzed spatial distribution of species and subspecies of the *Drimeotus* phyletic lineage to obtain information, which can be corroborated with available taxonomic and molecular data. Romanian Leptodirini offer good material for studying speciation and vicariance processes, because it involves insular distribution, which is different from the large, continuous limestone surfaces such as those of the Dinarides and the Pyrenees, where speciation has occurred in the absence of geographical barriers.

THE STONEFLY (PLECOPTERA) FAUNA
OF THE CARPATHIAN BASIN
AND ITS ZOOGEOGRAPHICAL AFFINITIES

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The stonefly fauna of the Carpathian Basin consists of 138 species, which is the one fourth of the known European species. Though the occurrence of some taxa needs confirmation, and some species just have been described recently, the number of the species known from the area won't change notably in the future.

The distribution of the species in the main areas of the Carpathian Basin are given in a table, and brief discussion on some notable species are also given. These are endemic or subendemic species, or taxa with special taxonomical or zoogeographical interest: *Taeniopteryx araneoides* Klapálek, 1902, *Rhabdiopteryx hamulata* (Klapálek, 1902), *Capnopsis schilleri* (Rostock, 1892), *Leuctra signifera* species group, *Protonemura risi* species group, *Nemoura marginata* species group, *Nemoura fusca* species group, *Nemoura sciurus* Aubert, 1949, *Diura bicaudata* (Linnaeus, 1758), *Isoperla tripartita* Illies, 1954, *Siphonoperla torrentium* (Pictet, 1841), *Marthamea vitripennis* (Burmeister, 1839), *Perla pallida* species complex.

The composition of the fauna by coryotypes is presented. Relations of the stonefly fauna of the Carpathian Basin towards the Alps and the Balkans are discussed, with special attention on the border zones (foothills of the Alps, Papuk Mts, Fruska Gora, Mehadian Mts). Connections between the main areas of the Carpathian Basin, and the distribution of the endemisms are also discussed.

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DISTRIBUTION OF *ODONTOPODISMA RUBRIPES* RAMME, 1931
(ORTHOPTERA: ACRIDIDAE) IN NORTHEAST HUNGARY

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Odontopodisma rubripes is a characteristic Orthoptera species of the north-eastern part of the Great Hungarian Plain. The area of this Carpathian sub-endemic grasshopper covers the eastern part of the Carpathian Basin including Northeast Hungary and the western part of Transylvania. Formerly, we had only sporadic distribution data from forest refuges and bogs near Lónya, Csaroda, Barabás, Tarpa, Szatmárcseke, Gulács Kömörő, and Bátorliget villages. Considering these data, *O. rubripes* prefers meadows with diverse vegetation structure including mostly wet grasslands with shrubs, however, collaterally occur in forest edges, clearings and hedges of cultivated areas.

We studied the distribution of *O. rubripes* between 2005 and 2007 in order to approve and complete our knowledge. During the study we proved the occurrences of the species at several new location, while the former occurrence near Lónya could not be proved. According to new data in Hungary, the area of *O. rubripes* is more continuous than previously assumed. The largest population lives in edges and clearings of forest refuges and large bogs of the Bereg and the Szamos-hát. The connection between these populations is maintained by hedges and shrub patches as narrow corridors. Considering management and protection of the species, maintenance of corridors and monitoring are particularly important.

SETTING PRIORITIES FOR CONSERVATION
OF THE ORTHOPTERA SPECIES IN THE
AGGTELEK NATIONAL PARK (NORTHEAST HUNGARY)

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Concerning Orthoptera fauna, the Aggtelek Karst is one of the most studied regions in Hungary. We set priorities for conservation of habitats and species on the basis of a data set including 75 species from 67 sampling areas. We determined hotspots with simple ranking and complementary areas methods in order to enhance the effectiveness of management and protection of the area. Further, we expressed the responsibility of the Aggtelek National Park to conserve protected and rare species. During area selection, we used species richness, sum of rarity values and number of rare species as ranking variables. The rarity values of species were calculated on the basis of frequency of occurrence according to the Hungarian 10×10 km UTM grid data. In order to determine the group of rare species we used the quartile definition of rarity. For both methods, the sum of rarity values provided the best results. Areas selected by simple ranking covered maximum 85% of the total fauna within 7 areas, that were grouped at the plateau north to the Nagy-oldal. The complementary areas (minimum 7 areas) covered the whole fauna, and areas were evenly distributed across the study region. Responsibility of the Aggtelek National Park was the highest for the global conservation of the Carpathian *Isopteryx stysii*, *Phlydoptera transsylvanica* and *Pseudopodisma nagyii*. On the European level, the protection of viable population of the species *Leptophyes discoidalis*, *Poecilimon fussi*, *Paracaloptenus caloptenoides* and *Stenobothrus eurasius* was highlighted. On the national level, highest responsibility was associated to the species *Omocestus viridulus*, *Leptophyes discoidalis* and *Poecilimon fussi*.

PHYLOGEOGRAPHY OF THE CASPIAN WHIPSNAKE
(SQUAMATA: COLUBRIDAE: *HIEROPHIS CASPIUS*)
AND RECENT ADVANCES TO THE PHYLOGEOGRAPHY
OF SOME EUROPEAN SNAKES

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A phylogeographic analysis of the Caspian whipsnake (*Hierophis caspius*) was carried out using mitochondrial and nuclear genetic markers. A remarkable genetic variation was found, even within Hungary – at the species' northwesternmost distribution – several isolated populations were detected. Based on these results, conservation biological consequences are discussed.

As a number of phylogenetic and phylogeographic studies were recently published on European snakes, a comparative overview is given. In general, highest genetic diversity was found among the southern populations of each species complex, where hypothetical Pleistocene refuges are supposed to have been located. In central Europe, only the last Holocene invasions from those refuges left imprints in the genomes. The predominant direction of invasion was from the Southeast (Balkans, Turkey, Caucasus). Populations in the Iberian and Apennine peninsulas were less efficient invaders to other regions.

