

## Abstracts of posters

The posters are arranged in alphabetic order according to first author.

### ***Ommatoiulus malleatus* n. sp., a new Tunisian millipede, with notes on the *punicus* species group of *Ommatoiulus* (Diplopoda, Julidae)**

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A new millipede species, *Ommatoiulus malleatus* n. sp. (Diplopoda, Julidae), is described from the Ichkeul National Park, Tunisia. The gonopod structure of the species indicates the *punicus*-group which includes *Ommatoiulus punicus* (Brölemann, 1894), *Ommatoiulus seurati* (Brölemann, 1925), *Ommatoiulus aumalensis* (Bröle-

mann, 1925), *Ommatoiulus atlanteus* Schubart, 1960, *Ommatoiulus quadridentatus* Schubart, 1960 recorded from North Africa and *Ommatoiulus brandti* (Berlese, 1885) from Sicily. The new species is, however, well differentiated by a particular “hammer-like structure” on the mesomerite process of the posterior gonopod.



The poster session during the Nordic Baltic Congress of Entomology.

## Biodiversity of soil mites in urban landscapes of Ahwaz, southwest Iran

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The urban landscapes in Ahwaz, with a semiarid climate, were sampled monthly for soil mites in two periods of spring-summer and autumn-winter during 2003-2004. Collected individuals were identified to species level, belonging to the orders of Prostigmata, Mesostigmata, Oribatida and Astigmata. Diversity of soil mites in the two periods were compared using Shannon's diversity index ( $H'$ ). The overall diversity of soil mites assemblages was not significantly different between the two above mentioned periods

while Prostigmata had significantly higher diversity than Oribatida and Astigmata throughout the year. Also, we found no significant differences between diversity of Prostigmata and Mesostigmata. The most numerous species was *Tyrophagus putrescentiae* Schrank and among oribatids, the most abundant was *Zygoribatula connexa* Berlese. This study may lead to a better characterization of the biota of urban environment in the future.

## Ant fauna of the grey dunes in Latvia

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The investigation took place from 2001 till 2005 in the coastal dune habitats in seven plots along the western coast of Baltic Sea in Latvia. The investigation in the Ziemupe Nature Reserve was made during four years, in the Pape Nature Reserve - two years, in other territories - once.

The ants were sampled by two methods. Ant nests were counted with 1 m<sup>2</sup> frame and ant specimens were caught in pitfall traps exposed 22-28 days according to investigation year.

During research in sample plots of grey dunes there were representatives from the following species of ants: *Lasius niger*, *Lasius paralienus*, *Lasius meridionalis*, *Formica cunicularia*, *Formica cinerea*, *Formica fusca*, *Formica pratensis*, *Formica rufa*, *Myrmica ruginodis*, *Myrmica*

*rubra*, *Myrmica schencki*, *Tetramotium caespitum*, *Leptothorax acervorum*.

*Formica cinerea* was the the dominant species in both sample plots of the Uzava Nature Reserve and Lielirbe coastal dunes in the Ovisi nature Reserve according to number of nests and individuals.

*Lasius niger* was the dominant species in the Pavilosta coastal dunes, in the Ziemupe Nature Reserve, in the coastal dunes of Perkone and in the Pape Nature Reserve according to number of nests and individuals.

*Formica pratensis*, *Formica rufa*, *Myrmica ruginodis* were species found in dunes in Ziemupe Nature Reserve, which borders with pine forest.

## Spatial distribution and sampling of *Icerya purchasi* Maskell (Hom.: Margarodidae) on orange trees in southwest Iran

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The Cottony-Cushion Scale, *Icerya purchasi* Maskell, is an important pest of citrus and ornamentals. The first objective of this study was to analyze the spatial distribution of this insect on the orange trees, in southwest Iran. The second objective was to develop sampling plans to determine sample sizes for fixed levels of precision and fixed-precision-level stop lines for sequential sampling. Population estimates were made by registering the number of various stages of the scale on 40 twigs at 10 days intervals from 2003 to 2004. Taylor's power law and Iwao's

patchiness regression were used to analyze the spatial distribution of the pest. Taylor's power law fitted the data better than Iwao's regression model, indicating that *I. purchasi* populations were aggregated. Optimal sample sizes for fixed precision levels of 0.10 and 0.25 were estimated with Taylor's regression coefficients. Required sample sizes increased dramatically with increased levels of precision. The sampling plans presented should be a tool for research on population dynamics and pest management decision.

