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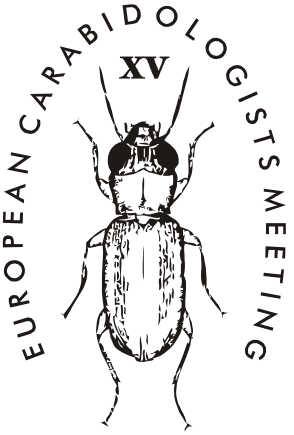

15th European Carabidologists Meeting
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BOOK OF ABSTRACTS

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To memory of Italian carabidologist Tullia Zetto Brandmayr...

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Tullia Zetto – short history of a gentle mind

June 2010, Pollino National Park

Tullia Zetto was born in Trieste 1949, January 15, and graduated in Natural Sciences 1972 at the University of the same city. After a short parenthesis in planarian regeneration research and fish endocrinology, she turned to carabid beetles and their biology, encouraged also by her husband Pietro Brandmayr, who worked as independent and voluntary researcher of entomology in the Institute of Zoology. In the years 1974-1980 she was active as granted research assistant of Comparative Anatomy for Biology and Natural Sciences, focusing at the same time on larval biology of this large beetle family, that shelters still so many incredible predatory and behavioural adaptations. Several approaches were especially successful in investigating larval feeding both in predatory ground beetles species, as well as in phytophagous Harpalines, among them practically all the most important *Ophonus* taxa living in Italy. In 1981, after many years of provisional job, she obtained a permanent position as "researcher" at the University of Trieste. This allowed her to implement the knowledge of larval morphology of unknown old-world genera, among them: *Harpalophonus*, *Graphipterus, Stomis, Metapedius, Platyderus, Myas*. Many of these larvae were collected in the field by pit fall traps during ecological surveys on italian biodiversity. Tullia demonstrated here an uncommon ability to organise sorting and identification of the trapped material, providing that no specimen of any taxon went lost or damaged. Especially two CNR (Centro Nazionale Ricerche) field surveys/collections, the first on the Dolomites (published 1988) and the second in Sicily (Nebrodi Mountains) were cared by her. In Sicily she was able to discover the first specimen of a new and unexpected woodlice genus,

Siciloniscus tulliae Caruso 1982, a relict living in the pristine forest of Malabotta in Northern Sicily. Despite her contributions to larval systematics and morphology, Tullia was not really devoted to carabid taxonomy. Anyway in the 80's she was able to identify any larva we presented her, in fact on the basis of van Emden's key she "self constructed" for her personal use a sort of specular preimaginal system of carabids; unfortunately her key to Italian larval ground beetles remains … in the drawer. The collection of carabid larvae is now conserved at the Ecology Department of the University of Calabria; it has to be considered the largest for the Mediterranean area.

Since the very first years of her scientific life Tullia's inquisitive mind was already impressed by the variety of behavioural patterns and morphofunctional solutions the larvae were able to display. The best of her work appeared after 1987, when she went to Calabria, as associate professor, to the Dipartimento di Ecologia in Rende near Cosenza. Here the shortage of teaching staff forced her to act as President of the Faculty Course of Natural Sciences for about thirteen years, meanwhile taking care of the work in a small morphofunctional laboratory on behavioural ecology of ground beetles. Two directions were immediately clear: behaviour and communication in relation to morphology, and chemical defence and avoidance mechanisms, always in the preimaginal stages.

On the one side she tried to put the "morphoecological types" of M.me Sharova into a more understandable framework, updating and reinterpreting them at least at an European level. On the other side more attention was paid to larva-larva interactions, to chemical cues and sensory complements –at both ultrastructural and functional level- in many taxa. Especially outstanding findings are those leading to the demonstration that some *Chlaenius* larvae are able to avoid intraspecific aggressive interactions by sharing the prey, a fact that contradictsthe old idea that all carabid larvae behave as cannibalistic in laboratory or in the field (Zetto Brandmayr et al., 2004). The research on antipredatory mechanisms was perhaps also more fruitful, and here the collaboration with other research groups (prof. E. Ferrero, Trieste), allowed for the first time the identification of the allomones of the pupae of *Carabus lefebvrei*, together with their abdominal glands secretion mechanisms (Giglio et al., 2009). This target is of particular importance, because the chemical defences of a coleopteran pupa detected and identified could provide, perhaps for the first time, a carabid species as a research "model" for the entire order. The history of Tullia's research needs to be completed by remembering the large amount of work devoted to the myrmecophagous habits of *Siagona europaea*, started 1993 with the discovery of ant remainings in the midgut of dissected adults. *Siagona europaea*, the only largely distributed european species of this old-tropics genus, revealed to be a large spectrum ant feeder catching its prey in the clay fissures of the mediterranean soils. Many of its sensory specializations and chemoecological adaptations represent a step towards true myrmecophily. The finding of the blind larva that was done with the help of Thomas Bauer, using subterranean pitfall traps was a real happening for us, following the "serendipity" tradition of entomologists. Tullia's "vision" about carabid defence mechanisms is outlined in a review on this topic written for the "Festschrift" of Professor Pietro Omodeo (Brandmayr et al., 2009). 2002/03 Tullia became full professor of Zoology. On her academic side, she was always deeply engaged in student welfare problems. As Rectors delegate she looked after for about 10 years and more the international student exchange procedures (Erasmus, LLP projects) at the University of Calabria, and still after the first attack of cancer, she was tireless active as vice-dean of the Faculty of Math., Phys. and Nat. Sciences. As an enthusiast and motivated teacher and organizer she dealt with a lot of subjects: zoology, population ecology, ethology and animal communication, basic ecology and environmental education for elementary school teachers in close related faculties. Except for some short periods in various hospitals, she never missed a day of work at the university. Only in the last months of her life

she used to spend the afternoon at home, still preparing slides or texts for her own courses or reading the manuscripts of co-workers: Anita Giglio, Teresa Bonacci, Emilia De Rose, Federica Talarico.

Tullia died November 24, 2010 in the Annunziata Hospital of Cosenza at 3.15 pm, surrounded by Pietro and their children Giulia and Enrico.

May God have mercy

Pietro Brandmayr, December 2010
(Enrico Ferrero, University of Trieste, gave me precious hints for this eulogy)

BRANDMAYR P. & T. ZETTO BRANDMAYR (con la collab. di R. Pizzolotto), 1988 - Comunitą a Coleotteri Carabidi delle Dolomiti Sudorientali e delle Prealpi Carniche. *Studi trent. Sci. nat. 64, Acta biol. suppl.*:125-250.
ZETTO T., T. BONACCI, A. MASSOLO & P. BRANDMAYR, 2004 – Peace in ground beetle larvae: non–aggressive outcome in *Chlaenius* spp. larvae interactions. *Ethology Ecology & Evolution*, *Nuova Serie*, 16(4):351-361.
BRANDMAYR P., BONACCI T., GIGLIO A., TALARICO F. F., ZETTO BRANDMAYR T., 2009 - The evolution of defence mechanisms in carabid beetles: a review. S. Casellato, P. Burighel & A. Minelli, eds. Life and Time: The Evolution of Life and its History. Cleup, Padova 2009.
CARUSO D., 1982 – *Siciloniscus tulliae*, nuovo genere e nuova specie di crostaceo Isopode della foresta di Malabotta nei M.ti Peloritani (Sicilia Nordorientale). *Animalia*, 9:293-302.
GIGLIO A., BRANDMAYR P., DALPOZZO R., SINDONA G., TAGARELLI A., TALARICO F., ZETTO T., FERRERO E., 2009 - "The defensive secretion of *Carabus lefebvrei* Dejean 1826 pupa (Coleoptera, Carabidae): gland ultrastructure and chemical identification.". *Microsc. Res. Tech.*, 72:351-361. DOI 10.1002/jemt.20660.

May 2003, near Squillace, with Thomas Bauer and Antonio Mazzei on the field, burying traps for Siagona.

ABSTRACTS

CYLINDERA (*EUGRAPHA*) *ARENARIA VIENNENSIS* (SCHRANK, 1781) (COLEOPTERA: CARABIDAE) IN LATVIA

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The first record of *Cylindera (Eugrapha) arenaria viennensis* (Schrank, 1781) (Coleoptera: Carabidae) in Latvia is published by R.Cibuļskis at 2003, mentioning of finding some beetles at forest near railway embankment, Daugavpils (SE Latvia). The species is known from other Baltic states - there are records about this species from Lithuania (V.Tamutis, unpublished information, Ferenca et al 2002, Ivinskis et al 2004, Tamutis et al 2011).

There are new finding in South-East of Latvia – near Svente village in sand pit, belonging to State joint-stock company „Latvia State Forests". The species is recorded in large quantities at July 2011. These beetles were considerably active in sunshine – hunting, copulating and migrating around all area of sand pit. Some specimens of *Cicindela hybrida* L. and *C. sylvatica* L. are observed in the same site and time.

This species are found in Latvia only starting with year 2002, and location in Svente is only second known. Nevertheless species has considerably wide distribution range with main part at South from Latvia (Central, Southern, South-East Europe, Caucasus and towards East to Siberia). The authors of article concluded that due to climate changes and warming this species possibly are starting to distribute towards North. It is possible that this species could be found in other places of Latvia in suitable habitats. In order to clarify this issue, additional research on distribution and ecology of this species is necessary.

The research has been done within the framework of the project of European Social Fund (No 2009/0206/1DP/1.1.1.2.0/09/APIA/VIAA/010).

THE FAUNA OF CARABIDS (COLEOPTERA, CARABIDAE) OF PROTECTED NATURAL OPEN LOWLAND SWAMPS OF SW BELARUS

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Protected swamps “Sporovski”, “Zvanets” and “Dikoie” are situated in SW Polesie near the border of Poland and Ukraine. Two of protected swamps are international Ramsar territories (“Sporovski” and “Zvanets”), another one “Dikoie” is the part of Belovezhskaya Pushcha National Park. The beetles were collected in the open marsh using pitfall traps, during 1999-2000, and 2007. In addition UV and Malaise trap were used in 2000. More of 4000 specimens of 85 carabid species were collected during the research period. A relative numerous populations of the rare and protected carabid species were discovered. There were: Carabus clathratus (Linnaeus,1761) (ER according Red Book of Poland); Carabus menetriesi Hummel,1827 (VU according Belarus and Russia Red Books); Trechus rivularis (Gyllenhal,1810) (CR, Red Book of Poland); Agostenus costulatus Motschulsky,1859 (VU, Belarus Red Books); Agostenus quadrisulcatus (Paykull,1790) (CR, Red Book of Belarus); Agostenus sulcicollis (Paykull,1798) (ER, Red Book of Belarus).

