XXVIII Nordic - Baltic Congress of Entomology

Abstract book

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ISBN: 978-9955-33-580-1

2010 07 28. Tiražas 100 egz.
Spausdino UAB “Ciklonas”, J. Jasinskio g. 15, LT-01111 Vilnius

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ORAL PRESENTATIONS

ON THE BIOLOGY OF *SIMULIUM ORNATUM* GROUP (DIPTERA: SIMULIIDAE)

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The species of *Simulium ornatum* group proves to be one of the most distributed species in Central Europe. Black flies of *S. ornatum* group are very common in Lithuania and Latvia, and larvae and pupae of *S. ornatum* group can be found in very different types of running water. Different species of this group are very similar morphologically. *S. ornatum* is a pest species in Lithuania attacking both humans and livestock. The *S. ornatum* group is known to have five species in the East Baltic area. Four species of *S. ornatum* group are known in the fauna of Lithuania.

We collected larvae and pupae of *S. ornatum* group in 27 rivers in Lithuania and in Latvia (the material from Latvia was collected by M. Kalnins) from April till September. Ten morphological - morphometrical parameters of larvae and four parameters of pupae were measured and analyzed. It is very difficult to separate species according parameters of larvae within *S. ornatum* species group. Some authors have prepared identification keys for *S. ornatum* larvae. We have tried to identify larvae and pupae according morphological characters detected in these keys.

Three species of *S. ornatum* group were identified according morphological characters. Black flies of *S. (Odagmia) intermedium* Roubaud, 1906 were not abundant, they were found in 2 rivers in July and in 1 river in August. Black flies of *S.(O.) trifasciatum* Curtis, 1839 were also not abundant, they were found in 5 rivers in April and in 1 river in June. Black flies of *S.(O.) ornatum* Meigen, 1818 were very abundant, they were found in 27 rivers in Lithuania and in Latvia, they were collected from April till September. Investigated morphological - morphometrical parameters varied within *S. ornatum* species group and depended mostly on the season.

WHAT DO THE TRAP-NESTING WASP AND BEE COMMUNITIES TELL US ABOUT THE HABITAT NATURALNESS?

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The goal of our study was comparison of species composition of cavity-nesting Hymenoptera communities in semi-natural and agricultural landscapes and preliminary assessment of tolerance of these wasp and bee species to the anthropogenic impact at landscape level. We applied trap-nests for cavity-nesting bees and wasps placed on tree trunks in semi-natural and agricultural habitats, as well as trap-nests on buildings in rural and urban environments in 13 countries of Europe, using possibilities of field site network of the EU FP6 project ALARM.

Results of the study demonstrate that there is no significant difference between the semi-natural and agricultural landscape in the abundance and species diversity of the synanthropic communities of cavity-nesting Hymenoptera occupying trap-nests on buildings: the wasp and bee species exploiting the anthropogenic environments little depend on the surrounding landscape. In contrast, the communities of the cavity-nesting Hymenoptera occupying the trap-nests placed on tree trunks demonstrated significant differences between the landscapes. For instance, abundance and share of Pompilidae and Crabronidae in the trap-nesting community was significantly higher in semi-natural landscapes than in agricultural ones. The share of nest cells with inquilines and parasitoids and the number of natural enemy species per host species in a trap-nest were significantly higher in semi-natural landscape, that is, representatives of the higher trophic ranks of the trap-nesting community were more abundant and diverse in the semi-natural landscape, in comparison to the agricultural landscape. Some species, e.g. Dipogon subintermedius, Trypoxylon figulus, Rhopalum clavipes, were significantly more often found in semi-natural landscape. On the other hand, a set of species was significantly more abundant in the agricultural landscape with dominating early succession stage habitats (e.g. Ancistrocerus gazella, Symmorphus gracilis, Megachile centuncularis, etc.). We propose a preliminary "landscape naturalness index", based on the ratio between the number of trap-nesting species related to the semi-natural landscape and the number of those related to the agricultural landscape, for further testing and elaboration.

FAUNA AND ECOLOGY OF SPIDERS (ARANEAE) IN THE APŠUCIEMS FEN IN LATVIA

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The spiders in mires in Latvia were not investigated properly. More or less complete researches were done in the raised bogs (Spuņģis 2008, Šternbergs 1991). The investigated fen is protected, represent calcareous fens of EU habitat directive Annex I, and it is also Natura 2000 site because of specific composition of vegetation, soil structure and hydrological conditions. Complex investigation of biota, including invertebrates and particularly spiders was done in the fen. An aim of the research was to describe the fauna and some influencing factors in the Apšuciems fen.

Sampling of spiders usually is made by one method although complete spider fauna might be distinguished by using different methods. Efficiency of methods is described in some publications (Norris 1999, Churchill, Arthur 1999, Jiménez-Valverde, Lobi 2005, Green 1999 etc.).

Pitfall traps and entomological sweep-netting were used to describe the invertebrate fauna in the Apšuciems fen. 30 pitfall traps were arranged on 60 m long transect after every 2 m, traps were exposed for 28 days from May 20 to June 17, Braun-Blanquet method was used to describe vegetation cover. Sweep-netting of invertebrates in the herbaceous layer were performed six times per season (20.05; 17.06; 11.07; 05.08; 27.08 and 13.09 in 2009) on six transects (60x2m).

559 adult spiders (totally 616 individuals including juveniles) were collected by pitfall traps, 68 species from 13 families were identified. 88 adult spiders (totally 375 individuals including juveniles) were collected by sweep-netting, 37 species from 11 families were identified. Consequently, the results clearly showed two spider groups: epigeic and grass-dwelling. Spiders from families Clubionidae, Corrinidae, Gnaphosidae, Hahniidae and Liocranidae were collected only by pitfall traps. While spiders from families Dictynidae, Miturgidae, Philodromidae, Sparassidae and Tetragnathidae were collected only by sweep-netting. *Hypsosinga pygmaea* (Araneidae), *Gongylidiellum murcidum* (Linyphiidae), *Pardosa pullata* (Lycosidae) and *Sitticus spp*. (Salticidae) were collected by both methods.