## A five year epidemiological study of scorpion sting in Kerman province, Iran from 2001 to 2006

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Scorpion stings are a major public health problem in many underdeveloped tropical countries. The rate of scorpion stings in Iran is one of the highest amongst the world. More than 25 species of scorpions have been identified in Iran so far, and 5-7 of them are of health importance. In Iran the most stings occur in the southern part with tropical climate including Khuzistan, Kerman and Sistan-Baluchistan provinces.

A total of 3960 stings have been reported, with the majority reported from the non-lethal scorpions in Kerman province (in south-east of Iran) during 2002-2006.

According to a field study in Kerman province 7 species of scorpions have been identified. These species belongs to 3 families: Buthidae (*Mesobuthus eupeus*, *Androctonus crassicauda*, *Odontobuthus doriae*, *Orthochirus scrobiculosus* and *Hottentotta saulcyi*), Liochelidae (*He-*

*miscorpius lepturus*), Scorpionidae (*Nebo henjamicus*).

This is a descriptive study intended to raise epidemic data and the occurrence of scorpion stings in Kerman province. The data have been collected from Kerman province health center during 2002-2006.

A total of 3960 stings have been reported in Kerman province during 2002-2006. Whereas 20 deaths have occurred as a result of scorpion stings in these 5 years. Only 2 of 7 scorpion species in Kerman province are found dangerous to human. The lethal scorpion species are *Hemiscorpius Lepturus* and *Androctonus crassicauda*.

Foot and hand are the most affected parts of the body (90%) ( $P < 0.05$ ). Children under 10 years old are more affected. While adults are stung more often than children, children are more likely to develop a more rapid progression

and increased severity of symptoms because of their lower body weight. Furthermore, elderly persons are more susceptible to stings because of their decreased physiological reserves and increased debilitation.

Females are more susceptible to the same amount of scorpion venom than males, because of their lower body weight. The epidemiological features of patients who has been envenomed show a disposition for rural areas (66%)

( $P > 0.05$ ), with most of the stings occurring in the summer months. Furthermore, the larger the scorpion population, the larger the incidence rate.

Constituting an important tool for the control of scorpion sting is necessary. Delimitation of the areas which are most involved and determination of the victims' profile is recommended. Also enabling more official and durable privation educational campaigns are suggested.

## Characterization of impact of different entomophthoralean isolates using laboratory culture of *Schizaphis graminum*

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There are over 500 fungi known to be associated with insect diseases from five classes of fungi, the Deuteromycetes, Zygomycetes, Oomycetes, Chytridiomycetes and the Trichomycetes. The largest number of pathogenic fungi are in class Zygomycetes (Dent 1993). Nowadays entomopathogenic fungi as the perspective bioagents are in the focus of scientists' attention in Latvia.

In this research the pathogenicity of five isolates – *Conidiobolus obscurus*, *C. obscurus* 15, *C. obscurus* J, *C. thromboides* and *Bazidiobolus ranarum* was tested on green bug aphids applying two methods: spraying and exposure methods.

The study was carried out on in the Institute of Biology (Salaspils) of the University of Latvia, in the Laboratory of the Experimental Entomology from October 2005 till March 2006.

Experimentally it has been found, that *C. obscurus*, *C. obscurus* 15, *C. obscurus* J, *C. thromboides* and *B. ranarum* cultures are virulent and cause death of aphid imagos.

Isolates of entomopathogenic fungi *B. ranarum* ( $LC_{50} = 41.8$  germs/mm<sup>2</sup>) and *C. thromboi-*

*des* ( $LC_{50} = 42.0$  germs/mm<sup>2</sup>), using exposure method, after 72 hours caused 60-75% corrected mortality of aphids.