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GENETIC CHARACTERISTICS OF TWO CLADOCERAN SPECIES FROM TEMPORARY POOLS IN THE HUNGARIAN GREAT PLAIN

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Allozyme patterns and haplotype composition of *Moina brachiata* (Jurine, 1820) and *Daphnia atkinsoni* Baird, 1859 populations were studied with the use of cellulose acetate gelelectrophoresis and sequences of the cytochrome-oxidase I and 16S rDNA regions to investigate genetic variability of the species in three regions of the Hungarian Great Plain.

Phylogenetic analysis of the mitochondrial regions revealed large differences between two lineages in the *M. brachiata* taxon (sequence divergence was 8.7% between the lineages), implying cryptic speciation. Salinity seems to play a key role in the maintenance of the discovered molecular differences. In most cases the “saline” haplotype occurs in temporary pools with a higher conductivity (4800–6000 $\mu\text{S}/\text{cm}$) while the other haplotype is much more frequent under this level; although examples of sympatric populations were found. The separation of the two types is relevant, because – although salinity has been known to affect species occurrences and diversity – it has arisen within a narrow range of salinity. Genetic differentiation based on allozyme patterns of selected populations from the one lineage was high (Wright’s $F_{ST} = 0.246$).

Morphological differences between *D. atkinsoni* Baird, 1859 and *D. bolivari* Richard, 1888 are striking, however, some authors believe that they are actually the same species, *D. bolivari* being the result of intraspecific phenotypic plasticity.

Our investigations addressed the above mentioned taxonomical problem on the level of allozyme variability. Allelic patterns at the PGI, PGM, MDH and AAT loci were studied using cellulose acetate gelelectrophoresis for five *D. atkinsoni* and two *D. bolivari* populations from different temporary pools. Correspondence analysis and UPGMA of the pairwise genetic distances of the populations were used to show possible clusters. Contrary to expectations, *D. bolivari* populations did not make up a distinct group. Instead, two *D. atkinsoni* populations showed clear separation from the rest. Based on these results *D. bolivari* is not a valid taxon, but other highly separated groupings might exist within the *D. atkinsoni* complex.

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POPULATION SIZE AND DISPERSAL
OF *COENONYMPHA OEDIPPUS* IN A HABITAT COMPLEX

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The False Ringlet (*Coenonympha oedippus*) is one of the most endangered butterflies in Europe, due to the decrease of habitats and the current small population sizes and isolation at most of its locations. The butterfly, occupying wet meadows, occurs in only one habitat complex in Hungary, consisting of 12 larger habitat patches. Our aim was to reveal the population structure of the butterfly in this habitat complex; to determine the population size in each part of the habitat complex and the extent of dispersal among habitats. Mark–release–recapture method was used to estimate the daily population size and the daily survival. All habitat patches were visited every second day and as there was difference among the size of habitats (1600–16000 m²) the sampling effort was determined based on the size of the habitat. The captured butterflies were individually marked by permanent pen.

Totally 1526 individuals were marked during 2052 capture events. The maximum density of individuals differed among the habitats from 0.09 to 1.78 individual/minutes. The maximum of estimated daily population size was 33.3±15.7 individuals in the least populated habitat patch, while the estimation was 267.3±52.3 males and 87.1±26.4 females in the most populated habitat patch. Altogether 46 dispersal events were detected among habitats, 37 males and 9 females were captured in habitat patches different from their original. There were several short (20–70 m) and few longer distance (5.2 km) movements among these events. The maximum distance moved by a female was 440 m, while the longest distance by a male was 5.2 km.

Our results suggest that the population size of *Coenonympha oedippus* in this habitat complex is large enough to maintain a viable population in this case, if the dispersal among habitats is guaranteed. Although it has to be considered that this number of butterflies was separated to 12 small, more or less independent subpopulations. The population complex is probably not threatened by all the problems of small populations; inbreeding is unlikely as large distance movements of males can maintain the gene flow. But other problems might occur, as after an occasional extinction of a smaller subpopulation, natural recolonization would be dubious, since during our survey females were able to span just smaller distances among habitats. Besides that facilitated dispersal, adequate timing of mowing, the suspension of game feeding and ensuring suitable subterranean water level on the area would contribute to the stability and increase of population size.

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THE SPECIES RICHNESS OF THE DIPTERA FAUNA OF HUNGARY

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The survey of the Diptera fauna of the Carpathian Basin was started with delay and with low intensity. A true development was performed through the publication of 22 parts in the *Fauna Hungariae* series (1955–86), as well as through the faunistical survey of the Hungarian national parks (1974–89). Presently 5800 species of 111 dipterous families have been known (and other 4500 spp. and 11 more families are still expected to occur).

A majority of the species is widely distributed and West Palaearctic. The relative richness is accounted for the mosaic of less disturbed habitats amongst agricultural areas and a comparatively rich network of protected areas. There are true mountain brooks in our low mountains at some special geological situations, at the same time South European and Asian steppe faunal elements maintain populations on our lowlands (salty marshes and sand dune areas).

It is well-known that the Carpathian Mountains have numerous endemic species. As for the endemic dipterous species of the Carpathian Basin, one must judge them cautiously. We do not know enough about the majority of the species described from Hungary to consider them as endemic (they may occur also elsewhere).

There are but a few groups of the Hungarian Diptera, where the questions of the faunagenesis can be posed realistically (the preconditions are: a satisfactory knowledge of the majority of species and their distribution, a clarification of the taxonomical relations, a knowledge of their life-habits, including the modes and ways of spreading).

When compared to the dipterous fauna of the Mediterranean countries, the Hungarian fauna does not seem particularly rich. In order to make operative plans for a future faunistical survey, the dipterous families found in Hungary were sorted in five groups:

- faunistic survey completed (18 families of low species number);
- rather well-known Hungarian fauna (ca. other 10% of the spp. expected to occur, 4 families);
- 50% or higher percentage of the potential fauna has already been reported (78 families);
- less than a half of the potential fauna has hitherto been reported (9 families);
- only a minor part of species has hitherto been reported (Simuliidae, Lestremiinae, Porricondylinae, Sciaridae).