Special characteristic of SW Belarus swamp fauna is the representation of Agostenus spesies, not found in Polesie east to Jaselda floodplain.

SW Belarus may be regarded as hot spots for swamp species in Middle Europe and therefore have high conservation value.

THE FAUNA OF GROUND-BEETLES (COLEOPTERA: CARABIDAE) OF THE KALININGRAD REGION (RUSSIA)

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The Kaliningrad region has an area of 15.1 thousand square kilometres is situated on the south-eastern coast of the Baltic Sea. The fauna of Carabidae is generally typical for the Eastern Baltic Region: it is of the transitional character and is assembled at the junction of the southern taiga and the broad-leaved forest zones. The most important factors influenced on the features of the ground-beetles fauna are the soil type, humidity, vegetation and economical use of the lands. The loamy gleyed clays prevail in the soils composition of the Kaliningrad region. It is humid with dominance and variety of the wet and riparian habitats of different types. The most part of the region is occupied by flat and undulating plains spotted by fragments of the mixed and broadleaved-spruce forests. The forest cover of the territory has man-made or transformed character, it consists no more as 18% of whole area. All this reasons can impact negatively on the carabid species diversity of the region.
275 species of ground beetles were known in the area of the contemporary Kaliningrad region (north part of the former East Prussia) according to the last German catalogue (Bercio & Folwaczny 1979). Alekseev (2008) provided information on 283 species of Carabidae for studied area. Two new for the local fauna carabid species [*Trechus austriacus* Dej. and *Bradycellus verbasci* (Duft.)] were noted last time (Alekseev & Bukejs 2010) and three species more were confirmed to be inhabited the region [*Dyschirius angustatus* (Ahr.), *Amara equestris* (Duft.), *Acupalpus parvulus* (Strm.)].

A total of 284 carabid species of 66 genera are mentioned for Kaliningrad region. The number of the registered species per subfamily is as follows: Nebriinae – 10, Cicindelinae – 6, Carabinae – 16, Loricerinae – 1, Omophroninae – 1, Elaphrinae – 5, Scaritinae – 11, Broscinae – 2, Trechinae – 49, Patrobinae – 1 and Harpalinae – 182. The analysis of the species composition shows that the genera *Bembidion* (with 37 species), *Amara* (with 32 species) and *Harpalus* (with 25 species) are represented most widely. No less as 300 species of the Carabidae may occur in the region, but only 191 species from them were recently collected and thereby confirmed. The presence of a number of species (known from period before 1945) on the recent list of ground beetles of the Kaliningrad region need to reconfirm.

The most abundant, widely distributed in whole region and representative ground beetles of the Kaliningrad region are: *Carabus granulatus* L., *Nebria brevicollis* (F.), *Pterostichus oblongopunctatus* (F.), *Platynus assimilis* (Payk.) and *Loricera pilicornis* (F.). They are typical for forest habitats. *Harpalus rufipes* (Deg.), *H. affinis* (Schrank) and *Amara aenea* (Deg.) are the most common in different open habitats.

Ten species of the carabid beetles are listed in the in the Red Data Book of the Kaliningrad region (2010). Of them there are 4 that are certainly or probably extinct [category 0: *Carabus menetriesi* Humm., *Calosoma investigator* (Ill.), *C. sycophantha* L. and *Callisthenes reticulatus* (F.)]. Four

species, *Cicindela maritima* Latr., *Calosoma inquisitor* (L.), *Carabus coriaceus* L. and *Agonum ericeti* (Panz.), are included in basic part and two species, *Carabus nitens* L. and *C. clathratus* L., belong to category 4 ("required in special attention and control").

Some species, *Nebria livida* (L.), *Blethisa multipunctata* (L.), *Bembidion pallidipenne* (Ill.), *Epaphius rivularis* (Gyll.), *Blemus discus* (F.), *Pterostichus macer* (Marsh.), *Agonum impressum* (Panz.), *Dolichus halensis* (Schall.), *Harpalus flavescens* (Pill.), *Masoreus wetterhallii* (Gyll.), *Lebia cruxminor* (L.), *Dromius quadraticollis* Morawitz and *Philorhizus notatus* (Steph.) are rare in the Kaliningrad region (comparatively rarer as the included in basic part of the Red Book key species).

Ground beetles, *Carabus violaceus andrzejuscii* F.-W., *Notiophilus aestuans* Dej., *Dyschirius angustatus* (Ahr.), *Panagaeus cruxmajor* (L.) and *Chlaenius vestitus* (Payk.), are registered only in western parts of the Kaliningrad region. Some of above mentioned species can be recommended for the detailed ecological researches and possible for the future conservation measurements and including in the next edition of the regional Red Data Book.

The research by Andris Bukejs has been done within the framework of the project of European Social Fund (No 2009/0206/1DP/1.1.1.2.0/09/APIA/VIAA/010).

TAXONOMY IN XXI CENTURY: HOBBY OR BUSINESS?

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The modern processes of globalization of all spectres of a mankind have directly concerned scientific area, including taxonomy, fundamental "root" of biological disciplines.

In present study we are made analysis of the number of taxonomic publications on examples of two large families of the beetles (Carabidae and Staphylinidae) for the period from 1900 to 2005, besides that we are registered all authors on the countries, years and their fruitfulness. The quality of papers was considered and whether is the author the professional (i.e. work as the museum employee or the research assistant in the scientific organization, institute, etc.), or he is engaged in taxonomy at amateur level (hobby), the number of coauthors was considered also.

As a result of the received data it is possible to note following positive tendencies: 1. Increase in total of taxonomic publications; 2. Use of a new methods and an equipment, allowing to improve quality of paper and to specify results; 3. Occurrence of a new high quality taxonomists in China.

The change of priorities of a modern society and its monetarism results in many negative phenomena: 1. Occurrence of a considerable quantity of not reviewed and badly reviewed scientific magazines, and as result increase in number of poor-quality and erroneous publications; 2. Writing of paper for the report to justify financing, and to receive new, leads to occurrence of superficial, poor-quality publications, as a rule with several coauthors. For the sake of quantity it is endowed by quality of works; 3. Occurrence of concept "Impaήt-factor" as deification of commercialization of a science; 4. The "aging-and-extinction" of taxonomists. Ripening of the present expert-taxonomist is a long process, as well as ripening of a good taxonomic publication. The youth moves after market condition, and old men try to be arranged under it; 5. The problem so-called «Vandalism in taxonomy» (see Jach, 2006) which essence consists that nonprofessional fans of insects, without having necessary preparation and qualification, can publish descriptions of new taxa, ignoring rules of a International Code of the Zoological Nomenclature.

Summarizing the aforesaid, it would be desirable to pay attention to a question of SOUL. The subject needs to be loved, in our case – beetles. To make business (money) on a subject it is possible, but it contradicts the primary goals of fundamental science, process of knowledge for the sake of knowledge. We are try to develop the elementary units, "figures" in the living world which can be put or developed further in "higher mathematics" of the Animal Kingdom. Now we are also notice that last of Mohicans, professional taxonomists, publish their remarkable works in which long-term experience, and also love to the object, not spoiled by momentary profit sees in respectable age. It would be desirable to wish them strong health and longevity!

The research has been done within the framework of the project of European Social Fund (No 2009/0206/1DP/1.1.1.2.0/09/APIA/VIAA/010)

A REVIEW OF THE GENUS *NOTIOPHILUS* DUMERIL, 1806 (COLEOPTERA: CARABIDAE) OF THE WORLD FAUNA

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Notiophilus Dumeril, 1806 is monotypic genus of Carabidae family (Coleoptera: Carabidae) which is widespread in Northern Hemisphere, mainly Holarctic region. Some species are found in northern part of Neotropic region. The fauna of this genus is well investigated in general, nevertheless species new to science have been described from Eastern Asia in previous years. There are 58 species of *Notiophilus* Dum. known in world fauna nowadays. The complete taxonomic revision of genus *Notiophilus* Dum. has not been conducted until now.

The goal of research was taxonomic revision of genus *Notiophilus* Dum. The methodology of research was revision of taxa of this genus, deposited in museums and private collections, with classic methods of taxonomy – analysis of morphological features, as well as with modern methods of molecular biology and genetics.

The results of this research are revision of specimens of this genus in 60 museums and private collections around the world. More than 5000 specimens of this genus are processed. The result of research is description of 8 species new to science done by author of current article. These species origin is China: *N. anichtchenkoi* Barš., 2009; *N. chinensis* Barš., 2003; *N. dacatrai* Barš., 2004; *N. facchinii* Barš., 2003; *N. gansuensis* Barš., 2003; *N. katrinae* Barš.,2005; *N. schawalleri* Barš., 2003; *N. sichuanensis* Barš., 2003. The taxonomic status of *N. semenovi* Tschtsch. has been changed, proofing the validity of species, but taxa *N. bodemeyeri* Roub. and *N. solodovnikovi* has been synonimized. The genetic and morphologic research is ongoing on systematics of *N. aquaticus* (L.) and some other similar taxa, and results could improve the knowledge about world fauna and distribution of genus *Notiophilus* Dum. significantly. The author has been published the biogeographical review of world fauna of this genus.

Speaking about distribution of genus *Notiophilus* Dum. around continents, the author concludes that the highest species diversity can be found in Asia, where 43 species of this genus are found; there are 16 species of this genus known in North America (including introduced species); Europe – 14 species; Northern Africa – 5 species; Central America – 2 species. It is concluded that three species of this genus are introduced in North America: *N. biguttatus* (F.), *N. palustris* (Dft.) and *N. rufipes* Curt., but there are no species from North America introduced in Eurasia. There are provisional hypothesis for genetic research of populations of *N. aquaticus* (L.) about possible introduction of specimens of this species to North America from Europe.

In order to complete revision the author has insufficient material for genetic research from species found in Himalayas, therefore it is difficult to establish status of some taxons from there, as well as populations of *N. danieli* Rtt. found in Middle East.

CALOSOMA INQUISITOR (LINNAEUS, 1758) (COLEOPTERA: CARABIDAE) IN LATVIA

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Calosoma (s.str.) inquisitor inquisitor (L.) (Coleoptera: Carabidae) is very rare protected species in Latvia. The data about occurrence of species in previously known locations is insufficient and has not validated during some last years.

The goal of our research is to clarify distribution of this species in Latvia by inventory of previously known locations. The research has been conducted during 2009.-2011. The methods of research – inventory by inspecting of suitable habitats and using soil traps.