For comparison, Vilbaste (1980, 1981) investigated spiders in the Estonian fens (actually all mire types: peat bogs, transition bogs and fens) and identified 295 species (collected by sweep-netting). Some species from this research were common with Vilbaste (1980, 1981) and Kajak et al. (2000).

LITHUANIAN ENTOMOLOGICAL SOCIETY 1965-2010

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The Lithuanian Entomological Society was established on the 3rd of November, 1965. It was one of the first entomological societies in the former Soviet Union. The iniciative group was composed of Dr. P. Zajančkauskas, Prof. S. Pileckis, Prof. R. Kazlauskas, Prof. V. Valenta, and Prof. T. Ivanauskas. The board of the Society was elected and it was composed of 13 members. The first chairman was Dr. P. Zajančkauskas. There were 38 members at the beginning of the Society. Dr. P. Zajančkauskas was a chairman of the Lithuanian Entomological Society for 30 years (since 1965 till 1995).

New statute of the Lithuanian Entomological Society was registered in 1991, and since then the Society became an independent organization. Prof. A. Skirkevičius was elected as the president of the Society in 1995, Dr. D. Dapkus takes this position since 2001.

The Lithuanian Entomological Society publishes scientific journal „New and Rare for Lithuania Insect Species“ since 1982, and 21 volumes have already published. "Acta entomologica Lituanica" was published since 1970 untill 1994, and 12 volumes were published. Later it was incorporated into "Acta Zoologica Lituanica".

The Lithuanian Entomological Society is an independent scientific organization. Its aim is to consolidate Lithuanian entomologists, exchange experience, propogate entomological activities and achievements. The Society carries out entomological research, organizes different entomological events and expeditions, exhibitions, supports the school of young entomologists. More information related to the Lithuanian Entomological Society is available at www.entomologai.lt

MACROLEPIDOPTERA OF LITHUANIAN AND BELARUS PEATLANDS

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Wetlands are known for providing critical habitat for many plant and animal species Western Europe lost most of its natural peatlands, while much more of them are still preserved in Eastern European countries. Wetlands occupy approximately 2939000 ha or 14.2% of the territory of Belarus. Of these, fens make up 79.7% (1494852 ha), bogs – 13.8% (258229 ha), and transitional mires – 6.6% (123573 ha). Bogs are mainly located on the Northern part of the country, while fens predominate in the South of Belarus. North-western part of Belarus is called Land O'Lakes, where the majority of bogs are located. Some peat bogs are quite natural and large enough, e.g. the Jelnia mire complex (19984 ha). Of the three Baltic countries, Lithuania has the least number of wetlands and the heaviest preassure on peatlands. Peatlands are distributed over the whole territory of Lithuania, occupying approximately 352000 ha or 6,6% of the territory. Minerotrophic fens are the most widespread, making up 71% (249920 ha) of the total mire area, while bogs occupy 22% (77440 ha), and transitional mires – 7% (24640 ha). Most of the bogs suffered anthropogenic threats during the last century except of the biggest mire complexes, e.g. the Žuvintas Palios mire (6847 ha, the Čepkelių Raistas wetland (5858 ha)).

Insects are considered to be good indicators of the stableness of bogs and are very valuable subjects for habitat conservation. Anyway, there is a lack of information about insects living in peat bogs of Eastern European countries.

The peatland Lepidoptera was studied in Lithuania in 1998–2009, while the research was carried out in Belarus in 1995–2009. Diurnal butterflies and moths were registered during field expeditions using transect counts. Nocturnal moths were collected using automatic light traps (in Lithuania) or episodic light trapping (in Belarus). Some of the material was collected by the use of baits. Larvae of lepidopterans were collected by examining typical bog plants, and reared under the laboratory conditions.

214 species of Lepidoptera were registered in Belarus peatbogs, while 350 – in Lithuanian peatlands. Of these, 10 species are considered to be tyrphobiontic and 32 – tyrphophilous species in Belarus, while 17 species are tyrphobiontic and 22 – tyrphophilous in Lithuania. *Carsia sororiata, Semiothisa carbonaria, Anarta cordigera, Colias palaeno, Boloria aquilonaris, Clossiana frigga, Oeneis jutta*, *Vacciniina optilete*, *Eupithecia gelidata,* and *Coenophila subrosea* are tyrphobiontic species of Lepidoptera occuring in Belarus and Lithuania. *Aspitates gilvaria, Scopula virgulata, Syngrapha microgamma, Amphipoea lucens, Lithophane lamda, Proclossiana eunomia,* and *Orgyia antiquoides* are tyrphobiontic species in Lithuania, while they are tyrphophilous in Belarus, or their status is unknown (e.g. *Lithophane lamda* is registered once in a mixed forest in Belarus). *Scopula virgulata* and *Aspitates gilvaria* live in peatbogs only in Northern part of Belarus, while they prefer dry habitats in the South of Belarus. *Chloroclysta infuscata* seemed to be tyrphobiontic species in Lithuania, but later studies revealed that it prefers wet forests with *Vaccinium myrtillus,* so it is a tyrphophilous

species. *C. infuscata* is not recorded from Belarus. *Arichanna melanaria, Rheumaptera hastata*, *Hypenodes humidalis*, *Syngrapha interrogationis, Lithomoia solidaginis, Papestra biren*, *Celaena haworthii,* and *Clossiana euphrosyne* are quite abundant on peatbogs but they are found on other wet habitats as well, so they are typical tyrphophilous species in both countries. Some other species show weaker preferences to peatbogs, as *Ematurga atomaria*, *Itame brunneata, Jodis putata*, *Perconia strigillaria*, *Scopula ternata*, *Lycophotia porphyrea, Anarta myrtilli, Nola aerugula, Plebeius argus*, and *Callophrys rubi.*

PREDICTING SPECIES GEOGRAPHIC DISTRIBUTION USING ECOLOGICAL NICHE MODELING: HOW DOES THE AMOUNT OF DATA INFLUENCE THE QUALITY OF PREDICTIONS?