A quicker advance in finding the species still expected to occur must be through the activity of young dipterists working on the last two groups of families (with at least 2500 spp. of the 4500 spp.).

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PATTERNS OF GENETIC AND TAXONOMIC DIFFERENTIATION
IN SELECTED BUTTERFLY SPECIES
(LYCAENIDAE: *ARICIA ARTAXERXES*, *PLEBEJUS SEPHIRUS*;
NYMPHALIDAE: *MELITAEA PHOEBE*, *M. TELONA KOVACSI*;
EUPHYDRYAS MATURNA, *E. AURINIA*;
PAPILIONIDAE: *PARNASSIUS MNEMOSYNE*)

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The structure of genetic variation was surveyed in several populations of seven butterfly species (Lepidoptera: Lycaenidae, Nymphalidae and Papilionidae) mostly in Hungary. When selecting the species, either taxonomic (*Melitaea phoebe* and *M. telona kovacsi*) or conservation genetic (*Euphydryas maturna* and *E. aurinia*, *Parnassius mnemosyne*, *Aricia artaxerxes issekutzi*, *Plebejus sephirus*) viewpoints played important role. In the course of the study, one of the most fascinating problems was the potential effect of life cycle on the genetic structure of the species investigated. Based on their reproductive strategy the seven species can be divided into three categories: predominantly K-strategist (*P. mnemosyne*), mainly r-strategist (*Euphydryas* and *Melitaea* species), myrmecophilous species with mixed strategy (*A. artaxerxes issekutzi* and *P. sephirus*). We collected several samples from all seven species mostly in Hungary though some samples originated from Transylvania and Slovenia as well. We had a total of 167 samples from 70 populations of the seven species. Genetic variation was studied by analysing enzyme polymorphism. The number of loci varied across the species; it ranged between 6 and 18. The results suggested that r-strategists had an obviously lower level of variation than K-strategists: they had fewer alleles per locus, lower level of heterozygosity but they had more fixed alleles. The most probable explanation of the lower genetic variation in the populations of the r-strategist species is that they are exposed to a relatively strong effect of genetic drift as a consequence of their reproductive strategy. Differences were also detected in the structure of genetic variation among the three categories of species. Genetic differentiation among the populations of the r-strategist species did not exhibit evident geographic pattern; that is the genetic composition of the samples originating from the same geographic region were not more similar to each other than that of collected in different regions. At the same time, the other species showed a more or less clear geographic pattern in their between population variation. The lack of geographic pattern in the genetic structure of the r-strategist species can be the consequence of strong genetic drift affecting their populations, resulting in very intensive genetic differentiation among them, which can not be counterbalanced by migration.

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ECOLOGICAL STUDY OF AN ASSEMBLAGE
OF THREE *DORCADION* (COLEOPTERA: CERAMBYCIDAE)
SPECIES IN A SALTY GRASSLAND IN HUNGARY

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The aim of our studies was to understand the ecology of the target species in order to support a scientifically established nature conservation management.

Populations of *Dorcadion pedestre*, *D. fulvum cervae* (strictly protected) and *D. scopolii* were sampled in three consecutive years in the Kiskunság National Park, Central Hungary in an intensively grazed sheep-run and a less intensively grazed cattle pasture.

The dominating plant association of the study area is *Artemisio santonici-Festucetum pseudovinae*. In both habitats a dense (2.5×2.5 m, 243 traps) and a sparse (5×5 m, 75 traps) grid of pitfall traps were settled. Traps were emptied in 2–4 days interval (14 sampling events in 2005 and 21 in 2006 and 2007). The captured beetles were marked with a unique code. The capture-recapture analyses were carried out by the MARK v4.3 and POPAN5 programmes. We used the Cormack-Jolly-Seber model for AICc-based model selection and the Jolly-Seber model for population size and survival estimation.

Movement patterns were examined by determining the distribution of distances walked by the individuals between consecutive capture occasions. Positive relationship was found between the movement intensity and capture probability for all species and sexes.

All years on both habitats *D. pedestre* was the most numerous. No significant changes in densities were detected between 2005 and 2006. In these years only minor differences were found between the habitats. However, in 2007 all three species showed a dramatic, an order of magnitude increase in densities. In 2007 the estimated number of *D. fulvum cervae* increased tenfold on the sheep pasture, while only threefold on the cattle pasture. An opposite pattern was found in case of *D. scopolii*, where the density proved to be higher at the cattle pasture. The estimated number of *D. pedestre* was ten times larger at both pastures than that of the previous years. These changes, however, do not necessarily attributed to nature conservation management, therefore, long-term studies of consecutive years are essential to prove the effect of management.

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HABITAT PREFERENCES, POPULATION STRUCTURE
AND MOBILITY OF THE GROUND BEETLE
CARABUS HUNGARICUS IN THE POUZDRANY STEPPE

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We conducted mark-recapture study of *Carabus hungaricus*, NATURA2000 species endemic to Pannonian region, in southern Moravia, Czech Republic. Adults were trapped using nearly 300 beer-baited pitfall traps, the sampling took place from March to November 2006. The traps were placed in following habitats: field, vineyard, fallow land, various successional stages of steppe, forest steppe, orchard, scrub and forest. They were emptied every third to every fifth day. Adult beetles were individually mechanically marked and released near the capture site; their sex, body size and injuries were recorded. We marked 3864 adults in total (1803 males and 2056 females).

We found, that

- (i) *Carabus hungaricus* forms a metapopulation that inhabits the whole area of steppe and penetrates into steppe enclaves and ruderal habitats in a vicinity,
- (ii) the Pouzdrany steppe population is sufficiently abundant (about 6500 females, 5000 males) and does not seem to be imminently threatened,
- (iii) adults exhibit two peaks of activity during the season, the first in June, the second from August to September,
- (iv) it prefers tall-grass patches with thick litter layer, whereas either scrubby or short-grass successional stages are avoided,
- (v) it can cross distances of hundreds to thousands meters, including sections of non-habitat (field, orchard); closed forest acts as an effective migration barrier,
- (vi) unmown sections were preferred over mown ones, uniform whole-area cuts proposed as restoration measures for the steppe are hence risky.