This species is first mentioned in Latvia by K.H.Precht from Riga at 1818. Later the concrete original sites of finding in Latvia and by citations from other authors the species is mentioned by Gimmerthal (1829), G. Seidlitz (1872, 1887), Jacobson (1905), Lindberg (1932), L.Danka (1950), V.Šmits (1968, 1973), Z.Spuris (1983), M.Stiprais (1984, 1988), A.Barševskis (1993, 2003) and others. This species is included in 1st category of Red Data Book of Latvia, and there are 7 locations mentioned, only three are considered as currently existing: Moricsala (NW Latvia), Babīte (C Latvia) and Ilgas (SE Latvia).

The result of our research – inventory in all three existing sites, the species was found only in one of locations – Moricsala. This site is included in protected nature territory – Moricsala Strict Nature Reserve. Moricsala is the island in Lake Usma, its area is 84 hectares, mainly covered by old broadleaf forest – oaks, lime, maple trees. The soil traps show presence of this species for all three years of research. The location in Ilgas, part of Nature park Silene, has been carefully inventoried in all suitable habitats, nevertheless the species is not found here and can be considered as extinct here. The species is not found in site near Lake Babīte as well. Our conclusion after inventories and careful analysis of published literature data by other authors is that population of *Calosoma (s.str.) inquisitor inquisitor* (L.) in Latvia is seriously endangered and there is need of specific conservation measures for this species, first of all – development of Species conservation plan. The attention should be paid also to state of population of this species in other Baltic countries.

IMMUNOCOMPETENCE OF THE CARABID BEETLES, CARABUS LEFEBVREI DEJEAN 1826 (COLEOPTERA, CARABIDAE) AT DIFFERENT DEVELOPMENTAL STAGES

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Carabus lefebvrei Dejean 1826 (Coleoptera, Carabidae) is an helicophagous Italian endemic ground beetle that lives in central and south Apennines mountain forests. The pathogens and parasites can be the main causes of mortality for all life-cycle stages of carabid beetles. However, few morpho-functional data about immune system are available. In this study we have compared the cellular population in the hemolymph of *C. lefebvrei* adult, larvae and pupae by light and electron microscopy analysis and identified the hemocytes involved in phagocytosis after *in vivo* artificial nonself-challenges. Moreover, the plasma phenoloxidase (PO) activity were detected using a L-DOPA substrate and enzyme activity was expressed as absorbance units at 492nm/ġL of hemolymph. Total hemocyte counts revealed in pupae a higher number of circulating hemocytes compared to larvae and adults. Four morphotypes of circulating hemocytes were found: prohemocytes, granulocytes, oenocytoids and plasmatocytes. The plasmatocytes were always the main circulating hemocyte type and the pupae percentage was lower than adults and larvae ones whilst the granulocytes were higher in pupae than in adults and larvae. After in vivo artificial non-self challenge treatments, all *C. lefebvrei* stages showed a non-specific immune response involving phagocytosis performed by plasmatocytes. The comparison of hemolymph PO activity (measured as the increment of absorbance at 30 min with respect to 0 min readings) between larvae, pupae and adults revealed a significant difference among stages (Kruskal-Wallis rank sum test, p-value<0.01). In particular PO in adults showed a significant higher activity compared to larvae (pairwise comparisons using Wilcoxon rank sum test with Bonferroni correction, $p<0.05$) and a highly significant higher activity compared to pupae ($p<0.01$). No difference was recorded among larvae and pupae PO activities. The exarate pupal stage produced a mixture of terpenes, ketones, aldehydes, alcohols, esters and carboxylic acids as defensive secretion from abdominal glands. This glandular secretion has both a deterrent function against predators and a prophylaxis function against pathogens. From an ecological perspective, the chemical protection is an efficient barrier against pathogen, hence, the pupal stage invest more energetic resources in specific cellular defence responses rather than in PO activity.

PREDATION AVOIDANCE MECHANISMS IN A GREGARIOUS PLATYNINE CARABID, *ANCHOMENUS DORSALIS* (PONTOPPIDAN, 1763)

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Anchomenus dorsalis (Pontoppidan, 1763) is a gregarious platynine carabid inhabiting muddy soils and fields across Europe. It is often found in association with species of *Brachinus* and like *Brachinus*, it has a bright bicoloured coat body that contrasts with the background. These species usually aggregate under heavy stones in open lands with sparse vegetation, such as pasturelands, croplands or in humid, sun exposed soils (Bonacci et al. 2004b). Laboratory investigations showed that *A. dorsalis* use warning signals versus natural enemies (Bonacci et al. 2004a, 2006; 2008; 2011a,b). We supposed that the combination of visual and olfactory signals, can produce a multimodal warning display (Rowe and Guilford 1999) toward the predators. When disturbed, *A. dorsalis* releases a strong odour (Bonacci et al., 2011a), and quickly retreats (with dispersal movement) into deeper soil crevices. Based on these behavioural observations, chemical analysis (by all-glass aeration apparatus) were conducted to identify the compounds produced by this carabid under undisturbed and disturbed conditions. GC-MS analysis of the extracts from individuals highlighted four major volatile compounds, undecane, heneicosane, Z-9 tricosene and tricosane, of which significantly more undecane was released by disturbed adults compared to undisturbed beetles. This suggests that this hydrocarbon could play a prominent role in the chemical defence of the species. The role of undecane as a defensive substance has been widely reported in other Insecta but the occurrence of undecane in pygidial glands of ground beetles has been described in Pterostichini, Loxandrini, Morionini, Catapieseini, Perigonini and Odacanthini (Will et al. 2000). Nevertheless, in *A. dorsalis*, volatile compounds ejected after disturbance could have a double function: repellent function to predators and chemical signalling function for conspecifics. In fact, previous studies showed that the chemicals released by a number of disturbed *A. dorsalis* individuals is not only a repellent towards natural enemies, but also elicites dispersal behavior in conspecifics (Bonacci et al. 2004a,b, 2006, 2008, 2011b). Such an intra-specific dispersal function is supported by the gregarious nature of this species; gregariousness and high population density allowing rapid intra-specific communication is generally thought to be necessary for evolution of chemical signalling molecule (Nault and Phelan 1984). It is reasonable to believe that in *A. dorsalis*, undecane discharge by the pygidial glands causes dispersal movement of individuals inside the interspecific aggregation (*B. sclopeta* /*A. dorsalis*). Assemblages of mixed species that share common predators may experience benefits that are similar to or exceed those of monospecific groups. These benefits may be particularly pronounced if individuals of one species can recognize the alarm signals produced by individuals of other species in the assemblage (in Mathis and Smith 1993).

CHANGE IN THE COMPOSITION OF CARABID BEETLES ASSOCIATED WITH ABANDONMENT OF PADDY FIELDS

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This study investigated changes in diversity and species composition for carabid beetles associated with abandonment. In addition, determination of the environmental variables that effect carabid assemblages in these habitats was attempted. 807 carabid beetles, which were comprised of 37 species found in the studied habitats, were collected. With increasing period since abandonment, the diversity and stability of the carabid beetles increased correspondingly. Ordination analysis showed that the species assemblages for all habitats could be clearly separated from paddy field, but earlier stages of abandonment showed no differences relative to paddy fields. Canonical correspondence analysis revealed that the most significant environmental variables that influenced carabid assemblage were soil pH, organic matter and the presence of tree cover. For earlier stages following abandonment, soil nutrient was the strongest factor influencing species composition of carabid beetles, in contrast to the presence of tree, shrub, or herb cover, which were associated with increasing diversity of carabid beetle in later stages following abandonment. The results of this study suggest that when restoration and management of abandoned paddy fields in some paddy field areas is performed it provides an excellent opportunity to improve the diversity and habitat qualities in agricultural landscapes.

PRE-PHYLOGENIC MOLECULAR ANALYSIS OF AIR-DRIED SPECIMENS *EUROPHILUS FULIGINOSUM* PANZER, 1809

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Dry insect specimens are commonly held in entomology collections (Gilbert et al., 2006). The Carabidae are among the largest and most diverse insect families, with no less than an estimated 40,000 described species that inhabit all terrestrial habitat types from the sub-arctic to wet tropical regions (Arndt et al., 2005). Insect mtDNA consists of thirty-seven genes including two ribosomal RNA (rRNA) genes twenty-two transfer RNA (tRNA) genes thirteen protein coding genes (Kambhampati, Smith, 2005). 650-bp sequences of mitochondrial DNA (mtDNA) have been designated as ‘‘DNA barcodes’’ and have become one of the most contentious and animated issues in the application of genetic information to global biodiversity assessment and species identification (Rubinoff et al., 2006).

During the study, 50 specimens of *Europhilus fuliginosum* Panzer, 1809 from air-dried collection of Institute of Systematic Biology (Daugavpils University) were examined. Beetles were collected at different times, from 1989 to 1999 in different parts of Latvia. Three different protocols for DNA extraction were used. Two protocols were based on the method of spin-column (Qiagen), and the third on the isolation on magnetic silica (NucliSens). Quantitative DNA analysis was based on measuring of concentration and quality analysis on using the method of agarose gel electrophoresis. The resulting DNA was of varying quality, but all of the samples could be amplified. RT-PCR method was also used. For the amplification, primers of the mitochondrial gene COI were used. Obtained PCR products were sequenced using Applied Byosystems chemistry on sequencer 3130xl. In 60% of cases obtained DNA sequences could be successfully used for further phylogenetic analysis.

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IMPACT OF GENETICALLY MODIFIED MAIZE MON 810 ON CARABID BEETLES (COLEOPTERA:CARABIDAE)

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Carabid beetles (Coleoptera: Carabidae) are one of the most abundant group of common epigeal anthropods in maize agroecosystems. They were chosen for our studies due to their important role played in arable fields as predators of phytophagous pests.

Growing genetically modified maize expressing insect toxicity may have indirect effect on this group or beneficial insects. The presented results included obervations on: (a) carabid's fauna in three different cultivars of maize (genetically modified maize MON 810, its corresponding non-transformed near isoline, conventional cultivar Bosman); (b) the effect of *Spodoptera littoralis* (Lepidoptera: Noctuidae) larvae fed on MON810 maize on biology of *Pterostichus versicolor*, *Carabus cancellatus* (Coleoptera: Carabidae); (c) the level of Cry1Ab toxin in three trophic levels.

Field trials was conducted at Experimental field of Department of Applied Entomology. Carabid beetles were collected in 2010 season. That was no differences in carabid's assemblage between three cultivars.