In exposure experiment after 72 hours birth ratio of exposed individuals was essentially lower than birth ratio of control individuals. The most significant influence on aphids' birth ratio caused isolates of *B. ranarum* ( $LC_{50} = 41.8$  germs/mm<sup>2</sup>) and *C. thromboides* ( $LC_{50} = 42.0$  germs/mm<sup>2</sup>).

Isolates of *C. obscurus* ( $LC_{50} = 4.0 \cdot 10^5$  germs/ml), *C. obscurus* 15 ( $LC_{50} = 2.6 \cdot 10^5$  germs/ml) and *C. obscurus* J ( $LC_{50} = 3.3 \cdot 10^5$  germs/ml), using spraying method, after 72 hours caused 63-72% corrected mortality of aphids.

After 72 hours no individuals were born to aphids sprayed with isolates of entomopathogenic fungi *B. ranarum* ( $LC_{50} = 7.6 \cdot 10^5$  germs/ml) and *C. thromboides* ( $LC_{50} = 8.9 \cdot 10^5$  germs/ml).

Both spraying and exposure methods can be applied for estimation of pathogenicity of fungi and did not differ significantly.

## Carbohydrate inhibitory effect on lectins of *Ornithodoros lahorensis*

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Lectins from different tissues of ticks have been recognized, using different inhibitory carbohydrates. *Ornithodoros lahorensis* (Acari:Argasidae) were collected from north west of Iran and kept in laboratory for experiments. The ticks were fed artificially through parafilm membrane on sheep blood and kept in insectaria. Ticks' hemolymph, salivary gland, midgut and whole body were dissected 5-7 days post feeding. The extract of the tissues were used for hemagglutination inhibition assays against erythrocytes of dog RBC. Ten different carbohydrates (sialic acid, N-acetyl-D-glucosamine, N-acetyl-D-galactosamine, galactose, mannose, lactose, arabinose and fructose) were used as inhibitors. The results revealed that protein binding sialic acid are present extremely in

all tissues accordingly the agglutination activities were completely inhibited (e.g. the titer was reduced from 64 to 0 in hemolymph, in presence of sialic acid). In addition, the same results were obtained with salivary glands and whole body extracts using N-acetyl-D-galactosamin and N-acetyl-D-glucosamin inhibitory carbohydrates, while the midgut lectin activity was slightly inhibited by two mentioned carbohydrates and reduced the agglutination activity from 512 to 64 titer. No significant binding specificity to other sugars were observed. Lectins from all tissues of *O. lahorensis* have affinity for sialic acid and partially for N-acetyl-D-galactosamin and N-acetyl-D-glucosamin, it is assumed that these lectins can interact with glycosylated structures of transmitted pathogens.

## Spider fauna of Finland

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The aim of the project "Spider fauna of Finland" is to produce data on the spider fauna, its distribution, and ecological features for nature protection (especially for the new Red Data Book of Finland). The checklist of Finnish spiders (ca 630 species) has been compiled, and it is

available on the internet. The list is updated on a regular basis. Distribution data of spiders in Finland are under process, and distribution maps (10 x 10 km) are planned to be published. The project has been financed by the Ministry of Environment in Finland (in 2004-2007).

## Virulence of new strains of entomopathogenic hyphomycetes to *Leptinotarsa decemlineata* Say

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Control of Colorado potato beetle (CPB) with the use of entomopathogenic hyphomycetes is one of most important direction in solanaceous crop protection from pests. During field surveys in Almaty region of Kazakhstan and Krasnodar territory of Russia in 2006, five new strains of *Beauveria bassiana* were isolated from coleopterans of various species, including two strains from CPB (BLeK-06 in Russia and BLeA-06 in Kazakhstan), two strains from curculionid beetles (BCu2-06 and BCu4-06) and one strain from a chrysomelid beetle (BCh-06). These strains have been assayed for pathogenicity to older instar larvae and adults of CPB. For comparison, a *Paecylomyces farinosus* Pfl-03 strain from CPB and a *B. bassiana* BBK-1 strain from *Calliptamus italicus* (Orthoptera: Acrididae) were assayed. The beetles were treated with water suspension of fungal conidia with concentration of  $5 \cdot 10^7$  conidia ml<sup>-1</sup> and maintained under lab conditions for 30 days.