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Species occurrence data from museum collections and databases can be used to produce a model of the species ecological niche which is projected onto terrain to infer the species distribution. Of particular importance are predictions for the Red List species, but the major problem is the shortage of occurrence data, as these species are typically rare. To find out how many occurrence points are necessary to reliably predict distributions of the Red List species, we examine the influence of the amount of data on prediction quality. Predictions based on random subsamples from the full occurrence dataset are compared with the one based on the full dataset (used as a proxy for the real distribution). Our results indicate that as few as thirty occurrence points may be sufficient to predict distribution with high reliability. Smaller datasets produce unreliable and inconsistent predictions.

LEAFHOPPERS OF THE LINNAEAN LANDSCAPE UPPLAND

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Carolus Linnaeus (1707-1778) described xxx species of leafhoppers in his most important work, Systema Naturae (1758). A brief presentation of these will be given, with a reference to the leafhopper fauna of today, and an attempt to relate Linneaus' findings to the currently known species in the Swedish leafhopper fauna, which comprises approximately 400 species. Changed agrarian methods which aim for monocultures free from all types of weeds, as well as shorter rotation periods in forestry, are presumably the most important reasons for the changes in the fauna over the last 250 years. That sensitive species become extinct has to some extent been countered by more recent imports of species, a result of the increased mobility between countries.

SOME DATA ON ECOLOGY OF *BOROS SCHNEIDERI*, AN ENDANGERED BEETLE SPECIES

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Boros schneideri (Coleoptera, Boridae) is an endangered insect species listed in the Annex 2 of the European Union Habitat Directive. To devise management plans and develop protected areas, it is necessary to carry out in-depth analysis of habitat requirements of this species.

The studies on *B. schneideri* ecology were conducted in years 2006-2008 in Dainava, Labanoras and Karšuva forests. Dead standing Scots pine trees provide the main habitat for this species in Lithuania. The percentage of trees with *B. schneideri* detected increased progressively with the tree diameter and was found to be the highest among trees thicker than 25 cm. As the investigated forests were dominated by thin dead trees, larvae of this species were mainly found under the bark of trees with a diameter in the range of 10 to 20 cm. The level of insolation, to which most of the trees with *B. schneideri* were exposed, was typical of a medium-dense and sparse-growth pine forest. All dead trees inhabited by *B. schneideri* had loose and at least slightly fragmented bark. The mean density of larvae was 3.1 specimens per 1 m^2. The critical bark thickness for *B. schneideri* larvae was 5 mm.

The biggest amount of dead trees suitable for *B. schneideri* as well as the number of trees inhabited by this species was found in 40-60 years old Scots pine stands. Dead pine trees retained in clearcuts were preferred by this species (occupation was higher than 50 %). Among the biotopes, the highest density of trees with *B. schneideri* was observed in *Cladonia-Pinetum, Vaccinio vitis-idea-Pinetum, Vaccinio myrtili-Pinetum* and *Vaccinio uliginosi-Pinetum.* Biotopes with higher soil fertility were not found to be inhabited by this species. Presence of Norway spruce in *Vaccinio vitis-idea-Pinetum* and *Vaccinio myrtili-Pinetum* significantly reduced the occupation frequency of this beetle in cases when canopy cover of the spruce exceeded 5 % of the total area.

POPULATION CHARACTERISTICS OF *LEPTURA MACULATA* AND *L. QUADRIFASCIATA*: A MARK-RECAPTURE APPROACH

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Using the mark-release-recapture technique we describe sample characteristics of two saproxylic species, the threatened longhorn beetle *Leptura maculata* (Coleoptera: Cerambycidae) and the common *L. quadrifasciata* in southeastern Finland over two summers. We also provide formal estimates of the survival and population size of *L. maculata*.

Over 350 individuals of *L. maculata* and 150 individuals of *L. quadrifasciata* were marked each summer. For *L. maculata*, the sex ratio was male-biased (2:1), whereas for *L. quadrifasciata* the bias was less clear. For both species, the male-bias can reflect behavioral differences between sexes, rather than true population differences. The proportion of recaptured individuals was low and varied between 7 and 33% depending on the species and year, which allowed us to estimate population parameters only for *L. maculata* in 2006. Based on the local population size estimate obtained (mean ± 95% CI = 865 ± 131), and the current distribution area of *L. maculata*, we infer that the species is not in immediate risk of extinction.

Our analysis shows that mark-recapture technique can provide accurate estimates of population size of saproxylic beetles which have different adult and larval habitats, and thus be useful in assessing extinction risk and monitoring population trends. Our study also highlights several important aspects that should be considered in monitoring flower- visiting longhorn beetles.

INTRODUCED OR OVERLOOKED? NEW BARK BEETLE SPECIES IN SWEDEN (COLEOPTERA; CURCULIONIDAE)

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The bark beetle fauna in Sweden and other Scandinavian countries is rather well known and the number of new species discovered during the last 50 years is low. However, during the last decade several new species have been recorded. In this presentation the changes in the bark beetle fauna since 2000 will be described. The causes of the changes will be discussed.

CUCKOO WASPS OF FINLAND (HYMENOPTERA: CHRYSIDIDAE)

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The cuckoo wasp fauna of Finland and adjacent areas of Russia was studied in 2008-2010 as a part of a research project funded by the Finnish Ministry of Environment. During the study over 10 000 cuckoo wasp specimens in private and museum collections were determined and databased. As a result, 49 cuckoo wasp species were found to belong to the Finnish fauna, although the taxonomic status of a few species still remains uncertain. Species that were not previously published in Finnish checklists, but are now included in the Finnish fauna are *Hedychridium chloropygum*, *Chrysis corusca*, *C. insperata*, *C. leptomandibularis*, *C. mediata* (sensu stricto) and *C. westerlundi*. The species *Chrysis mediadentata* and *C. rutiliventris* were deleted from the fauna. According to the new Red List of Finnish species (to be published later in 2010) nearly half of the evaluated cuckoo wasp species are regionally extinct, threatened or near threatened. The main factors that threaten or have led to extinctions of cuckoo wasps are the decrease of dead wood and overgrowth of dry meadows and open sandy areas.