Larvae of *Spodoptera littoralis* were fed on Bt and non-Bt maize leaves as offer and offered as a prey to carabid beetles. The survival of carabid beetles were monitored every day during two weeks and the experiment was repeated twice. No differences in the carabid guilds' mortality between two combinations (Bt and non-Bt) were observed.

The quantity of Cry1Ab toxin was detected using enzyme-linked immunosorbent assay (ELISA) (Envirologix QualiPlate™ kit for Cry1Ab/Cry1Ac) modified for quantitative analysis. The content of the toxin in a fresh weight was as follows: (a) in the carabid beetles – an average 422,4 ng/g FW; (b) maize leaves - 89,22 µg/g FW; (c) larvae of *S.littoralis* - 917,2 ng/g FW. The experiment demonstrate that there was no accumulation of the toxin between phytophagous and predatory insects representing the second and the third trophic level.

The results of the laboratory experiments will be confronted with data collected under field conditions where the carabid beetles have a choice to feed on various prey species and a plant material.

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STRUCTURES OF CARABIDAE (COLEOPTERA) ASSEMBLAGES IN SELECTED FOREST HABITAT TYPES IN PUSZCZA BORECKA PRIMEVAL FOREST

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The article presents the results of 7 years' research on the structure of Carabidae (Coleoptera) assemblages in a mixed forest and linden-oak-hornbeam forest located in the ParsÄ™ta River catchment basin, in the area supervised by the Integrated Natural Environment Monitoring Base Station in Puszcza Borecka Primeval Forest. Fieldwork was carried out in the years 2004-2010. Carabidae were captured from May to September into Barber's pitfall traps filled with ethylene glycol and set up at 6 permanent study sites representing two habitat variants, i.e. the mixed forest and the linden-oak-hornbeam forest. Three sites were set up within each habitat with 5 traps mounted at each site. Beetles were captured over five months, from May to September, in 5 monthly cycles.

A total of 11696 Carabidae individuals representing 27 species were captured. The mixed forest supported 7115 carabids representing 21 species, and the linden-oak-hornbeam forest yielded 4581 individuals representing 26 species. Pterostichus niger was dominant in both habitat types.

The sample was subjected to qualitative, quantitative and ecological analyses. Some correlations between catch results and selected environmental factors are also presented.

THE SIGNIFICANCE OF NATIONAL PARKS IN PROTECTION OF GROUND BEETLES - AN EXAMPLE FROM POLAND

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According to the definition given by the IUCN a national park is a place with a "*minimum size of 1,000 hectares and with one or several ecosystems not materially altered by human exploitation and occupation, where plant and animal species, geomorphological sites and habitats are of special scientific, educative and recreative interest or which contain a natural landscape of great beauty*". In Poland there are 23 national parks witch in total cover ca. 1% of the country.

The aim of this study was to analyze the significance of national parks in protection of ground beetles in Poland. The Polish fauna of this group includes 518 species. In the analysis all available literature data were included (ca. 100 papers) as well as unpublished records collected in 7 national parks.

As the results of analysis 96% of carabid species known from Poland were noted as occurring in national parks, included 97% of species protected by the law, 60% of species listed in the Red Data Book, and 95% species from the Red Data List. For many rare and endangered species (eg. *Carabus zawadzkii*, *C. fabricii*) national parks group all or most of recent Polish localities.

HABITAT PREFERENCES IN BALKAN TIGER BEETLES (COLEOPTERA: CICINDELIDAE)

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The Balkan Peninsula is a one of the richest region in Europe according to species diversity of tiger beetles. In this area (ca. 5% of European continent) almost 40% of all European cicindelid species occur.
Material was collected during three entomological expeditions (TB-Quest III, TB-Quest V, TB-Quest VII) in the localities where the following species occurred: *Calomera fischeri fischeri*, *C. littoralis nemoralis*, *Cephalota chiloleuca chiloleuca*, *C. circumdata circumdata*, *Cicindela sahlbergi albanica*, *Cylindera trisignata trisignata, and Myriochila melancholica melancholica*. Samples (n=74) were collected in six countries: Albania, Bulgaria, Greece, Macedonia FYR, Romania, and Turkey (European part). To analyze habitat preferences of tiger beetles the following environmental parameters were studied: type of macrohabitat (sandy beach, bank of lake, bank of river, saltmarshes, ect.), and pH, salinity, humidity of soil as well as proportion of particle size of soil.
Among studied beetles *Calomera littoralis nemoralis* was found as the most eurytopic species, occurring in four different types of macrohabitats, while all other species occurred only in 1-2 types of macrohabitats.
The CCA analysis of Cicindelidae microhabitat preferences (soil parameters) showed that most species preferred soils with predominance of loam, dust, or sand particles. Only one species - *Cicindela sahlbergi albanica*, occurred on soils with gravel particles.

STRUCTURES OF CARABIDAE (COLEOPTERA) ASSEMBLAGES IN SELECTED FOREST HABITAT TYPES IN THE PARSETA CATCHMENT BASIN

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The article presents the results of 7 years' research on the structure of Carabidae (Coleoptera) assemblages in a mixed forest and linden-oak-hornbeam forest located in the Parseta River catchment basin, in the area supervised by the Integrated Natural Environment Monitoring Base Station in Puszcza Borecka Primeval Forest. Fieldwork was carried out in the years 2004-2010. Carabidae were captured from May to September into Barber's pitfall traps filled with ethylene glycol and set up at 6 permanent study sites representing two habitat variants, i.e. the mixed forest and the linden-oak-hornbeam forest. Three sites were set up within each habitat with 5 traps mounted at each site. Beetles were captured over five months, from May to September, in 5 monthly cycles.

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The sample was subjected to qualitative, quantitative and ecological analyses. Some correlations between catch results and selected environmental factors are also presented.

SPECIAL AREAS OF TIGER BEETLE FAUNA IN THE MEDITERRANEAN REGION PART II: THE MAGHREB REGION

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Traditionally the Maghreb region includes three countries of Northern Africa: Morocco, Algeria, and Tunisia. In total they cover an area of ca. 3 000 000 sq km. According to the biogeographical classification by Udvardy (1975) the region can be divided into three provinces: Mediterranean Sclerophyll, Atlas Steppe, and Sahara.

The tiger beetle fauna of the Maghreb region includes 18 species (ca. 16% of Palaearctic fauna) and is one of the richest in Western Palaearctic region. Assembled to their biogeographical origins, the Maghreb tiger beetle species fall into 10 different groups that include eg. Mediterranean, West Palaearctic, or Afrotropico Indo-Mediterranean species. Six taxa are endemic to this region.

The Mediterranean Sclerophyll is the Maghreb biogeographical province with the highest species richness (18 species), while the Sahara has the lowest Cicindelidae diversity (1 species). In Atlas Steppe 5 species have been recorded. Most species are restricted to single habitat types in lowland areas of the Maghreb region, only *Calomera littoralis littoralis* and *Lophyra flexuosa flexuosa* occurred in 3 different types of habitat.

USING OF THE DRY COLLECTION MATERIAL OF GENUS *NOTIOPHILUS* DUM.(COLEOPTERA: CARABIDAE) FOR THE SYSTEMATICS NEEDS: RESULTS OF DNA ANALYSES

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Key words: Coleoptera, Carabidae, *Notiphilus* Dum., barcoding, none-destructive DNA extraction, DNA amplification, sequencing.

Phenotypic plasticity and genetic variability of species can lead to incorrect identifications, therefore the identification of organisms by using DNA sequences becomes more and more important in ecological and biodiversity studies (Hebert et al., 2003; Raupach et al., 2010). A large number of dry-preserved insect specimens exist in collections around the world that might be useful for genetic analyses (Gilbert et al., 2006; Thomas et al., 2007). In this case molecular-based studies can be limited because of DNA degradation. In addition, standart methods of DNA extraction involve at least partial specimen destruction, when so called important specimens has been destroyed.

We analysed and compared the usefulness of nuclear ribosomal expansion segments, COI barcodes and mini-barcodes fragments for the molecular identification of genus *Notiophilus* Dum. (Coleoptera: Carabidae). Dry specimens from the collection of the Institute of Systematic Biology of Daugavpils University were used. The final species identification was done on the basis of combination of the molecular data with traditional systematics methods. Four species of the mentioned genus *Notiophilus aquaticus* (Linnaeus, 1758), *N. semistriatus* Say, 1823, *N. jakovlevi* Tschitscherine, 1903 and *N. semenovi* Tschitscherine, 1903 were included in the investigation (previously, *N. semenovi* was rated as *N. aquaticus* (L.) synonymous).

Genomic DNA samples were prepared from pinned collection material without external damages by using the QIAmp© Tissue Kit (Qiagen GmbH, Hilden), following the manufacturers extraction protocol with some modifications. Specimens used for DNA extraction were deposited in the collection. All amplification reactions of COI, 28S rDNA and 18S rDNA fragments were carried out on a Veriti Thermal Cycler GeneAmp© PCR System (Applied Biosystems) in 20 mkl volume. The obtained PCR products were purified following the protocol of the QIAquick PCR purification kit (Qiagen, Hilden, Germany). Sequencing was done using an ABI 3730xl capillary sequencer (Applied Biosystems, Foster City, CA, USA) and BigDye Terminator v 3.1 chemistry (Applied Biosystems). Morphological features was detected by using Zeiss stereomicroscope *Zeiss SteREO Lumar V12* and *Axiocam* digital camera. The pictures have been processed by Axioview *4.4* software. For the research of separate features the laser scanning microscope *Zeiss LSM 5 PASCAL* was used.

The most variable gene, as judged by the average proportion of nucleotides by which *Notiophilus* specimens differ, was COI; the less variable was 18S. Fixed differences for each gene examined and morphological features between similar *Notiophilus* species were shown that *N. semenovi* in future is considered as a separate valid species.