All the strains assayed showed high biological efficacy to the CPB larvae. The treated larvae ceased to feed on 2<sup>nd</sup>-4<sup>th</sup> day post inoculation. Treatment with BLeA-06, BCh-06 и BBK-1 strains caused 95-100% mortality 7 days post inoculation. Treatment with all fungal strains, except for B-Cu4-06 (showing 50% mortality)

and control (showing 35% mortality), caused 90-100% and 100% mortality on 9<sup>th</sup> and 10<sup>th</sup> day of experiment, respectively. However, at the end of experiment B-Cu4-06 treatment also caused 100% larval mortality. As much as 96-100% cadavers of larvae perished from fungal infection and placed into a moisture chamber produced fungal mycelial growth and sporulation, with the only exception of B-Cu4-06 strain which grew only in 10% of cases.

When the CPB adults were assayed, significant differences were found in virulence of the strains used. Beetle mortality was remarkably prolonged and reached its maximal level on 28<sup>th</sup>-30<sup>th</sup> day post inoculation. Virulence of BCu2-06, BCu4-06, BLe-06 and BCh-06 strains reached but 40-52%. On the opposite, BLeK-06 and Pfl-03 strains caused 72% and 92% at the end of experiment, respectively, and augmentation of mortality was higher in the case of Pfl-03. The latter two strains showed growth on 100% of cadavers, while other strains grew only in 35-90% of cases and no fungal growth was registered in case of BCu4-06 treatment. This allows us to presume that high toxigenic effect causes beetle mortality before the fungal pathogen itself is able to develop in the form of conidial sporulation.

## Diversity of dragonflies (Odonata) and protected species in Estonia

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Dragonflies are relatively large and conspicuously active insects. Despite of this more thorough data about ecological features of different species, including biotopical preferences and

zoogeographical distribution is still not characterized in Estonia. The accumulation of new material is very occasional.

Mainly only faunistic data has been collected

and lists of species for several districts have been established. All data we have now is very fragmented and based only on occasional observations.

There have been written only two more thorough papers concerning the dragonfly fauna in Estonia: First was made by H. Kauri in 1942 (MSc Theses, unpublished) second by Janika Ruusma in 1980 (Graduation Theses, unpublished).

The first records about Estonian dragonflies can be found from year 1778. Nowadays 54 species of dragonflies have been registered. Among these species seven species - *Cordulegaster boltonii* (Donovan), *Epitheca bimaculata* (Charpentier), *Libellula fulva* Müller, *Onychogomphus forcipatus* (Linnaeus), *Ophiogomphus cecilia* (Fourcroy), *Sympetma paedisca* (Brauer) (All category III, Rare) and *Anax imperator* Leach (IV, Care demanding) are listed in our Red Databook. From year 2004 only five NATURA 2000 species - *Ophiogomphus cecilia* (Fourcroy) (II,IV category by EU habitats directive), *Aeschna viridis* (Eversmann) (IV), *Leucorrhinia albifrons* (Burmeister), (IV) *L. caudalis* (Charpentier), (IV) and *L. pectoralis*

(Charpentier) (II,IV). protected in Estonia (Category III).

Among these protected species *Aeschna viridis* Eversman is the most rare one, whose distribution data has been rarely updated over past ten years. For *Ophiogomphus cecilia* (Fourcroy) more distribution data has been collected.