DIVERSITY OF TICK SPECIES IN BALTIC REGION

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Different species of ticks from order Parasitiformes are known to be found in Baltic region. During spring-summer of 2002-2009 in different localities of Baltic region different species and development stages of ticks were collected from vegetation, from small mammals and birds. For identification of ticks till species level were used both, morphological and molecular keys. Collected ticks belong to *Ixodes* genus (*I. ricinus*, *I. persulcatus* and *I. trianguliceps*), *Dermacentor reticulatus*. Parasitic mites from suborder Mesostigmata (Gamasida) *Laelaps* genus were also identified. According to results of study the most distributed tick species in Lithuanian were *I. ricinus*, in Latvia and Estonia *I. ricinus* and *I. persulcatus* ticks.

TRICHOCERA WINTER GNATS (DIPTERA: TRICHOCERIDAE) OF THE PALAEARCTICS

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Genus *Trichocera* Meigen, 1803 currently comprises around 110 species, mostly from Palaearctic region (with around 25 species in Nearctics), but several species were introduced into some South-Atlantic islands, Australian islands. Gnats of this genus are most often found in cool, humid mild climate during the autumn, winter and spring months around the Northern hemisphere. Adult insects are confined to biotopes rich in decomposing organic material.

During the early period of the studies, representatives of the genus *Trichocera* were most often considered belonging to different subfamilies of the Tipulidae, or, based mostly on the similarities of the larval stages - a part of the Anisopodidae (Rhyphidae) family up until the 1924 when G. C. Crampton put them into separate family Trichoceridae.

First winter gnat species was described by C. Linnaeus in 1758 as *Tipula regelationis* and several other species were described a bit later by C. De Geer, M. Harris and J. C. Fabricius. At the beginning of the XIX century, J. W. Meigen described four widely distributed and common species: *T. parva, T. annulata, T. maculipennis* and *T. fuscata* while H. Loew, E. Becher and J. Mik added several more. The XX century also gave us many outstanding entomologists – F. W. Edwards, C. P. Alexander, E. Brunetti, M. Tokunaga at the first half, Ch. Dahl, J. Starý, E. Krzemińska, T. Nakamura. T. Saigusa and others at the second part of the century - and many new winter gnat species described.

Palaeartics is the best-studied region concerning winter gnat fauna, although Central and Northern Europe saw considerably more effort compared to Asia. Thus our analysis of rather sparse winter gnat material from Mongolia, adjacent regions of Russia and China already gave two species new to science, formerly unknown males of *T. reticulata* were identified and known distribution area of *T. gigantea* was expanded. It is clear that deeper research will provide us with even more new and interesting species of winter gnats.

ACTION PLAN FOR THREATENED BEETLES ON RECENTLY DEAD PINE IN SWEDEN

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Species-focused conservation plans, under names as action or recovery plans, can be divided into single and multiple species plans. The latter is normally a functional group, such as phloeophagous beetles on recently dead pine trees. This action plan contains five phloeophagous species, of which three are bark beetles, and four saproxylic beetle species associated with bark beetle galleries on pine. Thus, the action plan encompasses nine species of red-listed saproxylic beetles in Sweden. Most of the species are regarded as threatened, but two of the species (*Carphoborus cholodkovskyi* and *Platysoma lineare*) are classified as near threatened in the Swedish red list of 2010.

Dying pine and bark fallen dead pine trees are discreet habitats with specific assemblages of saproxylic beetles. However, there is a succession in both the beetle assemblage and the decay of dead pines which gives an overlap between this action plan and the recovery plan for beetles on old pine wood. The species in this action plan occurs seldom on old pine wood, they need a habitat with quite intact bark on the dead trees, i.e. decay class 1 of dying and recently dead pine trees (see e.g. Stokland 2001). Further, the main habitat is standing dying pine trees (not logs) and inventories of this assemblage of beetles is rare since you have to find dying pines among thousands of living healthy pine trees.

Pine forests and threatened species on pine have not been high-lighted in Swedish conservation biology. Gaps in protection and restoration needs show that pine forests have been neglected by Swedish conservation officers. The result is that saproxylic pine species has gone regionally extinct or disappeared from the mainland of Sweden, nowadays only occurring on the island of Gotska Sandön. This lack of attention has reduced the Swedish biodiversity of pine beetles, and the future is grim for many species if there is no action trying to reverse this negative trend in the pine forests. The light in this darkness is prescribed burning of pine dominated forest reserves, an action performed by to few of the Swedish counties and conservation officers.

This action plan suggests prescribed burning in protected forest and in the productive landscape with forestry. Most people regard forest fire and dying trees as dangerous and ugly, and information about the importance of dying pine trees for biodiversity is very important. Further, the Swedish national inventory of forests could include variables for monitoring tracks of key species as e.g. the lesser pine shoot beetle (*Tomicus minor*) and the pine engraver *Ips acuminatus*. The latter is an example of a species regarded as of least concern until 2010 when it was established that this bark beetle has disappeared from large regions in Sweden. A loss that includes many more species, since the functional traits of bark beetles makes them key species for a whole assemblage of saproxylic insects.

BLACKFLIES OF NORTHERN EUROPE (DIPTERA:SIMULIIDAE)

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Blackflies are a family of homogenous small dipteran flies, usually quite darkly colored, hence the vernacular family name. Females of many species are vicious bloodsuckers that attack birds or mammals, and some species are vectors transmitting pathogen organisms.

Presently 2060 recent blackfly species are recognized worldwide. Many additional species are not known well enough to decide whether or not they are valid species. This uncertainty in some extent applies also to the North European blackfly fauna. Our knowledge is that we have at least 71 valid blackfly species in Northern Europe. Apparently, we still must expect discovery of new synonymy and name changes in Northern European species due to misunderstanding and wrong usage of names.

The presentation on this CD-ROM is a revision of the taxonomic and nomenclature status of the North European blackfly fauna. Most of the study is based on material from Fennoscandia and adjacent areas, including Denmark.

Taxonomic notes and references on distribution are given for each separate species. Common names are introduced to many of the blackfly species. These are not much cited in literature but we include them here as we feel they are useful and interesting. In addition we include vernacular names (relating to Norwegian geographical places) of two species (*Metacnephia tredecimata* and *Simulium truncatum*), which are in local use for many years.