An appropriate management of the steppe is occasional patchy mowing or grazing, maintaining mosaics of varying vegetation heights, including temporary fallows. For a long-term survival of the species, it is necessary to preserve all steppe enclaves and migration corridors in a wider environs of the present population, and to restore as many as possible of such enclaves in a wider landscape.

STRUCTURE OF BEE (HYMENOPTERA: APOIDEA)
ASSEMBLAGES IN EXTENSIVELY AND INTENSIVELY
GRAZED GRASSLANDS IN HUNGARY

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Pollinators have a key role in ecosystem functioning and in human well-being. Bees are the most important pollinators in Europe, which are responsible for the pollination of roughly two-third of crop species. It is known that pollination is declining with decreasing bee diversity. Therefore, the understanding of factors governing bee assemblages is of key importance both for nature conservation and for economic reasons.

We studied bee assemblages of three grassland types in the Hungarian Great Plain, in two different alkali regions in the Kiskunság and in the Heves, and in a mosaic-like “turján” meadow in the Kiskunság. Each grassland type was examined on 7 pairs of extensively and intensively grazed sampling sites. Bees were collected using sweep netting and singling along 1 m wide transects. Both sweep net and transect surveys were repeated at three times during the late spring and early summer of 2003. To gain landscape parameters of each study site we mapped land-use types (grasslands, arable fields, forests, built-up areas, marshy habitat and open water) based on aerial photographs within 500 m radius. During the field surveys we captured 483 individuals of 124 Apoidea species in total. This shows very diverse and species rich bee assemblages in these grassland areas. Both the diversity and the percentage of the rare species were highest on the Kiskunság alkali region. The dominance of the honeybee (*Apis mellifera*) was very low at each site, suggesting the existence of semi-natural bee assemblages on Hungarian pastures. Neither species nor individual numbers differed between extensively and intensively grazed sampling sites, among regions, and between edge and interior of sites. However, both species richness and abundance of bees positively correlated with species richness and cover of flowering plants, indicating the important role of food resources. From the landscape parameters the extent marshes and the built-up areas seems to have effect on bees; small species preferred wet areas, while large species seemed to avoid build-up areas.

The fact that the diversity and species richness of the bee assemblages are high on intensively and extensively grazed Hungarian grasslands as well, indicates that both management intensity should be maintained, because even the studied higher grazing pressure (usually 1–2 cow/ha) seems to promote sufficient floral resources.

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MOLECULAR BIOGEOGRAPHY OF EUROPE

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The climatic cycles with subsequent glacial and interglacial periods have had a great impact on the distribution and evolution of species. Using genetic analytical tools considerably increased our understanding of these processes. In this contribution therefore an overview of the molecular biogeography of Europe is given. Three major biogeographical entities can be distinguished: (i) “Mediterranean” with Mediterranean differentiation and dispersal centres, (ii) “Continental” with extra-Mediterranean centres and (iii) “Alpine” and/or “Arctic” with recent alpine and/or arctic distribution patterns.

Many “Mediterranean” species are differentiated into three major European genetic lineages, which are due to glacial isolation in the three major Mediterranean peninsulas. Postglacial expansion in this group of species is mostly influenced by the barriers of the Pyrenees and the Alps with four resulting main patterns of postglacial range expansions. However, some cases are known with less than one genetic lineage per Mediterranean peninsula on the one hand (e.g. *Polyommatus icarus*), and others with a considerable genetic substructure within each of the Mediterranean peninsulas, Asia Minor and the Maghreb (e.g. many amphibians and reptiles). Four different pattern of postglacial range expansions are known for the group of Mediterranean species (i.e. hedgehog, grasshopper, bear, butterfly) and the mode of expansion had important impact on the regional population genetic constitutions (e.g. remarkable differences between *Melanargia galathea* and *Polyommatus coridon*).

For the “Continental” species, it could be shown that the formerly supposed postglacial spread from Eastern Palaearctic expansion centres is mostly not applicable. Quite the contrary, most of these species apparently had extra-Mediterranean centres of survival in Europe with special importance of the perialpine regions, the Carpathian Basin and parts of the Balkan Peninsula, a pattern found e.g. in *Erebia medusa*.

In the group of “Alpine” and/or “Arctic” species, several molecular biogeographical patterns have been found, which support and improve the postulates based on distribution patterns and pollen records. Genetic analyses of arctic-alpine disjunct species support their broad distribution in the periglacial areas at least during the last glacial period (e.g. *Zygaena exulans*), whereas true alpine species and representatives of the mountain forest biome often showed much more complicated pattern (e.g. *Erebia epiphron*, *Erebia euryale*). These genetic studies further support the strong linkage between southwestern Alps and Pyrenees, northeastern Alps and Carpathians as well as southeastern Alps and the Dinaric mountain systems, hereby allowing conclusions on the glacial distribution patterns of these species with *Erebia epiphron* as an example.

UTILIZATION OF SCIENTIFIC RESEARCH DATA IN APPLIED NATURE CONSERVATION BY NATIONAL PARKS

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Nature conservation extensively uses several types of biotical data (occurrence of species, habitat types, ecological requirements of certain species) in its daily work by regulatory enactments and management practices. The amount of data needed is also huge. Information is especially sought-after from the protected areas (approximately 260 000 hectares, national and international levels), and the protected species (about 1000–1300 species) in the Duna–Ipoly National Park Directorate.

The amount of data is gathered mostly by scientific research financed and coordinated by the national park directorate. Besides the collection of data, there is a need for data registration in GIS databases, and the coordination between scientific research and practical nature conservation.