Among protected *Leucorrhinia* species, *Leucorrhinia albifrons* (Burmeister) is most common. This species is common inhabitant of all bogs water bodies over all territory except island Hiiumaa. Two other species *L. caudalis* (Charpentier) and *L. pectoralis* (Charpentier) have been very rare in Estonia until now. But in recent years these two species have become quite common in small water bodies in South-East and East Estonia. By opinion of authors there were two main reasons: 1) under changing social conditions fishing-nets were allowed to use to catch fish from small lakes. Before it was not allowed. After this from several lakes big fish, dangerous for dragonfly nymphs, were captured out; 2) distribution of beavers. These creatures have created several small water bodies. It seems that conditions in these water bodies were very acceptable for these two species.

## Mortality of scorpion sting in Kerman, Iran during 5 years (2001-2006)

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One of the important cause of children death is scorpion sting, specially in the south area of Islamic Republic of Iran. In this country incidence rate of scorpion sting is: 54/100000. In Kerman province incidence rate of scorpion sting is: 32/100000.

Scorpion sting is very important, because it create many social damage in all of world.

To survey on scorpion sting (cross sectional study) information & data that related to death due to scorpion sting during years 2001-2006 were collected from province hospitals & GIS map formed province scorpion fauna.

This study shown during 5 years, 29 people are dead due to 4229 scorpion sting.

Distribution of death was: *In women 51%, In men 49%, In children < 6 years 62%, In urban area 89%*. Highest incidence of deaths happened during first 6 months of year especially in May & Aug

Rate of death in cities of Kerman province: *kahnooj 79/3%, Bam 7/2%, Anbarabad 3/4%*

This study shows that in Kerman there are 8 species of scorpions. In addition, the study shows that all of death that occurred during 5 years only happened in areas that have one kind of scorpion species (*Hemiscorpius lepturus*)

Thus education and training of health staff and people for management of scorpion sting as an emergency is necessary.

## The importance of old deciduous trees in urban parks to saproxylic insects

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Saproxylic insects are one of the most threatened groups of species in Finland and elsewhere in Europe. These species are dependent on dead or moribund trees, or on other associated organisms. The main reason for their decline is the large-scale reduction of dead wood because of intensive forest management.

There are particularly many saproxylic species dependent on old deciduous trees. Old individuals of temperate deciduous tree species (oak, linden etc.) can be hundreds of years old, partly decayed, and they often have a hollow trunk. This kind of trees mainly occur in traditional cultural landscapes and habitats such as woodland pastures. In Finland, this kind of trees concentrate in the hemiboreal southern and south-western parts of the country. Because of the intensification of agriculture and other land use, old trees of this kind have disappeared to a large extent. At present, large-diameter hollow trees are mainly found in urban and suburban parks. These habitats can have a long continuity and provide substitutive habitats for saproxylic species. However, as hollow trees are often seen to pose a threat to public safety, they are increasingly being removed. Therefore, it is probable

that the most valuable old trees are decreasing faster than new ones are developing. To motivate and target conservation efforts more effectively, it is essential to be able to identify what kind of trees and sites in urban areas are the most important to the saproxylic species.

In preliminary studies we have found that several red-listed saproxylic beetle species (including some of Nordic conservation interest, i.e. *Crepidophorus mutilatus*, *Eucnemis capucina*) occur in urban and suburban parks within the Helsinki city area. We have initiated a study exploring which characteristics of host trees are the most important for the occurrence of threatened and rare saproxylic Coleoptera, Hymenoptera and Diptera. The studied characteristics include tree species, diameter, size and type of hollow, amount of wood mould ("mulm") and light conditions. We focus on linden, oak, maple and elms. We will also study the effects of host tree isolation to the species' occurrence, and assess if there are species or species groups that can be used to indicate high diversity of saproxylic assemblage and conservation value of the site. Finally, we will try to find out if the species will survive in felled trees too.