EFFECTS OF THE NEWEST CHANGES TO THE CODE OF ZOOLOGICAL NOMENCLATURE

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The International Code of Zoological Nomenclature was revised in 1999. New stricter rules were introduced for the description of species, thus preventing unintentional description. The naming of type specimens was also made mandatory. Other important changes made it possible to dismiss old forgotten names, even when they are senior synonyms. Similarly very old homonymies can now be disregarded. These changes can preserve stability in a number of cases.

Stability of scientific names is important if scientists from different countries are to understand each other. Because of this, there are internationally approved rules, known as the International Code of Zoological Nomenclature. There is also an organization, the International Commission on Zoological Nomenclature, which can set aside the rules, if the rules themselves threaten stability. The rules have been updated a few times, at present we are working with the 4th edition of the code, as approved in 1999. Most of the changes were minor formalities, but there were also some important changes.

Before 2000 very little was demanded for the description of new species; all that was necessary was that a name was introduced together with an indication how the species could be recognized. This led occasionally to unintended descriptions. One such was when Purasjoki & Fagerholm (1987) presented their work plan. They mentioned that they were to study two parasitic copepods, one of which was an undescribed species. They gave a name for this species, and mentioned a difference from the other one; that was all that was necessary then.

Under the revised rules such unintentional descriptions are no longer possible. After 1999 a description of new species must include a statement of intention, and a type must be fixated for it (Article 16.4). Thus when Humala (2003) included many new species in his keys to certain Ichneumonidae, only those species are counted as described, for which he elsewhere in the book mentioned type specimens.

Another important change introduced with the year 2000 concerns species names that are primary homonyms, that is, originally described in the same genus. Even when the species had long been in different genera the old rules demanded that the younger name should be replaced. This is no longer an absolute demand. In the revised rules we are urged to bring such very old cases to the Commission (Article 23.9.5), so that also the younger name can remain in use. An example can illustrate the situation. *Tillus elongatus* (Coleoptera, Cleridae) was originally decribed as *Chrysomela elongata* Linnaeus, 1758. It was soon moved to other genera. Much later, in 1851, Suffrian described a species *Chrysomela elongata* (nowadays *Oreina elongata*), and although Linnaeus's species had long been elsewhere, Suffrian's name was still a junior primary homonym. Since it is a well established name, I made an application to the Commission for its preservation (Silfverberg 2009), and have full confidence that it will be approved.

The discovery of unused senior synonyms has occasionally been an unwelcome result from studies of old literature. Such discoveries have in many cases been quietly ignored, but there has still remained the potential threat to established use. The revised code gives a way out of this dilemma. If the senior synonym has not been used as a valid name after 1899 it is now

possible to declare it a nomen oblitum, thus preserving a well-established junior name (Article 23.9.2).

For those working with taxonomy it is essential to know the rules of nomenclature. However, those working in other fields can also find it useful to know at least the basics. Then all the name changes encountered might not seem so illogical.

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ESTIMATION OF GYPSY MOTH LYMANTRIA DISPAR (LINNAEUS, 1758) POPULATION REPRODUCTIVITY IN MASS OUTBREAK REGION

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Gypsy moth outbreaks cause significant loss to economy and degrade biodiversity of forest ecosystems. The first mass outbreak of this pest in Latvian history was documented in 2008 in Liepaja city. Approximately 40 ha of deciduous forest stands were completely defoliated.

In summer 2008 field survey was carried out with the aim to evaluate female densities, fecundity as well as egg hatching success. Field experiments were carried out to observe male dispersal capacity using mark and recapture method. Male flying capacity was found to be over 400 m per day. High densities of females were found (33.8 ± 2.5 females per tree) with average realised fecundity of 436 ± 66 eggs per female. No egg parasites were found and egg hatching success surpassed 96%. This leads to potential of 14 231 larvae per tree capable to repeated complete stand defoliation.

Fertility rates of gypsy moth, influence of predatory with loss method, parasitism on moth's larvae and pupae and their survival success were studied in 2009. Male flying capacity in heterogenous habitats were also studied. Based on recapture rates population size was calculated (Jolly – Seber mark and recapture methods for open populations), as well as flight dinamics and survival rates of flying males. Results were compared with Petersen's method which is provided to estimate closed populations. Male daily flying activity was also recorded. Male maximal flying distance recorded was 660 m. Male flying activities have tendencies to rise up during daytime (total number males caught in feromone traps were: during daytimes – 2 217, during night – 624). Number of recaptured males per trap decreased gradually (1.55 males per trap were cought 50 m from point of release, 0,65 males per trap - 100 m away, and at 200 m 0.53 males per trap were cought). Using Jolly – Seber method it was calculated that 11 108 flying males per 10 days of observation time were present in study area, while Petersen's method showed population size to be 65 302 males. Larvae collected in the field were reared in the laboratory. 46 % of larvae pupated successfully. Only 26.5 % larvae resulted in emerging adults. Main larval mortality causes were Nuclear NPV virus and larval parasitoides. In 2009 relatively low densities of females per tree were recorded. On average 5.7±1 females per tree were found with average realised fecundity of 539.6 eggs. Potential fecundity (dissected females, eggs with full yolk deposition counted) was found to be 665 ± 38 eggs per female. In field experiment where females were pinned to the tree trunk 11 % of daily disappearance was recorded.

Although population was rapidly decreasing in 2009 females showed increased realised fecundity compared to 2008. To compensate female incapability to fly males showed relatively high dispersion capacity. Gypsy moth are flight occurs mainly during the day, however, significant amount of males remain active during the night as well. Population seams to be distributed irregularly within outbreak area. In some localities population is very dense while other sampling localities showed sparse distribution. In 2009 population showed rapid decline with high larval parasitism and virus infection.

CECIDOPHYOPSIS MITES ON DIFFERENT CURRANT CULTIVARS IN LATVIA

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Red and black currants are the second most important berry crops in Latvia. During the second part of 20th century distribution of *Cecidophyopsis* mites in Latvia is increased. *Cecidophyopsis* mite faunal and distribution studies were started in 2008 and totally 1235 samples from *Ribes* plants (in cultivation and in wild) are collected from all parts of Latvia territory.