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BARCODING USEFULNESS IN THE SPECIES IDENTIFICATION OF COLEOPTERA: CARABIDAE

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Phylogenetic analyses used to studies of organism evolution, but today, they are a powerfool tool in broader fields of research, wheather related to genomics, protein engineering, conservation biology, or pest control in agriculture (Mauro, Agorreta, 2010). Genomic approaches to taxon diagnosis exploit diversity among DNA sequences to identify organisms (Wilson, 1995; Hebert et al., 2003; Gilbert et al., 1997). For animal taxa, the majority of these studies have used a short section of mitochondrial DNA (mtDNA), namely the first 650 bp of the 5'-end of the cytochrome oxidase I gene (COI) (Hebert et al. 2003; Elias-Gutierrez et al. 2008; Rock et al. 2008). DNA barcoding has been defined as a rapid species identification method and discovery without detailed taxonomic expertise (Hajibabaei et al. 2007; Stoeckle & Hebert 2008). In practice, mtDNA barcoding has received much criticism on methodological, theoretical and empirical grounds (Will & Rubinoff 2004; Hurst & Jiggins 2005; Meyer & Paulay 2005; Hickerson et al. 2006; Elias et al. 2007; Wiemers & Fiedler 2007), although mtDNA is a powerful tool for population genetic and phylogenetical studies of a variety of organisms (Kambhampati, Smith, 2005).

During the work more than 150 specimens of Coleoptera: Carabidae has been studied. DNA was extracted using the four different commercial protocols with various modifications. Two protocols have been developed to obtain the highest quality DNA for futher use in molecular studies. One method is based on spin-columns (Qiagen), and the second on the method of magnetic silica (NucliSens). The resulting DNA was amplified using primers of the gene COI. DNA was also amplified using the qPCR method by RT-PCR primers of the mitochondrial gene COI. PCR products were sequenced (Applied Biosystems 3130xl). In 70% of cases, received sequence may be used for phylogenetic analysis.

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UNDER WHICH CONDITIONS DOES RETENTION HARVESTING SUPPORT FOREST GROUND BEETLES?

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Forestry has impacted North European forests for hundreds of years, but a considerably more intense era begun only some 50 years ago. This intensification has speeded up the rate of extinctions among forest species. Indeed, in Nordic countries, forestry is considered one reason for the decline of one-third of threatened species. This finding has recently forced forest industries to partly replace clear-cut harvesting with other logging methods, and to change stand structures toward greater heterogeneity in tree composition. Here, I will review evidence for and against these actions, with special attention to ground beetles. Responses of ground beetles to logging are variable and depend e.g. on species habitat affinities. At the stand level, retention of approximately 30% will support most forest species. Evidence on structural heterogeneity in maintaining ground beetle assemblages appears scarce, and conclusions are currently difficult to draw.

EPIGEIC CARABID BEETLES (COL., CARABIDAE) IN STRAWBERRY PLANTATIONS IN NORTH-EAST POLAND

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A variety of scientific studies have been conducted in an attempt to establish the factors that influence the populations of Carabidae in various agroecosystems. The aim of our research has been to recognize the population size and species distribution of Carabidae present in selected strawberry plantations, and to verify if the age of the plantation can cause changes in the structures of assemblages of carabid beetles.
The observations were carried out in the north-eastern part of Poland near Bartoszyce. The four strawberry plantations of *Senga Sengana* variety selected for the experiment were of the different age. Samples were collected by use of modified Barber's traps every two weeks from May to October 2008.

The total 5682 carabid beetles, representing 61 species was catch. The most frequent were *Harpalus rufipes* 26,82%, *Calathus fuscipes* 23,69% and *Nebria brevicollis* 17,49%. In researched cultivations the autumn breeders, species characteristic for open habitats and eurytopic were the most abundant.

The results of the observations have confirmed that age and localization of the plantation has some influence on the abundance and species diversity of Carabidae populations dwelling in strawberries.

CARABID ASSEMBLAGES OF DRY MEADOW HABITATS IN HELSINKI METROPOLITAN

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Dry Meadows are important habitats for biodiversity in European countries. Their soil layer is thin and sandy, and too poor to support the growth of woodland, though these dry and rocky meadows harbor high species richness of vascular plants and arthropods. Although dry meadows are a key element for the conservation of biodiversity, already since the 1800's, the area of dry meadows has declined dramatically due to human disturbance, and particularly due to land use intensification and changes in agricultural practices. The main approach for the conservation of dry meadow ecosystems has been management by mowing and removal of hay, in order to reduce nutrient levels and halt overgrowth by nitrofilic vegetation. To address the problems of fragmentation and isolation of dry meadow habitats, artificial meadows are being constructed at sites in the Helsinki metropolitan areas recently. The carabid beetle assemblages of dry and rocky meadows in the Helsinki area are very species rich, and previous studies in this project have recorded approximately 80 species, including a number of rare and threatened species. The samples collected in 2009 were from sites at which artificial meadows are to be constructed and adjacent control sites of dry and rocky meadows. The carabid beetle assemblages of these artificial dry meadows, and dry and rocky meadow control sites will be compared, to see whether newly created artificial meadows with dry meadow vegetation acquire a carabid assemblage similar to that of dry and rocky meadow habitats in the local region. The BACI approach (Before-After-Control-Impact) is used for monitoring both plant and carabid species richness and abundances prior to construction of the meadows and afterwards (over three years), as well as at the control sites. This approach will provide information on which kinds of factors influence the development of the carabid assemblage at novel dry meadow habitats. Pitfall traps will be used for sample collecting and propylene glycol will be used as a fixative. This research will provide useful information on the potential role of artificial dry meadows in urban areas to supplement habitats networks and enhance urban biodiversity, and improve the provision of green space for urban residents with both biodiversity and cultural value.

A QUANTITATIVE ANALYSIS OF DOMINANCE STRUCTURE OF GROUND BEETLE COMMUNITIES

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The dominance structure is the most common characteristic of soil arthropods communities. Quantitative characteristics are often used as well (Renkonen, 1938; Mossakowski, 1970), resulting in dividing communities into mono-, oligo- or polydominant ones (Kuznetsova, 2005). Yet these are rather rarely used to describe of carabid communities (Khobrakova, 2006).

Any ground-beetle population can be subdivided into two, stable and labile, components, the former corresponding to resident species while the latter comprising migrant and sporadic ones combined. While being abundant in a particular habitat, the labile component can contribute a little to the structure of the entire community. From this evidence a hypothesis has been put forth that real structure and composition of the community is predominantly defined by the stable component. A study of the demographic structure proves this in general (Makarov, Matalin, 2009; Trushitsina, 2010; Matalin, Makarov, 2011).

In 2006-2008, dynamics of demographic structure of local carabid populations were studied in natural and lightly disturbed habitats within two, semi-desert and forest, belts. The stable component was identified for both the composition of dominant species and the dominance structure of entire community (full list) to be compared with those of residents (limited list). Prominent to strong differences were observed in nine out of 28 pairs compared. They concerned the structure of both the dominant and entire community. In spite of the fact that no general pattern was found, some trends were nevertheless revealed. These are as follows:
1) The dominance structure differs considerably between full and limited lists in transit habitats. As represented by flood-plains in the semi-desert belt these habitats aid mesophiles to migrate. In the forest belt, the highest elevations of the Oka flood-land are used by many carabids to escape from and survive during inundations.
2). Annual differences between full and limited lists usually coincide in the dominance structure.
3) Monodominant communities, as well as the phenomenon of superdominance, *ie*, when one species constitutes 70-85% of the total abundance, are rather exceptions to the rule. These were found in six cases only, their one-third being artifacts resulting from a technique peculiarity.
4) In floodplain terraces, the oligodominant communities are characteristic which include two species each reaching 30-40% of the total abundance.
5) Flood-plain carabid communities of high species diversity are characterized by a polydominant structure, with three or four dominant species being most frequent, each reaching 10-25% of the total abundance.

Thus, (a) when traditional methods are used to identify dominants, an error may occur; (b) the contribution of the labile component to the dominance structure depends on habitat peculiarity; (c) the labile component prevails in different biotopes depending on a particular belt.

THE PECULIARITIES OF LIFE CYCLE OF *BRACHINUS HAMATUS* F.-W.

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The old-instar larvae of *Brachinus* Weber (Coleoptera, Carabidae), which are known as ectoparasites of beetles pupae, were found in the start of 20th century (Wickham, 1893; quoted by Dimmok, Knab, 1904), while the first instars were described much later (van Emden, 1942; Wautier, 1963, 1964). In the late sixties Erwin (1966, 1967) described all larval stages and the main features of the life cycle of *B. pallidus* Erwin. Not long after Juliano (1984) studied in detail the biology of some North American *Brachinus*. He found that old-instar larvae feed on the pupae of aquatic beetles (Hydrophilidae and Gyrinidae) which are found by the first instar larvae (triungulins). The data about development of European *B. crepitans* (L.) and *B. explodens* (Duft.) were obtained only in the last years. It was established, that old-instar larvae of these species used as the food supply the pupae of carabid beetles from the genus *Amara* (Saska, HonÄ›k, 2004, 2005, 2008). In April 2007 two females of *B. hamatus* F.-W. were trapped in reedbeds on the right bank of Khara River (Elton Lake Region, Volgograd Area, southern Russia). They kept in the laboratory under ordinary room temperature (about 20-25°Š□). From 4 until 8 of May 2007 12 first instar larvae were emerged. The pupae of more abundant in this habitat carabid beetles, such as *Pogonus transfuga* Chaud., *Amara ambulans* Zimm. and *Curtonotus propinquus* (Mén.) were proposed to larvae of *B. hamatus* as the potential hosts. Only one triungulin selected in 7 of May a pupa of *C. propinquus* among all these species. During next twenty-four hours it fed intensively and increased in size very quickly. In the 8 of May it moulted on the second instar after that was preserved (at first in boiled water and then in 70% alcohol). According to data of pifall trapping in 2006-2007 the life cycles of *B. hamatus* and *C. propinquus* were reconstructed. It was found that the breeding period in *B. hamatus* and the period of larval development in *C. propinquus* are associated with each other. The mature specimens of *B. hamatus* were occur from early April until late May with peak of abundance during whole April. At the same time, the maximum number of first and second instars larvae of *C. propinquus* was observed in first and second ten-day periods of April, respectively, while in third instar ā€˜ in second ten-day of May. Because the teneral specimens of *C. propinquus* were emerged during whole June, the development of pupae can be occurs from early May until early June. The data of laboratory keeping and pitfall trapping of *C. propinquus* are well correspond to each other. Interestingly that among known hosts of *Brachinus* larvae *C. propinquus* is the first carabid beetles with an autumn period of reproduction (according to Larsson, 1939). All species of genus *Amara*, which were mentioned in previous studies (Saska, Honak, 2004, 2005, 2008), are characterized by eggs laying in spring or spring-summer (according to Larsson, 1939).

CLASSIFICATION AND PHYLOGEOGRAPHY OF *CARABUS* (*LIMNOCARABUS*) *CLATRATUS*. A MOLECULAR APPROACH

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The complex of *Carabus (Limnocarabus) clatratus* is widespread in the Palaearctic region: from Ireland to Japan. Many forms are described from delimited geographical regions. Some authors separated the former subspecies *maacki* as a distinct species (Imura et al. 1998, but Deuve 1994, Brezina 1999).