## Larval morphology and biology of the sawfly genus *Empria* (Hymenoptera: Tenthredinidae)

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We carried out the *ex ovo* rearings of ten sawfly species of the genus *Empria*: *E. candidata* (Fallén), *E. sexpunctata* (Audinet-Serville), *E. pallimacula* (Audinet-Serville), two species of the *E. hungarica* species group [*E. pumila* (Konow) and *E. pumiloides* Lindqvist], *E. liturata* (Gmelin) and four species of the *E. longicornis* species group [*E. alector* Benson, *E. longicornis* (Thomson), *E. tridens* (Konow), and *E. basalis* Lindqvist] and compared their external morphology. The larvae can be segregated into three groups: the species whose head is tessellated through granulation and with white spots on the trunk (*E. candidata*), the species with dark supraspiracular flecks (*E. sexpunctata*, *E. liturata* and *E. hungarica* species group) and the species without supraspiracular flecks (*E. pallimacula* and *E. longicornis* group). *E. sexpunctata* differs from the other species by having different form of the microsculpture of its cuticle and by very small glandubae. The larvae of *E. pumila* and *E. pumiloides* (their imagines are very similar) can be differentiated rather easily: the larva of *E. pumiloides* has completely black head and shows indistinct colour pattern on trunk while that of *E. pumila* shows yellowish-brown head with black coronal fleck and a distinct colour

pattern on its trunk. The colour pattern of the head and trunk in *E. pumila* is more similar to *E. liturata* than to *E. pumiloides*. *E. pumila* differs from *E. liturata* by its larger whitish glandubae. Discrimination of the larvae of *E. longicornis* species group can be difficult; however, *E. alector* has large and very distinct parietal as well as occipital flecks, while in other three species of this group these flecks are weakly developed or completely missing. The larva and the host plant (*Geum rivale*) of *E. basalis* were previously unknown. We found, that the larvae of several *Empria* species are often much easily differentiated than their imagines and starting from third larval stage it can be done by naked eye usually. In addition to colour characters, larvae can be separated through differences in the number of chaetae and glandubae, and in the morphology of glandubae. Although taxonomy of many tenthredinid groups on species level has traditionally been based on imagines, concurrent morphological study of the larval stages should be carried out before questioning the taxonomic status of a species regarded as problematic on the basis of imaginal characters. A key to the larvae is compiled.

## Spatial distribution of caddisfly Trichoptera communities in the small streams of Latvia

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The scale at which the lotic ecosystem is observed is important when determining which factors influences its structure and function. Large scale factors affect the macroinvertebrate distribution even on a very fine scale. Small streams are very heterogeneous ecosystems with patchy distributed microhabitats. It is not easy to categorize substrates on a linear scale as physical variables. Streambed substratum affects the distribution and abundance of lotic invertebrates. Diversity and abundance of macroinvertebrates increase with substrate stability and the presence of particulate organic matter.

The aim of this study was to characterize the spatial variability of the caddisfly communities in the stream reach, stream and river basin spatial scales of the small streams of Latvia.

Material was collected in the frame of the EU Fifth Framework Programme "STAR" project. Samples were taken with the Surber sampler (frame size 0.25 x 0.25m; mesh size 0.5mm) in the May-June and September of 2003. Hierarchical sampling design was applied for 9 streams: stream reach → stream → river basin. In 15 streams sampling was conducted only in

the lower part.

The investigated stream reaches were characterized according to the "STAR" site protocol (general site related information, stream morphology and hydrology, human impacts on sampling site, pollution at sampling site etc. and detailed sample related information).

The predominant stream substrate was sand, cobbles and gravel. The banktop and bank-face vegetation structure in most of the studied stream reaches was simple with 2 or 3 vegetation types, and mixed semi-natural woodland or shrubs were typically found within 50 m from the banktop.

There was a difference in the spatial distribution of the caddisfly Trichoptera communities on stream reach (upper, middle and lower part), stream and river basin spatial scales. For example, from the family Lepidostomatidae *Lasiocephala basalis* was characteristic for River Daugava and River Gauja basins, but *Oligopteryx maculatum* was characteristic only for River Venta basin.

Investigation was supported by European Social Fund (ESF).

## Epigeic invertebrates in the raised bogs in Latvia

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The aim of the study was to evaluate invertebrate diversity in different raised bogs in Latvia to give background for bog species protection and management.

Investigations were carried out in 2003 and 2005. 30 pitfall traps were arranged on 60 m

long transect in the typical raised bog habitats in nine bogs and exposed for 28 days once per year. All macroinvertebrates were extracted from samples and identified.