During this research occurrence of *Cecidophyopsis* mites were observed on *Ribes* plants from all kinds of inspect areas. Red and black currant cultivars are the commercially important group from all investigated plants.

In red currants from 21 cultivar *Cecidophyopsis* mites were observed on 14 cultivars. In Latvia commercially most important red currant cultivars are 'Jonkheer van Tets', 'Kodu Valge', 'Rachnovskaja', 'Rote Holländische' and 'Vīksnes Sarkanā'. Most susceptible cultivars were 'Kodu Valge', 'Rachnovskaja'. *Cecidophyopsis* mites were not found on all inspected plants of cultivar 'Vīksnes Sarkanā'. In black currants from all investigated 44 cultivar only on plants of 10 cultivars *Cecidophyopsis* mites were not found. Occurrence of mites in black currants was observed on all commercially important cultivars ('Belorusskaya Sladkaya', 'Ben Lomond', 'Katyusha', 'Mara Eglite', 'Stor Klas', 'Titania', 'Triton', 'Vologda', 'Zagadka' and 'Detskoselskaja') and the most susceptible cultivars were 'Belorusskaya Sladkaya', 'Ben Lomond', 'Katyusha', 'Mara Eglite', 'Stor Klas', 'Triton' and 'Vologda'. Interesting observation was made in cultivar 'Titania' where high mite infestation was recognised only in some local areas, mainly in plant collections and oldest plantations.

TAXONOMIC BIAS IN ESTONIAN ENTOMOLOGY: IMPLICATIONS FOR BIODIVERSITY RESEARCH AND CONSERVATION

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Relative to the vast taxonomic and ecological diversity of arthropods, their conservation biology has been long time neglected in Estonia. The typical reflection for arthropods is that they are small but abundant creatures that cannot be exterminated. Although they make up over 50% of the identified biota in country, their diversity research, authorized conservation and national Red List assessment is generally ignored when compared with the funding and publicity provided to the widely established vertebrate animal and vascular plant factions. Only some charismatic taxa distinguished in nature conservation.

Several potential factors can be stressed to threat arthropod diversity knowledge and conservation. Taxonomic bias in academic research and funding is extensive. It has been recognised that taxonomic predominance within biodiversity research is widespread and skewed towards vascular plants and birds, extending to the detriment of invertebrates during last decades. There exists historic bias in nature conservation traditions in Estonia, supporting natural monuments (ancient trees, erratic boulders etc) and flagship species (several birds, mammals and plants). Public support and acceptance for more fascinating objects is comprehensible. However, it is hard to imagine how we can sustain all the biodiversity continuing our taxonomic impediment. Thirdly, critically insufficient natural history formal training in general and in arthropod taxonomy particularly severely influence nature conservation targets achievement. Without people able to identify living specimens in situ it is unfeasible to make proper inventories or decisions for conservation purposes. Estonia has a reliable number of amateur naturalists, some of whom are the acknowledged taxonomic experts also on certain arthropod groups, but such a situation is inadequate. Amateurs follow their own interests, and they do not necessarily train successors. The shortage of professional taxonomists and taxonomic incapacity of conservation practitioners is causing fatal developments in nature conservation.

Resolving these issues is going to be a challenge for different institutions and will require certain collaboration between environmental administrators, conservation biologists and academic taxonomists. Following steps will need to be accomplished before general progress can be made:

- Arthropods should be integrated into mainstream biodiversity and conservation biology research, practice and legislation;
- A strong improvement of taxonomic training and expertise with shared standards is essential to support conservation activities at all levels;
- Great need for empirical data on diversity, ecology, distribution in most taxa of arthropods.

A REVIEW OF THE COLEOPTERA FAUNA IN LITHUANIA

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By far most comprehensive review of faunistic records was provided by the authors of the „Letuvos fauna. Vabalai“ [„Lithuanian fauna. The beetles“] devoted to Coleoptera (Pileckis & Monsevičius, 1995,1997). All faunistic records on Coleoptera in Lithuania have been summarized in two volumes, with the data concerning information on 2895 species of beetles given. Furthermore the authors forecasted that more than 990 species are expected for Lithuania.

Since that, a numerous taxonomical activities were done and new faunal information has been registered. The last 20 years was a time of major changes in beetle's classification and earlier classification system adopted by S. Pileckis and Vidm. Monsevičius (1995, 1997) became obsolete. More than 700 species of beetles have been reported for Lithuania as new. Therefore, compilation of new, annotated checklist of Lithuanian beetles had become an urgent necessity.

All published records of findings of the beetles in Lithuania have been summarized in current study. Besides true records in new list of Lithuanian beetles, 127 species noted for Lithuania in the several European catalogues are included too: "Enumeratio Coleopterorum Fennscandiae, Daniae et Baltiae" (Silfverberg, 1992, 2004), "Catalogue of Palaearctic Coleoptera" (Lobl & Smetana eds., 2003-2007), "Fauna Europaea" on-line version (2009). The primary source of these findings remains so far not known for the authors. We also suggest to remove 30 species from the list of Lithuanian beetles, such as: *Agabus biguttulus* Thom., *Ilybius wasastjernae* Sahlb. (Dytiscidae), *Carabus sheidleri* Panz., *Asaphidion curtum* Heyd., *Sinechostictus elongatus* Dej., *Harpalus caspius* Stev., *H. atratus* Latr., *Bradycellus csikii* Laczó (Carabidae), *Helophorus minutus* F., *H. redtenbacheri* Kuw., *H. pumilio* Er. (Hydrophilidae), *Ochthebius metallescens* Ros. (Hydraenidae), *Sogda ciliaris* Thom. (Leiodidae), *Taxicera deplanata* Grav. (Staphylinidae), *Chilothorax paykulli* Bed., *Bodilus punctipennis* Er. (Aphodiidae), *Cratosilis denticollis* Schum. (Cantharidae), *Ipidia sexguttata* Sahlb. (Nitidulidae), *Henosepilachna vigintioctomaculata* Motsch. (Coccinellidae), *Pedinus femoralis* L. (Tenebrionidae), *Isotomus comptus* Mann. (Cerambycidae), *Chrysolina herbacea* Duft., *Aphthona flaviceps* All., *Epitrix cucumeris* Harr. (Chrysomelidae), *Otiorhynchus gemmatus* Scop., *Omias conncinna* Boh., *Pseudomyllocerus canescens* Germ., *Larinus jaceae* F., *Ceutorhynchus trimaculatus* F., *Xyleborus dryographus* Ratz. (Curculionidae), because the reliable locality and / or collecting information of these species is missing. As a result 3595 species of beetles are included into the new check-list of Lithuanian beetles (Table 1.).