Mossakowski et al. (1995) found a high variability in enzymes within populations of northern Germany. Kamer et al. (2005, 2008) described a considerable variability at the level of DNA sequences; besides singletons, three main haplotypes exist in that region. *C. maacki* shows a p-distance of 4.9-5.5 % to continental (except F and I) populations what can be interpreted as support for the species status of this form. The Irish beetles showed also a relative high distance to all continental ones analysed up to that period.

The sequence data presented now necessitate a new arrangement of the forms described hitherto: a northern group comprises the 'continental' populations of middle Europe, Scandinavia, Poland, Western Russia up to the regions east of the Ural mountain, Kazakhstan, and Mongolia; a southern group covers population of Ireland, the south of France, Italy, the Talysch region of Azerbaijan, Kirgizstan, Mongolia and Yakutia.

Many European species show a pathway of re-colonisation from southern refuges to northern regions covered by ice during the glacial periods. The situation in *C. clatratus* is different and more complex.

FOREST EDGE CONTRASTS HAVE A PREDICTABLE EFFECT ON THE SPATIAL DISTRIBUTION OF CARABID BEETLES IN URBAN FORESTS

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Urban forest patches are highly fragmented and are characterised by sharp edges. These urban forests are bordered by various land-use types, which may have a considerable effect on the fauna and flora at forest edges, and into forest interiors. To investigate the effects of differentially contrasting edges (low vs. intermediate vs. high) on ground beetle assemblages (Carabidae) in urban boreal forests, we performed a study in the cities of Helsinki and Vantaa, southern Finland by placing pitfall traps along a gradient from ca. 10 m into three matrix types (secondary forest vs. grassland vs. asphalt) up to 60 m into urban forest patches. Individual species and carabid beetle assemblages were strongly affected by edge contrasts and distance from urban forest patch edges. The strongest effect on individual species was caused by high contrasting edges: generalist and open-habitat species were favoured or not affected while forest specialists were affected negatively. Effects of the abundances of potential prey and competitors on the carabid beetles were also evaluated, and some insights were gained. For example, forest and moisture-associated carabid species were negatively to neutrally associated with springtail abundances (a potential food source) while generalist and open habitat, and dryness associated species were more positively related to springtail abundances. In terms of potential competitors, forest and moisture-associated carabid species were negatively and/or neutrally affected by ant and wood ant numbers, while generalist and open-habitat species were neutrally to positively associated with ants and wood ants. It appears that carabid beetle habitat associations are more important in the responses of these beetles across edges of different contrast than are the prey and predator numbers collected there. Finally, we recommend the creation of "soft" or low-contrast urban edges if the aim of management is to protect forest specialist species in cities.

EGGS AND JUVENILES PREDATION BY CARABID BEETLES ON THE INVASIVE IBERIAN SLUG *ARION VULGARIS*, IN AGRICULTURE

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Arion vulgaris Moquin-Tandon 1855 is one of the most important invasive species in Europe, affecting both biodiversity and agriculture. The species is spreading in many parts of Europe causing severe damages to horticultural plants and cultivated crops in agriculture since satisfying and effective management solutions are still lacking. Regarding the biological control, *Phasmarhabditis hermaphrodita* is the only commercially developed agent. Studies have been addressed by several authors to investigate other potential biological controls and carabid beetles have been found to feed on *A. vulgaris*, in the laboratory as well as in the field. Three species in particular have been found effective and very common in agricultural environments: *Pterostichus melanarius*, *P. niger* and *Carabus nemoralis*.

The study is the first to apply semi-field experiments in a strawberry field, manipulating densities, to investigate how the carabid species *P. melanarius* and *C. nemoralis* affect densities of *A. vulgaris* eggs and juveniles, respectively.

For the first time, this study analyzed the detection time of slug-DNA of slug eggs in carabid beetles crops. Feeding experiments were carried out using *C. nemoralis* and *P. niger* feeding on slug eggs. Field sampling of target carabid beetles and slugs was also conducted in the field, for prey-predator relation and densities analyses. Gut contents of target carabid beetles were analyzed, using multiplex PCR methods, and results were combined with the data of the slugs.

Results show that both the species, *P. melanarius* and *C. nemoralis*, affect significantly slug eggs and juveniles densities under semi-field conditions.

Detection time of slug-DNA of slug eggs was found to be up to 10 and 20 hours post feeding for *P. niger* and *C. nemoralis*, respectively. One specimen over ten carabid beetles collected in the field was found to be positive to slug-DNA analyses of the gut contents. The egg laying period of *A. vulgaris* has been found to be in September and it is partly overlapping with the activity peak of *P. melanarius* in the field, which is in late August. The activity peak of *C. nemoralis* is in spring, when *A. vulgaris* is highly abundant as juveniles.

Carabid beetles, especially *C. nemoralis* and *P. melanarius*, have been shown to control densities of *A. vulgaris*, as juveniles and eggs, when population is larger in recruitments and more vulnerable. Moreover, natural conditions for predation in the field are confirmed by data from the field sampling, making these carabid beetles species good candidates as biological control agents.

THE COMMUNITY CONCEPT IN CARABIDOLOGY

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The community concept is one of the leading concepts in ecology, and the family of Carabidae is a taxon that can be easly used as a model for research on sinecological units, either for theoretical or practical aims. Even after a long debate that is going on since the beginning of the XX century, the definition of ecological community is still open, either between the functional view (i.e. interaction among the components of the community) versus the statistical view (i.e. recurring appearance of the same species in similar environments), either for what concern spatial limits (i.e., local versus regional). The problem if carabid communities are detectable units has been left open by Thiele (1977), who wrote that "In a well-defined faunal region such as central Europe it is possible to predict with some degree of certainity at least, which species of carabids can be expected to occur in a particular plant community", i.e. autoecological relationships are predictable.
In our presentation an unambiguous definition of carabid community will be discussed on the basis of unpublished case studies, and of the studies on carabid communities published in the proceedings of the past European Carabidologists Meetings.

REALTIONSHIP BETWEEN DECLINES IN GROUND BEETLE (COLEOPTERA: CARABIDAE) POPULATIONS AND PHENOLOGICAL CHANGES IN SCOTLAND

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Long-term trends in the abundance of ground beetles and their phenology were analyzed to test the hypothesis that species which are capable of changing their phenology are less prone to decline than those without this ability. Data have been collected by the author since 2005 at Glensaugh and Sourhope, two UK Environmental Change Network (ECN) sites in Scotland. Data from 1994 to 2004 were obtained from the ECN database. The 23 most species abundant were included in the study.Possible trends in total number of individuals caught and phenological indices (first day of appearance, median date of capture events, peak activity, length of activity period and last day of appearance) were analyzed using non-parametric Mann-Kendall's tau. Slope was estimated with Sen's method.Populations of seven species showed a significant decline over the studied period and only two increased in number. Eight of the 23 species appeared earlier in the year over the studied period and only Carabus violaceus showed later appearance. The median value decreased in six cases and increased marginally significantly in the case of Leistus terminatus. Peak activity of Calathus micropterus and Pterostichus diligens shifted to earlier dates. In contrast C. violaceus became more active on later dates over the 14 year period. The activity period shortened for 5 species. However, in all of these cases the activity-density also decreased markedly during the study period, decreasing the chance of individuals belonging to these species being caught.From those species with advanced phenology, only Pterostichus adstictus declined in number. However, in this case the cessation of yearly activity also became earlier and to a greater extent than the advance in the first appearance. Seven species with stable populations shifted their activity towards earlier dates. Nebria brevicollis and Pterostichus melanarius, the two species that increased in number, showed decreases in the median value and the first day of appearance. Four of the declining species disappeared from the catches progressively earlier over the study period.These findings provide evidence for significant changes in several species' phenology and support the hypothesis that populations of the species that advanced their phenology are more likely to adapt to global warming hence are less likely to decline. Earlier cessation of activity of several species over the study period indicates less suitable environmental conditions on later dates. The lack of an extention to the activity period suggests that this parameter is more likely to be controlled by photoperiod.

EFFICIENCY OF HOST UTILISATION BY COLEOPTERAN PARASITOID

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In insect larvae, optimising food utilisation with respect to available meals and time is essential for achieving maximum adult body size, which is a relevant proxy of fitness. We studied the efficiency of food conversion, body size, mortality and development time in a solitary idiobiont ectoparasitoid, *Brachinus explodens* (Coleoptera: Carabidae), reared in the laboratory on the pupae of another carabid genus, *Amara*. The efficiency of conversion index (ECI – ratio of ingested to assimilated food) was, on average, 54.1±1.1% (n=76), with a minimum of 26.9% and a maximum of 81.6%. The rate of increase in biomass gained (W_{gained}) with biomass of the host was constant in females, but it decreased in males over the range of host body mass. Females, therefore, grew heavier from hosts of the same mass compared to males. Body length increased with the host mass and was correlated with W_{gained} identically for both genders. Mortality was unaffected by the host mass, but it significantly increased below 20 °C. In contrast, the development time of the feeding phase of the larva increased with the host mass at 20.3 and 23.7 °C, but it remained unaffected at 26.9 °C and in all three temperatures considering pupal development. W_{gained} increased with development time up to ca. 8 days of larval feeding at 23.7 °C, above which it began to decrease. To our knowledge, our data are the first on food utilisation in solitary idiobiont coleopteran ectoparasitoids, and they present the highest values of ECI in insects.

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DOES MIB AS AN INDICATOR OF FOREST SUCCESSION FOLLOW A LOGISTIC FUNCTION? – EXAMPLES FROM WESTERN GERMAN BEECH AND POLISH PINE FORESTS

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Successional processes are an important element of most ecosystems, especially of anthropogenous forest monocultures. Here, after harvesting and replanting trees, large parts of the whole ecosystem start from early successional stages at the same time. Of course, succession depends on various site-dependent factors, but there are patterns broadly relevant for successional processes in forestry. One of these patterns seems to be underlying the course of development of epigaeic ground-beetle communities (Coleoptera: Carabidae) as can be followed, e.g., by monitoring the Mean Individual Biomass (MIB) of carabids over time.

E.g., in Western German beech stands of increasing age (14 stands, 1 – 165 years) MIB (just as well as the dominance of large carabids of the genus Carabus) can be described by a logistic growth function following the differential equation:

- with G being the study area's (ecological) capacity;
- and k being a constant comprising all other succession-related parameters.