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DIVERSITY AND COMPOSITION OF FOREST LAND SNAIL ASSEMBLAGES IN THE CARPATHIAN BASIN: PATTERNS AND PROCESSES FROM MICROSITES TO REGIONS

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Community composition has long been considered to be the result of local environmental variation and local ecological interactions. In the last decades the influence of local processes has been complemented by larger scale regional factors. There also has been growing interest in how dispersal occurring at multiple scales influences community composition. Here we use case studies to demonstrate how processes acting on the (1) micro, (2) local and (3) regional scales effect diversity and composition of forest land snail assemblages. (1) Our results, based on a microscale survey in beech forests, revealed that presence and decaying stage of coarse woody debris has profound direct effect on snail diversity. Most of the species tended to prefer microsites close to woody debris or under bark. Further, abundant species tended to aggregate, and microscale richness was limited and independent of local richness of the site. Richness was positively correlated with woody debris diameter in earlier decaying stages. These indicate that microscale limitation of the number of co-occurring species is driven by dispersal limitation and not by competition for limited resources. (2) Results of the meta-analysis of 210 Hungarian sampling localities indicate that species richness reflects primarily geographical (regional scale) constraints on the dispersal of species and secondarily responses to a moisture gradient. Species composition is determined primarily by local factors, i.e. vegetation, through species-sorting and secondarily by regional constraints. (3) In a wider regional context, species richness of beech forest land snail faunas in Central and Southeast Europe decreased from the Carpathians towards the south and the west. Species composition changed abruptly between the identified main zoogeographical clusters of the sites and species turnover was almost complete in 500 km distance. Vicariance was not a significant mechanism in shaping forest land snail faunas overall in the studied regions, although it was apparent in some genera. These indicate that recent patterns of composition might be the results of repeated dispersal events as a result of cyclical barrier formation and disappearance during the Pleistocene. This is in contrast to the North-western European patterns, where regional faunas are quite homogeneous and are results of differential migration from Pleistocene refugia. Thus both differential dispersal in previously glaciated areas and reticulated dispersal events in previously unglaciated areas contribute to the richness and composition of land snail faunas in Europe.

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JOINT RESEARCH PROGRAMME IN THE CARPATHIAN REGION
– CHALLENGE OR JUST DREAM?

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Last decade of development in Europe, it brought several crucial activities for taxonomists towards improving knowledge, data sharing and coordination of joint effort in almost all fields of zoology and botany. Among the most important projects, Fauna Europaea was funded by the EU 5th Framework Programme. The main target of the first Paneuropean taxonomic project was to compile the complete list of species of terrestrial and freshwater animals occurring in Europe. Utilizing the advanced technology, results of such a project are available to everybody through web interface. Fauna Europaea was also the first taxonomic project, where representatives of new the EU member states met together, derived profit from and contributed to common knowledge on taxonomy of animals in Europe.

In recent development, the EDIT network (European Distributed Institute of Taxonomy; a network of excellence) funded by 6th FP plays important role in research development and coordination, as well as it plays as the framework for continuation some Fauna Europaea activities.

Looking to the future, SpeciesBase and PESI will play important role in this field.

Among the most important contributions of the EDIT, application of ATBI schema in several European and oversea areas will be important step to knowledge of species biodiversity. Large scale species inventory in area of Mercantour and Alpi Marittime NPs (first European ATBI site) and in the Gemer ATBI site (activities will start here from 2008) will extend our knowledge of biodiversity, remove gaps and open gates to joint research activities.

Learned from, experienced and inspired by above mentioned projects, idea of unified effort of taxonomists in Carpathian and Pannonian region is rising up.

HABITATS OF THE ADDER (*VIPERA BERUS BERUS*, LINNAEUS
1758) IN RELATION TO ITS VERTICAL DISTRIBUTION
IN THE NORTHERN CARPATHIANS IN ROMANIA

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The adder (*Vipera berus berus*) is the most widespread venomous snake in the world, even occupying areas situated north of the Arctic circle. In spite of its success as a wide ranging species, it has been proven that this species is not a generalist, having complex ecological needs. Very few publications have specifically viewed the habitats of the adder and most of the papers that have done this refer only to lowland populations. In spite of the fact that the Romanian Red Data Book of Vertebrates classes *V. b. berus* as endangered, in Romania, the only publications which refer to the adder have been focused strictly on morphology or distribution, the ecology of the species being completely excluded from scientific studies.

In the present paper we aimed to analyze and describe, in detail, the habitats used by adders at different altitudes in the Northern Romanian Carpathians. More exactly, we aimed to identify which elements of the adder's habitat vary from a lower altitude to a higher one and which elements remain more or less constant irrespective of the altitude.

Adder habitats situated at altitudes of between 150 and 1800 m a.s.l were analyzed in the present study. In lowland areas (150–400 m a.s.l) the adder mostly inhabits moist deciduous forests which are situated on flat ground. In the hilly and low mountain areas (400–1000 m a.s.l.) *V. b. berus* inhabits deciduous or mixed forests or bushy areas located on pronounced south facing slopes. Exposed rock formations of varied shapes and sizes are almost always present in these cases. In the highlands (1000–1800 m. a.s.l.), the adder is encountered in two major types of habitat: stony areas with thick *Juniperus* and *Pinus mugo* covering (i) or alpine meadows with scarce small bushes and plenty of rocks (ii). Syntopic species common throughout almost the whole of the adder's range in the northern Carpathians are *Rana temporaria*, *Salamandra salamandra*, *Anguis fragilis*, *Zootoca vivipara*, *Natrix natrix* and *Lacerta agilis*. In most cases, some type of water pool or bog is present in the lowland, hilly and low mountain areas inhabited by adders, these probably serving as the species' preferred summer feeding grounds.