According to the faunal data of neighboring countries (Lundberg, 1995; Slfverberg, 2004; Telnov, 2004; Barševskis et al., 2005; Alexandrovich et al., 1996; Burakovski et al., 1973 - 2000; Wanat & Mokrzycki, 2005 et cetera), 1383 species of beetles are included into the new

check-list as expected for the Lithuanian fauna. The analysis of faunistic data in our country as well as in the neighboring ones shows, that Lithuanian coleopteran fauna is not completely investigated so far. There are still about 30% species beetles undiscovered in Lithuania.

Table 1. Known and expected number of species of Coleoptera in Lithuania

Family	Number of species		Family	Number of species	
	Known	Expected		Known	Expected
Aderidae	3	4	Lampyridae	2	0
Agyrtidae	0	3	Latridiidae	43	22
Alexiidae	1	0	Leiodidae	75	45
Anobiidae	47	36	Limnichidae	3	1
Anthicidae	12	6	Lycidae	6	1
Anthribidae	11	4	Lymexilidae	3	0
Apionidae	67	32	Lucanidae	6	1
Attelabidae	3	0	Malachiidae	15	4
Biphylidae	0	2	Melandryidae	17	12
Boridae	1	0	Meloidae	7	3
Bothrideridae	2	5	Melyridae	11	8
Bostrichidae	6	5	Monotomidae	15	8
Buprestidae	45	11	Mordellidae	16	18
Byrrhidae	12	4	Mycetophagidae	12	2
Byturidae	2	0	Mycteridae	0	1
Cantharidae	39	18	Nanophyidae	2	3
Carabidae	328	64	Nemonychidae	2	0
Cerambycidae	140	29	Nitidulidae	94	18
Cerylonidae	5	0	Nosodenridae	1	0
Chrysomelidae	315	66	Noteridae	2	0
Cisidae (Ciidae)	27	10	Phalacridae	12	8
Clambidae	6	2	Phloeostichidae	0	1
Cleridae	10	4	Pyrochroidae	3	0
Coccinellidae	54	10	Pythidae	2	0
Corylophidae	8	3	Platypodidae	0	1
Cryptophagidae	83	28	Prostomidae	0	1
Cucujidae	3	2	Psephenidae	1	0
Curculionidae	466	157	Ptilidae	22	47
Dascilidae	1	0	Rhipiphoridae	2	1
Dermestidae	27	19	Rhynchitidae	16	4
Derodontidae	0	1	Rhysodidae	1	0
Drilidae	1	0	Salphingidae	9	5
Dryopidae	8	2	Scarabaeidae	86	17
Dytiscidae	112	19	Scirtidae	16	3
Elateridae	74	30	Scraptiidae	8	12
Elmidae	10	5	Scydmaenidae	27	15
Endomychidae	5	2	Silphidae	19	2
Erotylidae	8	4	Silvanidae	9	2

Eucinetidae	1	0	Sphaeritidae	1	0
Eucnemidae	7	12	Sphaeriusidae	1	0
Geotrupidae	6	1	Sphindidae	2	0
Gyrinidae	12	3	Staphylinidae	784	399
Haliplidae	18	2	Stenotrachelidae	1	0
Heteroceridae	7	5	Tenebrionidae	49	24
Histeridae	56	16	Tetratomidae	5	1
Hydraenidae	16	12	Throscidae	2	7
Hydrophilidae	72	23	Trachypachidae	0	1
Kateretidae	10	1	Trogidae	3	0
Laemophloeidae	5	10	Trogossitidae	7	2
Ochodaeidae	0	1	Zopheridae	8	4
Oedemeridae	15	6	**Total**	**3595**	**1383**

THE ENTOMOLOGICAL SOCIETY OF FINLAND 75 YEARS OLD

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In Finland, the entomological research is said to begin in 1753 when Isaac Uddman defended his thesis 'Novae insectorum species'. The first biological society was founded in 1821 by Professor Carl Reinhold Sahlberg. The Entomological Society of Finland (ESF) was founded in 1935 on the initiative of Finnish speaking entomologists. During the first decades the main leaders of the society were Professors Uunio Saalas and Esko Kangas. The most important activities of the society have been monthly meetings with lectures and scientific notes, spring and summer excursions, and publishing of entomological journals Annales Entomologici Fennici and Acta Entomologica Fennica. Nowadays, Entomologica Fennica is published jointly by four Finnish entomological societies. ESF supports young biologists financially with grants for entomological research. The society has hosted the Nordic Congress of Entomology three times.

DNA TAXONOMY IN APHIDS – INTEGRATED APPROACH

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Idea of DNA taxonomy assumes that evolutionary entities in nature are recognizable equally as well from DNA sequences as from any other evidence in traditional taxonomy. The main idea of DNA barcoding is based on the fact that short pieces of DNA can vary a very minor degree within species and variation is much less than between species. Is it much more "scientific" to identify species applying DNA technologies than doing it in traditional taxonomic way? How to incorporate DNA data into taxonomical issues in a proper way?

We examined several aphid species, samples with known life cycle and host plants in order to be able to associate each DNA sequence with ecological features. Aphids are phytophagous insects showing divergent evolution through adaptation to different host plants and different life cycle. Analysis of Central European populations of *Macrosiphum knautiae* , *M. silvaticum* and *M. rosae* revealed one strong supported cluster. All our *Macrosiphum* samples were grouped in one clearly resolved clade. Species divergences in this case are very small and taxonomy must be based on other available information, because recently separated species usually display paraphyletic gene-tree patterns. On the other hand, phylogenetic analysis of mitochondrial and nuclear DNA sequences of four *Brachycaudus* species supported intrageneric relationships in this genus and the idea of placing *B. cardui* in a separate genus from *B. divaricatae* and *B. lychnidis*.