More than 150 epigeic beetle species were identified. Ground beetles (Carabidae) and rove

beetles (Staphylinidae) dominated in number of species and density among invertebrates. Among them bog specialists were identified: *Agonum ericeti*, *Pterostichus rhaeticus*, *Acidota crenata*, *Carabus nitens* and others. Numerous species were common in pine forests and heath lands, and wetlands.

Population density of beetles was higher in bogs with well-developed hummocks, but lower in bogs with dense moss cover. That could be explained by combination two factors: hummocks provide beetles with refuges and better possibilities to feed; but dense moss cover - less possibilities for sheltering and good possibilities to move more easily. Obviously, the latter factor provided higher species number and species diversity.

The most similar beetle fauna were observed in the bogs with well-developed hummock structure (Bazi, Kemeru, Teici, Cena bogs). But in the bogs with other type of micro relief (Nida, Lielpurvs, Vasenieki, Klani) the fauna was less similar. The specificity of fauna in Suda-Zviedru bog cannot be explained, as bog did not differ

from others with specific features. The beetle fauna did not follow the botanical classification of bogs in Latvia. No definite similarity in beetle fauna among bogs situated in the same geobotanical region was stated. Presence of recent bog fires, melioration and water bodies had some influence in forming of species composition of beetles.

Spiders had high population density in the bogs. The species were not identified, but Lycosidae were the most numerous among spiders. The relative population density of these spiders depended on possibilities to move (Nidas and Lielpurvs bogs). Higher density of spiders in the Bazu bog was determined by presence of inland dune ridges nearby. The population density in other investigated bogs was more or less similar.

Ants were also among the dominant insect group in bogs. Usually widely distributed and ecologically plastic species dominated. *Formica gagatoides* can be regarded as bog specialist.

Bugs and cicadids also were common in bogs, but Diplopoda, Chilopoda, Isopoda and Opiliones were rare.

## Comparing population size of the threatened longhorn beetle *Leptura maculata* to common congeneric *L. quadrifasciata*

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The northernmost European population of the longhorn beetle *Leptura maculata* is restricted to a small area in south-eastern Finland. The species is common in Central Europe but classified as threatened in Finland. *Leptura quadrifasciata* is distributed throughout Finland. Both species share similar habitat requirements. I studied the population size and structure of these species using mark-recapture technique along a 1.0 km roadside on adult habitat. Data were collected in July 2005 and 2006. In 2005, overall 383 individuals of *L. maculata* were captured and marked (53% males, 28% females, 19% undetermined). In 2006 the number of marked individuals was 355 (65% males, 34 % females).

Recapture percent was 19 in 2005 and nearly 33 in 2006. There were 139 marked individuals of *L. quadrifasciata* in 2005 (29 % males, 38 % females, 33 % undetermined) and 155 individuals in 2006 (55 % males, 34% females, 11% undetermined). Recapture percent was as low as 7 in 2005, but 17 in 2006. Recapture percentages were too low in order to use the Jolly-Seber model for estimating population sizes. However, the large number of marked individuals suggests that *L. maculata* has a viable local population in the study site. It was surprising that the threatened species was more abundant than its common congeneric.

## ***Dendrolimus superans sibiricus* and main secondary pests on Larch: An example from inner-Mongolia, China**

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Since the year 1990 there has been a continuing study in northern China to monitor the outbreak of Siberian moth (*Dendrolimus superans sibiricus*). Millions of hectares of forests and more than 98 % of the afforested area of northern China have been attacked by this pests in recent years. A new programme, funded by Academy of Finland and Ministry of Foreign Affairs in Finland, has been launched as cooperation between China and Finland. Main attention will be given to the Siberian moth, one of the most important defoliators of *Larix gmelinii* in China. The last outbreaks of the pest have occurred in 1935-1947, 1950-1959, 1962-1969, 1978-1985, 1989-1997 and 2001-.