GENETIC DIVERSITY OF GREAT BUSTARD (*OTIS TARDA*) POPULATIONS IN HUNGARY

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Great Bustard is a globally endangered Palearctic bird whose populations have declined markedly in the 19th and 20th century due to hunting and anthropogenic habitat changes. Nowadays, major populations persist only in Spain, on the steppes of Ukraine and Russia, and in the Carpathian Basin. During the last decades, the Carpathian Basin population suffered dramatic declines, with a recent population size of approximately 1200 specimens in 9 fragmented subpopulations. As flagship of the Hungarian conservation biology, Great Bustard received much attention and conservation effort, genetic diversity of the Hungarian population was, however, not yet investigated.

Here we present a molecular analysis of the mitochondrial control region of Great Bustards samples from different Hungarian subpopulations. Analysis of a 584 bp control region segment revealed nine haplotypes, and a relatively low level of mitochondrial sequence diversity within the whole population. Hungarian haplotypes were not to differentiate from the haplotypes of the bustards' living on the Russian steppes, Carpathian Basin population can be therefore considered as a part of this great East European steppe population (where genetic diversity is much greater).

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ZOOGEOGRAPHICAL SURVEY OF NEUROPTERIDA OF CARPATHIAN BASIN

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Evaluation of area and distribution pattern within the Carpathian Basin of 144 neuropterid (Megaloptera, Raphidioptera, Neuroptera) species was carried out.

The neuropterids living on the regarded territory may be arranged into the following zoogeographical groups: eurytherm Holarctic or Palaearctic species (9 = 6.3%), northern continental species with high degree of cold resistance (31 = 21.5%), extramediterranean European species with high degree of cold resistance (4 = 2.7%), northern continental species with moderate degree of cold resistance (9 = 6.3%), extramediterranean European species with moderate degree of cold resistance (5 = 3.5%), South Palaearctic continental species (9 = 6.3%), extramediterranean – Mediterranean European species (5 = 3.5%), Alpine – Carpathian species (4 = 2.8%), Holomediterranean species (28 = 19.4%), Atlanomediterranean species (5 = 3.5%), Adriato – Pontomediterranean species (3 = 2.1%), Adriatomediterranean species (7 = 4.9%), Balkan – Central European species (including a xeromontan one) (7 = 4.9%), Pontomediterranean – Pontocaspian species (11 = 7.6%), eremial species (3 = 2.1%), endemic species for the Carpathian Basin (4 = 2.8%).

It is worth to mention that while the total number of the North Palaearctic and extramediterranean European species is not too high (49 = 34.0%), the number of neuropterids with an area reaching some parts of the Mediterranean territories is higher (66 = 45.8%).

According to the suspected (closest) refugium territories during the last glacial period and immigration pathways after this time, the neuropterids existing now in the Carpathian basin may be grouped as below: species which were able to survive on larger part of the Carpathian Basin (44 = 30.6%), species probably survived only on the southern and southwestern territories of the Carpathian Basin (24 = 16.7%), species probably survived both in the Southern Carpathians and South-Eastern Alps (3 = 2.1%), species arrived after the last glacial period mainly, or exclusively from the South-Eastern Alps (6 = 11.1%), species immigrated only from the Illyricum (1 = 0.7%), species immigrated mainly or exclusively from the East Balkan (31 = 21.5%), species probably immigrated both from East and West Balkan (13 = 9.0%), species probably arrived from the both Balkan direction and also from the Noricum (8 = 5.6%), species immigrated probably both from East Balkan and Noricum (2 = 1.4%), species with entirely uncertain refugium territory or immigration direction (2 = 1–4%).

Consequently, about a half of the species probably was able to survive during the last glacial period on some parts of Carpathian Basin, while the other half of the neuropterids living now in our territory immigrated after this time from southern and south-western directions.

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GENETIC DIFFERENTIATION AMONG THE HUNGARIAN
POPULATIONS OF *EUPHYDRYAS MATURNA* AND *E. AURINIA*
(LEPIDOPTERA: NYMPHALIDAE)

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Both *Euphydryas maturna* and *E. aurinia* are r-strategist species. They lay 200–300 eggs in one or two big clumps on the leaves of the food plant and even their caterpillars live in a nest in the first three larval stages. The aim of our study was to analyse the genetic structure of the two species and search for the possible consequences of their specific life cycle on it. Therefore, we investigated enzyme polymorphism in several populations of both species. *E. maturna* samples were collected in 6 geographic regions: Bereg plain, Nyírség region, North Hungarian region, Körös region, Transdanubia and Transylvania. In this way, we had altogether 25 samples from 19 populations. *E. aurinia* samples (overall 10) originated from 5 populations in Transdanubia and from one in Slovenia.

Enzyme polymorphism was surveyed at 16 enzyme loci. The allele frequencies and the parameters of polymorphism were calculated in each sample. F-statistics was computed, AMOVA was carried out, dendrogram was constructed on the basis of the Cavalli-Sforza and Edwards distances and PCA analysis was conducted.

The results indicated that the level of polymorphism, especially the average number of alleles per locus and the average frequency of heterozygotes was relatively low in both species. At the same time, genetic differentiation among local populations within both species exhibited an average intensity. Nevertheless, the pattern of this differentiation did not show an evident geographic pattern; that is the genetic composition of the samples originating from the same geographic region were not more similar to each other than those of collected in different regions. This was evident on the dendrograms and in the results of the PCA analysis.