Solving this equation results in:
Due to incomplete degradation of the stands (that have been afforested for a long time in history) there are high baseline values at t = 0 as well as an early onset of succession (i.e., the inflexion point of the functions is already reached a few years after the present beech trees were planted); probably due to the good quality of loam soils the slope of the curves is steep while MIB reaches a plateau value of about 650 mg (= G) in old stands.

Another example is given for Polish pine forests (39 stands, 21 – 119 years) which have also had a long history of forestry. Probably due to sandy and therefore "poorer" soils the logistic function is not as steep as in the first example, and also MIB values already peak at about 610 mg (= G) in old stands.

In conclusion, a mathematical model has been developed which regresses field data on succession and supplies information on, e.g., the initial degradation, the onset and speed of succession, and the ecological capacity of the geographical region and/or forest type. The model is subject to further amendment.

PATTERNS OF CHANGES IN EPIGEIC CARABID FAUNA (COLEOPTERA: CARABIDAE) ON DIFFERENTLY TREATED POST-AGRICULTURAL LAND

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Fallow land offers many possibilities with respect to nature conservation. The treatment of such post-agricultural areas may significantly influence ecological processes as succession, and thus influence species occurrence. However, since succesional processes may run very differently, long-term studies undoubtedly necessary to understand the possible patterns of changes in species compositions.

The present paper is a contribution to understand the formation of carabid coenoses on differently treated post-agricultural land. Carabid beetles were collected on five different study sites from 2004-2010, which are a planted pine forest (26 years old in 2004), a natural regenerated pine stand (about 5 years old in 2004), two irregularly mown study sites without biomass removal and one regularly mown study site, where the biomass was removed. On each study site three pitfall traps were installed in all years of study from mid-May to mid-September. Characteristic parameters of the carabid coenoses - number of species, number of individuals, total biomass and Mean Individual Biomass (MIB) as indicator of the stage of succession - were analysed to compare the study sites and to detect changes in time on the respective sites. Unconstrained ordination (CA) was carried out to get information about environmental factors with an important impact.

Altogether, 5539 individuals from 77 species were collected. Five species, *Harpalus rubripes* (790 individuals), *Calathus fuscipes* (657 individuals), *Calathus erratus* (520 individuals), *Pterostichus niger* (513 individuals) and *Calathus melanocephalus* (512 individuals), made up more than 50% of all specimens. Numbers of species and numbers of individuals were highest on the regularly mown study site and lowest in the forests. These parameters showed a decreasing trend on all study sites, which was significant for the species numbers in the planted pine stand. Total biomass showed a decreasing trend in almost all cases, too, with low values for the irregularly mown areas. MIB values were constantly very low for the managed study sites, with a tendency to somewhat lower values on the regularly mown site. The planted pine forest stand shows constantly high MIB values. A significant succession process was visible on the natural regenerated pine forest. The correspondence analysis indicated stage of succession as the most important factor for formation of the carabid coenoses.

The conclusion can be drwan that the method of treatment of post-agricultural land influences significantly successional stages and species composition on the areas. Therefore, a well-thought-out management of such areas at the landscape level may be an important tool to protect native biological diversity.

PHYLOGENY AND EVOLUTION OF THE SUBGENUS *MESOCARABUS* (CARABIDAE: CARABUS)

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The study of species complexes in which traditional taxonomy can not provide reliable limits between species is one of the more challenging situations for molecular phylogenetics. Species of *Carabus* making up the subgenus *Mesocarabus* Thomson, 1875 (Carabidae, Carabini) are a good example of this situation. *Mesocarabus* comprises three Iberian taxa, the European *C. problematicus* and the North Moroccan *C. riffensis*. We have studied five mitochondrial, four nuclear genes fragments and the endophallus morphology in 300 individuals representing more than 150 populations. These samples correspond to 22 out of the 23 subspecific names compiled by Turin et al. (2003) for the *lusitanicus* complex, and to several subspecies or populations of *C. problematicus* and *C. riffensis*. Phylogenetic relationships inferred from mitochondrial data did not always agree (incongruence) with those derived from nuclear data or the morphology of the aedeagus (inflated median lobe). This finding suggests the occurrence of hybridization and introgression events between populations that have not yet completed the speciation process.

Calibrated phylogenies, potential distribution maps and phylogeography of main clades have been explored to study the underlying evolutionary processes. It is concluded that *Mesocarabus* diversification is linked to the Betic-Riffian massif geological history during the Miocene, a period of complex changes that much affected the South Iberian Peninsula.

THE STRUCTURE OF CARABID COMMUNITIES IN DIFFERENT- SIZE FOREST STAND ISLANDS SITUATED IN THE MOSAIC LANDSCAPE

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The study was conducted in two consecutive years: 2007 and 2008. The research included 15 islands, grouped in five size classes: 0.14 ha, 0.27 ha, 0.63ha, 1.11 ha and 3.68ha. Each island was isolated from any potential colonization source with a distance of at least 500 m. In every island, three traps were installed in its peripheral (ecotone) zone and another tree in its central zone. Those were functioning in the period from May, the first till mid October. Every trapped individual was identified to species, its body length was measured, and its biomass was calculated based on the formula presented by Szujecki et al (1983). The number of carabid species was higher in the ecotone zones as compared with the island interior zones. The non standardized number of species (Fig. 1) grew with the growing size of islands, up to 0.63 ha, while the standardized number grew with island size up the 1.11 ha islands. Concerning the bigger islands, the respective numbers diminished. The observed reduction in total number of carabid species is explained in terms of the relationship between the faster withdrawal (r=-0.45) of the open area species and the not so fast colonization (r=+0.40) by the forest species with the growing size of an island. Also, the dominant species composition was subject to change with the size of an island (Table 1). The share of forest related carabid species was positively correlated with the size of an island; similar was the pattern concerning the large zoophages, the European and brachypterous species. In most cases, the indices exceeded the level of 50 % in the communities living in 0.28 ha islands or 0.63 ha islands. In the central parts of the islands, the portion of individuals belonging to hemizoophages, open area species, and dimorphic species, has been on the decrease. The larger an island, the higher value of the mean individual biomass index SBO, the index of Progressive Features Sum SCP. With the growing size of the islands, the carabid communities are placed still further to the uppermost right hand corner in the CSP/SBO model (Fig. 2). This is usually where the old growth stands' carabid communities are placed on the graph. Based on the calibrated SCP/SBO model (Skłodowski 2007), the actual developmental status was determined of carabid communities in every island under study. The communities living in 0.14 ha islands and 0.27 ha islands have reached in the ecotone zone the level of those carabid communities living in forest cultures. The communities living in the ecotone zone of 0.63 ha islands, and 1.11 ha island, and 3.68 ha islands have reached all the level similar to that characteristic of forest coppices. Concerning the core (central) parts of islands, the 0.14 ha communities have reached the level similar to that of forest cultures; the 0.27 ha islands' communities – the level of coppices; the 0.63 ha and 1.11 ha communities – the level of premature stands' communities; and the 3.68 ha islands communities were similar to those living in the old growth stands. Summing up, the response of carabid communities to different size forest islands has shown that the smallest islands which favor the establishment of stable forest communities are 0.63 ha. Concluding, it is to consider in the practice of forest management to create islands not smaller than 0.63 ha (this may be established at the level of about 1 ha, for the practical purposes).

CARABID ASSEMBLAGES IN AGRILANDSCAPE: STRUCTURE AND EFFECTING FACTORS

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Agricultural intensification has led to the major loss of biodiversity. Few studies have considered simultaneously habitat features, landscape pattern and farming system to explain changes in biodiversity of agricultural landscapes. This study investigated the respective effects of different factors on carabid beetles assemblages in agrilandscapes. The work has been carried out in Russia Tatarstan. Carabid beetles were sampled by pitfall trapping in 64 agrilandscapes using chronosequences of plots across different bioclimatic zones. The sample plots were selected on the basis of farming system (organic and conventional), soil type (clayer chernozem, calcareous, lighn gray , crop type (cultivated, cereal crops, perennial grasses, gardens), tillage-type (moldboard, moaldbordles plowing, surface and inter – row tillage) and landscape features (South taiga and forest - steppe regions of Volga basin). A range of these environmental variables were measured in each plot to interpret differences in carabid community composition. A total of 72 carabid species from 23 genera was identified. Harpalus rufipes and Poecilus cupreus dominated in most of plots. Both abundance and species richness were high among Transpaleartic and European species, mesoxerophiles. Autumn breeders were more abundant in forage grasses, spring ones – in all remaining cases. Discriminant analysis revealed tillage – type as the main factor effecting carabid assemblages in agrilandscapes. Other factors i. e. crop type, soil –type and landscape pattern were less important.

PREY DETECTION BY MOLECULAR ANALYSES OF GUT-CONTENT IN CARABID BEETLES AND METAL TRANSFER FROM SOIL TO BEETLES THROUGH FOOD WEB

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Transport of contaminants in ecosystem may occur through food webs. Xenobiotics like leads and cadmium are highly toxic with tendency to bio-accumulate in soil biota. Since soil ecosystem has very complex food webs, exposure pathways for inorganic metals to wild life and ecological endpoints are not always clear. Many carabid beetles are predators in soil ecosystem regulating their prey abundance. Metal concentrations in carabids tissue vary between different species but the means of transport from soil to beetles as main invertebrate predators in the soil ecosystems is still unknown. Identifying trophic pathways is necessary to reveal the ecological impacts of many pollutants. Therefore, we have used PCR analyses of gut content in carabids to identify predation on soil invertebrates. Carabid beetles, earthworms, slugs and soil samples were taken from metal contaminated forest sites in Croatia and Wales. In addition, 320 carabid individuals were taken from the same plots for diet analyses and checked for great range of potential prey. Metals were analyzed using ICP technique in soil, carabid beetles and prey tissue. Extensive screening using various group- and species-specific primers revealed that 40% of carabids were positive on earthworms, 29% on slugs and 5,4% on springtails, and Croatian and Wales populations were compared. Differences in metal concentrations were analysed for carabid species, their feeding preferences and between the seasons. Metal concentrations in soil samples were correlated with that in animal tissue and between the organisms. Concentrations in earthworm tissue were very high for Pb (677 ppm average, with 4647 ppm upper value), Cd (59 ppm average) and Hg (855 ppb), as well as its concentration factors (F). Therefore we suggest that earthworm predation is the most important mechanism for transfer of lead and cadmium from soil to beetles.