*D. superans sibiricus* is presumed to have originated in Siberia but has apparently been spreading westwards at a rate that has been vari-

ously estimated as 12 km per year or 40–50 km per year. During outbreaks, trees can be defoliated during 2–3 successive years and many trees are unable to withstand such a long period of defoliation. Furthermore, the outbreaks of *D. superans sibiricus* are also very often followed by outbreaks of secondary pests (Scolytids, Cerambycids and others). In our study area particularly *Ips subelongatus*, *Acanthocinus carinulatus*, *Monochamus urussovi* and *Monochamus sutor*.

The program will try to find basic reasons for the forest insect outbreaks by applying e.g. the most modern GIS procedures and dynamic remote sensing landscape pattern models. As part of the program my study will focus on invasive alien species (IAS), that would have a suitable ecological niche also in Finland, and mass rearing of parasitoids on *D. superans sibiricus*.

## **Species diversity and insect-caused leaf damage in genetically modified Silver birch (*Betula pendula*)**

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Fifteen silver birch (*Betula pendula* Roth) lines carrying a sugar beet chitinase IV gene and eight wild-type birch clones were grown in a

field trial. The chitinase transgenic birch lines were originally produced in order to test the possibilities to increase fungal disease resistance

in birch. The objective of the field trial was to study the biological interactions between chitinase transgenic birch lines and other organisms. In the current study, insect species diversity, density and the damages caused by insects were monitored three times during one growing season, and the transgenic lines were compared to the wild-type birch clones representing natural variation among birch genotypes.

The most abundant group of insects in all the studied birch types was aphids. The total insect densities were well explained by aphid densities. In general, transgenic lines had more insects (mainly aphids) per branch meter than the control, especially in early and in mid season independent of the level of transgene expression. On the contrary, no clear differences between the transgenic trees and other wild type trees in total insect densities was found.

Chewing damage was the most common type of leaf damages in all the trees. The composition of the damage types was less variable in some chitinase transgenic lines than in the control plants. There were no differences in the proportion of damaged leaves between the transgenic lines, control and wild type trees. The effects of the transgenic chitinase on insect densities may have been mediated by the effects on fungal densities on birch leaves and on the general condition of the plants. In general, more variation was observed in the studied traits among the transgenic lines than in the wild-type clones. The distribution of insect groups as well as damage types were the most diverse in late season. This study provides important background information for the risk assessment of genetically modified trees.

## The outbreaks of the pale tussock moth, *Calliteara pudibunda* (L.), in Estonia

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The pale tussock moth, *Calliteara pudibunda* (L.) (Lepidoptera, Lymantriidae), is a common and widespread species, occurring throughout the temperate deciduous forests of Europe and Asia. Mass outbreaks of the species have been recorded in beech (*Fagus sylvatica*) forests of Central Europe and in oak (*Quercus robur*) stands in south-western Russia and Ukraine. In northern Europe, including Estonia, the species usually occurs sparsely on different deciduous trees in forests and parks. In the recorded history of forest entomology of Estonia, only three occasions have been described when populations of this lymantrid moth suddenly and locally exploded and the caterpillars occurred in huge numbers. All these outbreaks occurred in birch (*Betula pendula*) forests. In 1935–1936, outbreaks of *C. pudibunda* were recorded in some localities (Paide and Tallinn regions) of central

and northern Estonia. About fifty years later, in 1984–1985, *C. pudibunda* spread over an area of 200 hectares in the Laeva forest district in southern Estonia, 90 hectares of birch stands growing on drained soils were entirely defoliated. In the autumn of 2004, heavy attack on birch trees by the caterpillars was observed on the Island of Hiiumaa where an area of 86 hectares of the birch forests was defoliated. The outbreak continued in 2005. The small hairy caterpillars were also transported by the wind to the surrounding area where they fed on birches, willows (*Salix* spp.) and occasionally on other trees and shrubs. According to the observations, the population declined suddenly after two-year culmination. In latent populations, the caterpillars of *C. pudibunda* are normally bright yellow in colour but when occurring in high numbers, they get discoloured in mainly brownish or greyish tones.