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QUATERNARY BIOGEOGRAPHY AND PHYLOGEOGRAPHY OF EASTERN CENTRAL EUROPE AND CARPATHIAN BASIN

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The European fauna was traditionally subdivided into a “*holothermic*” refugial and a “*holopsychric*” invasion type. The former type was subdivided according to the secondary subdivision of the large Mediterranean refugial area. This view was strongly confirmed and modulated by the recent molecular results and re-formulated as repetitive patterns of the generalized “paradigms” of core areas and tracks of post-glacial re-population. The second type was considered for a long time as result of a “Siberian” invasion, despite of the evidences which have revealed the taxonomical differentiation of northeastern “boreal” and southern European montane populations. Recently, growing evidence from fossil records and genetic research is starting to suggest that the traditional paradigm became questionable that the arboreal refugia were restricted to southern Europe and in particular the Mediterranean peninsulas (Balkan, Italian and Iberian) during the full-glacials. The earlier, pollen-based “tree-less tundra” models for Europe north of the transverse mountain ranges of the Pyrenees, Alps and Carpathians have repeatedly been questioned by surveys of the Late Pleistocene mammalian and mollusc fauna, as well. Extra-Mediterranean core areas were identified also in widely dispersed cool-tolerant frogs and reptiles. Some of these core areas had been at least near to the Carpathians and/or marginal areas of the Carpathian Basin. The close geological and also faunal connection of the Carpathians suggests the existence of highly dynamic contacts with mountains of the Balkan peninsula during the climatic fluctuations of the Upper Pleistocene. These connections show a highly contrasting picture compared with the refugia of the Iberian and Appenine peninsula which were much more sheltered by glaciated mountains of Pyrenées and Alps, respectively. The Carpathian Basin exhibits also numerous important characters concerning its post-glacial re-population. The organisation of community-complexes of the Pannonian forest-steppe connected by habitat ecotones resulted in the overlap of several different faunal types, e.g. Mediterranean, Balkanic, Siberian, Ponto-Caspian, Ponto-Pannonian, Turano-Eremic and Xeromontane elements. The E and S Carpathians, together with the mountains of W Transylvania can be considered as core areas of survival and autochthonous evolution in some invertebrate groups with limited mobility. In mobile insect groups only peripherally isolated sibling species/subspecies have been evolved, which display manifold biogeographic connections, e.g. to the Balkan peninsula, Asia Minor or S Russia. The distribution of the Mediterranean-Manchurian bicentric faunal elements, connected to the Ponto-Caspian waterway-system, shows long-distance disjunctions from the eastern Asiatic taxa. Gallery forests of Illyrian and Pannonian type and wetlands accompanying the large rivers of the Pannonian lowland have served as corridors of the northwards expansion of these species. The post-glacial re-population of the Carpathian Basin from different directions has been supported by Illyrian vs. Dacian vicarious pairs of sister species/subspecies. Cases of vicarious „Siberian”-Mediterranean sibling taxa have also been established.

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PANNONIAN GRASSLANDS: HABITAT TYPES AND INVERTEBRATE ASSEMBLAGES

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The Pannonian region (113 300 km², about 3% of the extension of the EU only) belongs to the smaller biogeographical regions of Europe. 56 habitat types of Community Interests (see: Interpretation Manual of the European Habitats, EUR 25 version, 2003, IMEH) occur in this region, among them there are 21 priority habitat types. Some of them, e.g. the Pannonian grassland and forest-steppe habitat types are endemic or nearly endemic for this region. The Natura 2000 network of the Pannonian region has an approximate extension of 14 000 km² (12.4% of the extension of the region) of which about 27% is the extension of the grassland types. These grassland types are mostly phytocenologically defined, and also their typical species, enumerated in the IMEH, belong to the Cormophyta, i.e. to single large monophyletic unit. Oppositely, their invertebrate assemblages consist of phylogenetically and ecologically rather heterogenous groups of animals. It is nearly impossible, therefore, to establish a general zoocenological system (*per analogiam* to the phytosociological approach) and also to outline some general rules of community organisation and habitat typisation based on invertebrates.

Consequently, here some case studies, based on invertebrate “taxocenoses”, could only be attempted which serve as “umbrella” groups for the habitat types. The land gastropods mostly reflect the relevant factors of the pedosphere, i.e. the geological substrate, soil and litter, in connection with the microclimate. The Orthoptera assemblages, characterised by some life-form types, mostly reflect the structure of the vegetation. They were analysed by ordination methods. The results generally coincide with the habitat typisation of the Hungarian National Biodiversity Monitoring System (A-NÉR). The butterfly assemblages were mostly analysed based on a dataset collected during the EU 5 FW project MacMan. They clearly follow the Ellenberg-Zólyomi ecological characteristics of the phytocenological relevés. The results of the PCA are, however, more fuzzy, due to the rather heterogeneous food plant and life cycle specialisations of this very diverse group.

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INTERESTING RECORDS OF TERRESTRIAL ISOPODS
(ISOPODA: ONISCIDEA) FROM THE ALSÓ-HEGY,
AGGTELEK NATIONAL PARK, HUNGARY

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Although several parts of the North Hungarian Mountains (e.g. Bükk, Zempléni Mts.) has been in the focus of faunistic surveys on isopods, reliable data on above ground isopods of the Aggtelek Karst were missing until our field surveys named “Dolina 2007 Expedition”.

Hand sorting in the plateau region of Alsó Hill of Aggtelek Karst have resulted ten isopod species (*Ligidium hypnorum*, *Mesoniscus graniger*, *Haplophthalmus hungaricus*, *Trichoniscus provisorius*, *Lepidoniscus minutus*, *Orthometopon planum*, *Protracheoniscus politus*, *Porcellium conspersum*, *Trachelipus difficilis*, *Trachelipus ratzeburgii*) including several rare Carpathian, Atlantic-Alpine and endemic ones. Moreover, we recorded the above-ground occurrence of the troglobitic *M. graniger* for the first time in Hungary. The most frequent isopods were *P. politus*, *L. minutus* and *T. difficilis* occurring both inside and outside of dolines. Small bodied and less frequent species (e.g. *H. hungaricus*, *L. hypnorum*) were found only within dolines.

Isopod assemblages in deciduous forests often include non-native or cosmopolitan species in Hungary, but species number rarely exceeds ten. The lack of synanthropic isopods indicates naturalness of the observed area. The high number of native species may be explained by high biotope diversity ensured by dolines of different size and depth. Our results suggest that dolines may serve as humid shelters practically for all isopod species during dry summer seasons.