Potential toxic effects and further predator-predator transport and metal accumulation should be examined since carabid beetles are known to be main prey of many birds and terrestrial small mammals.

RAPOPORT'S RULE, SPECIES RICHNESS AND BODY SIZE VARIATIONS OF CARABID BEETLES ALONG ELEVATIONAL GRADIENT

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Efforts to gain universal patterns of grouping species richness along environmental gradients, like latitude and elevation are still present. Rapoport's rule assumes positive relationship between geographical range sizes of species with increase of latitude, claiming that latitudinal range sizes of species increase towards higher latitudes.

Here, we examined the response of carabid beetles to 1400 meters elevational gradient of Mt. UÄ¨ka and tested whether elevational ranges of beetles respond to this rule, meaning that species at higher elevations should have greater elevational ranges. This pattern has been tested for butterflies, ants and tephritid flies. In addition, we have analyzed carabids body size variations at both intraspecific and interspecific levels with increasing elevation to check for Bergmann's rule.

Present study was conducted during 2008 year in UÄ¨ka Nature Park, which is situated in the N-NE part of Istrian peninsula. Eleven plots were selected along elevational gradient. We calculated elevational range of each species that occurred at two or more plots subtracting the lowest altitude at which species was collected from the highest elevation and mid-point as a mean of the highest and lowest elevation. For two species, *Abax parallelepipedus* and *Carabus caelatus* present along whole gradient, body length was measured and the body size variations along elevation were analysed. Rapoport's rule was not supported for elevation by carabids, at least not as a linear function of elevational range size and a mid-point of elevation range. Instead, quadratic function has fitted data much better. Linear function has explained 10.8% of variation in collected data and quadratic function 63.3%. Species collected on lower and higher altitudes had smaller elevation range size from species collected on mid-elevation plots.

Results show decrease in body size with increase of elevation which is not in compliance with the Bergmann's rule.

THE FAUNA OF GROUND BEETLES ODOCANTHINI LAPORTE, 1834 AND LEBIINI BONELLI, 1810 TRIBES (COLEOPTERA: CARABIDAE) OF THE LITHUANIA

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The ground beetles of Odocanthini and Lebiini tribus are characterized by transversally or obliquately truncated, without membranous fringe apex of elytra, which not covering entire abdomen and smooth outer margin of front tibia.
It is a very diverse group, worldwide containing about 4000 species and 200 genera living mainly in tropics and subtropics, but only 252 species and 70 subspecies belonging to 30 genera occur in Europe. Most species are known in southern part of Europe and only 30 species belonging to 12 genera occur in north countries such as: Norway, Sweden, Finland, northern Russia, Estonia, Latvia and Lithuania.

The faunictical ecological and biological investigation of these ground beetles groups is very complicated as their lifestyle is very specific. For this reason the data about these ground beetles is not numerous. The species composition, distribution, ecological and biological aspects of their life in not good investigated in Lithuania. Perhaps all species of Lebiini and Odocanthini are considered as rare or very rare in Lithuania. At the moment 25 species are known in Lithuania and 7 are expected. One new species - *Demetrias atricapillus* (Linnaeus, 1758) for Lithuanian fauna has been disclosed after revision of collected material. All data about distribution and category of rarity of species of current tribes has been specified.

DOES FOREST MANAGEMENT ABANDONMENT AFFECT THE DIVERSITY OF GROUND BEETLES (COLEOPTERA, CARABIDAE)?

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Forest management may be viewed as a human-induced disturbance regime that is suspected to negatively impact biodiversity. On the contrary, unmanaged forests are submitted to a natural disturbance regime which may benefit some taxa, such as forest specialists. Previous studies comparing carabid species richness between managed and unmanaged forests showed either positive, negative or null results. These contrasted results may indicate that some specific habitat requirements, possibly influenced by forest management, might better explain carabid patterns than the simple occurrence of forest management itself.

We tested whether management abandonment is beneficial to carabid diversity by comparing the diversity of carabids in terms of total species richness and species richness of several ecological groups (trophic groups, dispersal ability, canopy-openness affinities and moisture affinities) between managed and unmanaged areas located in six French lowland and mountain forest sites. We hypothesised that carabid diversity would better respond to specific habitat components than to management abandonment per se. We expected species groups based on ecological traits to react differently to the studied environmental variables.

Within each forest site, sampling plots were randomly selected both in the strictly-protected reserves and in the managed areas surrounding the reserves and corresponding to the edaphic conditions and the stages of stand development observed in the reserves. In each of the 92 plots, three pitfall traps were activated during 3 one-month periods in spring-summer. We analysed the effects of management type, stand structure and microenvironmental variables on carabid diversity at the trap level, using generalised mixed-effect models.

We found that management per se type did not influence carabid total and partial species richness. Diversity was rather influenced by specific habitat features such as, depending on the ecological group, stand basal area, humus form, sapling density, seedling cover and abiotic parameters (pH, elevation). Our results support the hypothesis that landscape heterogeneity is beneficial to overall ground beetle diversity. However, the diversity of forest-specialist, carnivorous and brachypterous species is positively dependent on stand basal area which may be viewed as a degree of canopy closure. As a consequence, special attention should be paid to conserve closed-canopy mature stands in the landscape for the preservation of this specific diversity.

A REVIEW OF SUBGENUS *PHRATOR* SEMENOV, 1922 (COLEOPTERA: CARABIDAE: OMOPHRON) WORLD FAUNA AND DISTRIBUTION

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There are 1348 specimens processed from 12 collections of Natural Science museums and Universities during research. The data are obtained about 8 carabid species of subgenus *Phrator* Semenov, 1922, one of these is new species of world fauna. The distribution range information has been adjusted for 6 more species.

Phrator Sem. subgenus species are broadly oval, multistriate, often complexly marked carabids which inhabit sandy shores of rivers and lakes. In comparison with other round sand beetles, representatives of this subgenus are larger (7-12 mm), and they have significantly longer hind legs, as well as wider and longer mandibles.

The basic distribution range of species of subgenus *Phrator* Sem. is Afrotropic region: there are one species found in West Tropical Africa (*P. vittulatum* Fairm.), Northeast Tropical Africa are two species known (*P. multiguttatum* Chaud., *P. vittulatum* Fairm., East Tropical Africa two species (*P. multiguttatum* Chaud., *P. rothschildi* Alluaud), West-Central Tropical Africa four species (*Phrator n.sp., P. multiguttatum* Chaud., P. *schoutedeni* Deleve, *P. vittulatum* Fairm.), South Tropical Africa two species (*P. multiguttatum* Chaud., *P. depressum* Klug), and Southern Africa region – one species (*P. multiguttatum* Chaud.). One of the species (*P. grandidieri* (Alluaud)) is endemic to Madagascar.

Two species fron subgenus *Phrator* Sem. is found in Palearctic region. One of them (*P. multiguttatum* Chaud.) is known in Palearctic region only from delta of Nile river, but main distribution range is Arfotropic region. Second species (*P. variegatum* Oliv.) is endemic to Mediterranean sea basin. There are four separate subspecies of *P. variegatum* Oliv. considered nowadays – *P. variegatum variegatum* Oliv., *P. variegatum sardoum* Reitt., *P. variegatum boiteli* Alluaud, and *P. variegatum seurati* Alluaud. *P. variegatum variegatum* Oliv. is distributed in Spain, Portugal, and Algeria. *P. variegatum sardoum* Reitt. are found only in Sardinia, *P. variegatum boiteli* Alluaud known from Northern Tunisia, but *P. variegatum seurati* Alluaud. from Southern Tunisia.

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URBAN DRY ROCKY MEADOWS ARE VALUABLE HABITATS FOR CARABID BEETLES

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Many urban regions contain remnants of cultural habitats, such as pastures and hay meadows. The Helsinki metropolitan region contains a network of dry meadow habitats comprising, in addition to cultural habitats, of dry rocky meadows and fortifications. The urban region also contains ruderal habitats and a diverse matrix of informal green space, which can also be valuable for maintaining dry meadow assemblages. In this study I compare the carabid beetle assemblages of a variety of meadow habitats in urban, suburban and rural locations. My results show that rocky dry meadow and managed dry meadows are the favoured habitat for many xerophilic open-habitat species and that many such species favour urban habitats, presumably due to the availability of dry, light and warm microclimate. Mesophilic and hygrophilic species were generally more abundant in matrix habitats and more rural areas. The proportion of granivorous species was also greater on the rocky and dry meadows compared to matrix habitats. This study also revealed the presence of a thriving population of *Ophonus schaubergerianus* in the Helsinki dry meadow network. This species was previously represented only by a single record from 1947.

SPATIAL PREDICTION OF GROUND BEETLES IN BEECH FORESTS ON KARST

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Beech (*Fagus sylvatica* L.) is most widespread tree species in Croatia, which constitutes several forest communities on karst. In Croatia, spatial arrangements of these forests is different in Dinaric part where they creates continuous matrix, while in Pannonian part it is fragmented on isolated mountains. Plant diversity of these forests is influenced mainly by climatic conditions. Here, we have used field data on ground beetles from several mountains across Croatia, and data on five environmental variables for the whole territory of Croatia (elevation, annual precipitation, mean-, minimum- and maximum annual temperature). Using Maxent software we have developed predictive distribution models for 24 species which had at least 10 recorded localities. Exemption to this was *Calosoma sycophanta* with eight records. Developed models have shown patterns according to spatial distribution of species that can be divided into three groups. First group encompassed species distributed all over beech areal, while second group those species that are more restricted to the Dinaric part of beech areal. Distributions of species from former group were mostly influenced by elevation and maximum temperature, while those from latter group were influenced by precipitation and elevation or maximum temperature. Third group consisted of just two species; *Abax parallelus* and *Carabus ullrichi* that was limited to the Pannonian part, and predicted mostly with minimum temperature, followed by maximum temperature and precipitation. Five species that did not show clear membership with neither of three groups were all distributed across complete areal with exemption of *Leistus hoffmanseggi* which was restricted to the Dinaric part. The highest percentages of single environmental variable's contribution to the predictive models were those of precipitation for *Molops ovipenis*, and elevation for *Leistus spinibarbis*, 90% and 89.4% respectively. For majority of species, two environmental variables contributed with over 85% to the models. Models that had four similarly important predictive variables were developed for *Abax carinatus, A. parallelus* and *Carabus ullrichi*. Predictive models has designated some un-surveyed areas that were anticipated as potential habitats as suitable habitats for carabids species. Future efforts will be directed to inclusion of data from other types of habitats in models development, as well as field checking of prediction on un-surveyed areas.