WHERE IS THE BIODIVERSITY OF PANNONIAN FORESTS?
MULTIPLE TAXONOMIC GROUPS REQUIRE
OPEN-CANOPY MANAGEMENT

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It is increasingly understood that such groups as higher plants or butterflies contain multiple representatives depending on open, sparse-canopy woodlands. High numbers of such species have been evoked to support grazing savannah theory, or the notion that the structure of European vegetation would be kept open by large animals in absence of humans. Throughout most of the Holocene, open woodland species have benefited from human actions, such as forest pasture or coppicing, whereas recent closure of woodlands is driving these species to such structures as glades and edges. Consequently, it is often being proposed to actively restore traditional management methods in order to support threatened populations of such groups as butterflies. However, these proposals are often played down under the pretext that other may have opposing requirements.

During last few years, we investigated the habitat requirements of butterflies, saproxylic beetles and epiedaphic invertebrates in a complex of lowland oak-hornbeam forests in southeastern Moravia. Butterflies, observed using transects, were associated with open structures. Oak-feeding saproxylic beetles, sampled quantitatively using wood bait traps, also preferred sun-exposed wood, and the amount of sunlight was more important than supply of dead wood in vicinity. Regarding epiedaphic invertebrates, we found that carabids, spiders, myriapods and isopods all contained endangered “relic” species displaying association with open-canopy stands, whereas only very few generalists displayed an association with closed canopy.

We hence obtained a strong argument that the recent closure of lowland Pannonian woods is not reconcilable with preserving their biodiversity. It is not just butterflies and plants, but many other, ecologically disparate groups. Some basic assumptions and strategies of woodland conservation will have to be reconsidered, if conservation is to fulfil its mission.

PHYLOGEOGRAPHY AND SPECIES COMPOSITION
OF THE TWO *BOMBINA* SPECIES AND THE
TRITURUS CRISTATUS SPECIES COMPLEX
IN THE CARPATHIAN BASIN

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Hungarian populations of *Bombina bombina* and *Bombina variegata* show very interesting pattern. Isolated populations of *B. variegata* inhabiting mountainous areas of Hungary are surrounded by *B. bombina*. Hybridization between *B. bombina* and *B. variegata* in or around the islands occupied by *B. variegata* has been reported since the early twentieth century based mainly on morphological and partly by molecular evidence. Recent studies has shown that *Bombina variegata* had two different refuges during the last glaciation, representing two interspecific lineages, western (Alpine) and eastern (Carpathian), which lineages split well before the glaciations of the Pleistocene. Although the pattern of postglacial colonization processes of the two *Bombina* species in Europe are well known, evolutionary origin of the isolated *B. variegata* populations located in the Hungarian mountains remains obscure. In our study we inferred the genetic diversity of the two species in Hungary, using two mitochondrial genes (*cox1* and *nad4*), we described the evolutionary origin of the isolated *B. variegata* populations, and using phylogenetic and phylogeographic analysis we reconstructed the migration of the two species, and colonization of the Carpathian Basin by both *Bombina* species.

Three of the four species that form the *Triturus cristatus* species group are known to be present in Hungary. *Triturus dobrogicus* is the most common species in Hungary, inhabiting the lowlands, while *Triturus carnifex* lives only in the Órség and Kőszegi Mts area. *Triturus cristatus* was reported from the Aggtelek-karst region, however species status of this population is ambiguous, due to hybridization with *T. dobrogicus*, and lack of useful distinguishing morphological characters between the two species. In order to infer the distribution of the three species, and molecular diversity and population genetic structure of the Pannonian populations of the most common species *T. dobrogicus*, we used eight microsatellite loci, and partial sequences of the *nad2* mitochondrial DNA gene. Fifteen locations and 110 individuals were sampled. Levels of allelic diversity and heterozygosity for the eight microsatellite loci were high in the *T. dobrogicus* populations. We detected *T. cristatus* diagnostic alleles on two loci in the population from Aggtelek-karst, and similarly *T. carnifex* diagnostic alleles were found in Western Hungary, implying introgression between *T. dobrogicus* and *T. carnifex*. The phylogenetic analysis of the mitochondrial *nad2* gene revealed two main clades within *T. dobrogicus*, and population from Aggtelek karst region was identified as *T. dobrogicus*.

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In 2005 a consortium of seven partners initiated a three year national research project, entitled “The origin and genesis of the fauna of the Carpathian Basin: diversity, biogeographical hotspots and nature conservation significance”. The project supported by the National Office for Research and Technology (contract no.: 3B023–04). The main aim of the complex zoological research was to investigate and understand the various aspects of the biodiversity of the Pannonian region. The research involved classic and modern taxonomic investigations on taxa characterised by high species diversity and/or highly endemic groups, population biology, population genetic and conservation biology analysis of certain selected species, study of the species composition and diversity patterns of characteristic grassland and temporary aquatic habitats of the Pannonian Region. The studies aimed to support scientifically established nature conservation.

Consortium members and their project leaders:

- Hungarian Natural History Museum – Sándor Mahunka (leader of the consortium);
- University of Debrecen, Faculty of Natural Sciences, Department of Zoology, and Evolutionary Genetics and Conservation Biology Research Group of the Hungarian Academy of Sciences, Debrecen – Zoltán Varga;
- Szeged Biological Center, Institute of Genetics, Molecular Biodiversity Group – Zsolt Péntes;
- Directorate of Kiskunság National Park – Emil Boros;
- Directorate of Duna-Ipoly National Park – Sándor Bérces;
- Directorate of Aggtelek National Park – Sándor Boldogh;
- Öko Co. Ltd. – Tibor László.

Fauna Pannonica 2007 is organised by the Department of Zoology of the Hungarian Natural History Museum, the Directorate of the Kiskunság National Park and Öko Co. Ltd. It aims to bring together scientists interested in and working on the taxonomy, faunistics and phylogeography of animal taxa in the Carpathian Basin; conservation and ecology of threatened taxa; analysing biodiversity of various habitats and its changes.

The conference promotes better contacts among zoologists and ecologists dealing with the above topics in the Carpathian Basin and in Europe and provides a discussion forum, also for future development of these researches.