These DNA taxonomy examples highlight the need to obtain voucher specimens with known life cycle and host specificity. Then, using DNA characters in a diagnostic context would be entirely compatible with the process of current taxonomic research. Corroboration from more than one line of evidence would serve as a bridge between morphological, ecological and molecular approaches.

ICHNEUMONID-PARASITOID SPECIES RICHNESS IN DIFFERENTLY TREATED INNER-MONGOLIAN LARCH FORESTS

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Millions of hectares of forests in northern China have been attacked by the Siberian moth, Dendrolimus superans Butler (Lepidoptera: Lasiocampidae) which is one of the most destructive native defoliators of Larix spp. in China. The Siberian moth outbreaks are usually followed by the outbreaks of wood-boring insects (e.g. bark beetles, longhorn beetles) due to a great number of weakened trees. In these conditions the populations of Ichneumonid parasitoid wasps that parasitize wood-boring insects and Lepidopteran species increase notably. On the other hand the use of pesticides can decrease the population sizes. In our study the aim is to examine whether the species richness of Ichneumonid wasps changes when forests are differently treated. We compare man-made forests that have and have not been treated with broad spectrum pesticides targeted against Siberian moth. Semi-natural forests that have avoided the outbreaks are used as control. The data were collected in summer 2008 using 36 window traps. Preliminary results concerning the Ichneumonid species richness and its variation during the summer season 2008 will be presented.

Key words: Ichneumonidae, wood-borer, Larix gmelinii, Inner Mongolia, China

THE PORTION OF CADDISFLIES (TRICHOPTERA) IN BENTHIC MACROINVERTEBRATE COMMUNITIES OF DIFFERENT LITHUANIAN RIVERS

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The species composition, abundance, and community structure of benthic macroinvertebrates were investigated in 33 Lithuanian rivers. In order to evaluate caddisfly importance (the portion of caddisfly taxa and individuals) in the communities of benthic invertebrates, five environmental parameters (river size, discharge, water temperature regime, bottom structure, and current velocity) were selected. The impact of every environmental parameter for distribution of caddisfly taxa and individuals in the rivers was tested. The greatest significant influence on the abundance of caddisfly taxa and individuals had river discharge, river size and bottom structure. Different structure of benthic macroinvertebrate communities were found in various riverine conditions. As the dominant share of benthic macroinvertebrates, caddisfly larvae were in medium-sized and medium discharge, cold-water rivers, on stony bottom according to the abundance of taxa and also in medium-sized, medium discharge, and stony bottom according to the abundance of individuals.

POSTERS

FAUNA AND RESEARCHES OF BEETLES (COLEOPTERA) ON THE TERRITORY OF THE KALININGRAD REGION

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The fauna of the order Coleoptera in the Kaliningrad region is represented by no less as 2800 species. The investigations dealing with the beetles on the territory of the contemporaneous Kaliningrad region were started at the close of the XX century only (Sakhnov, 1989; Besyadka, Moroz, 1996). After that (in last 20 years) more as 40 papers devoted to different systematical and ecological coleopterous groups were published. But till present, the recent fauna and bionomy of the beetles of the region is studied insufficiently and fragmental. The data on two the most numerous in species families of beetles (Curculionidae and Staphylinidae, composing about 30% of our fauna) is incomplete and special papers about this families for our region are absent at the moment. The many families represented by small-size and especially difficult in determination beetles (Ciidae, Lathridiidae, Cryptophagidae, Ptiliidae) are studied poorly too. The following "big" families are the best recognized in the Kaliningrad region in faunal aspect: Dytiscidae, Hydrophilidae, Cerambycidae, Chrysomelidae, Carabidae, Silphidae, Coccinellidae and Scarabaeidae. The best inventoried (concerning beetles) areas in the Kaliningrad region are: the territory of the Curonian Spit, area in vicinity of the Chernyakhovsk city (the NE-direction) and northern part of the Sambian peninsula.

The old records from our region require verification and the present occurrence of any beetles species must be confirmed by recent samplings. Our region is strongly transformed by human activity in the past and it is especially interesting as field for ecological and bionomical investigations of insects, adapted to the semi-natural and human-made ecosystems. The areas and distribution ranges of the beetles' species in the South-Eastern Baltic Region are due to be studied in details. The future researches on beetle fauna and its peculiarities in the Kaliningrad region are actual, necessary and interesting.

MATERIALS ON LATVIAN CIONINI (COLEOPTERA: CURCULIONIDAE)

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The aim of the current work is to summarise data on tribe *Cionini* Schönherr in Latvia. Bibliography analysis on this group in Latvia is made for the first time. The first data on weevils of *Cionini* in Latvia were published in the beginning of the 19th century (Precht 1818). Subsequently, more than 15 works were published where information can also be found.

In Latvian fauna the tribe *Cionini* Schönherr is presented by 3 subgenera and 9 species: *Cionus* Clairville & Schellenberg with 6 species, Stereonychus Suffrian, 1854 with one species and Cleopus Dejean, 1821 with two species. In adjacent territories, the number of registered species of this subfamily slightly varies: Belarus – 7 species of 2 genera are recorded, Estonia – 8 species of 3 genera, Lithuania – 8 species of 3 genera.

Three species (*Cionus tuberculosus*, *C. scrophulariae, C. hortulanus)* in Latvia are common and widely distributed, and five species (*Cionus longicollis, C. nigritarsis, C. olivieri, S. fraxini, Cleopus pulchellus and C. solani)* are rare and insufficiently known species (known no more than 4 localities).

Material studied is stored in the collection of Daugavpils University Institute of Systematic Biology (DUBC, Daugavpils, LV) and the private collection of author (Daugavpils, LV).

Shape and structure of male genitalia and internal sacs of Latvian species were studied. Illustrated key to these species is prepared.

Representatives of the tribe *Cionini* Schönherr are monophagous, oligophagous or polyphagous species and feed on *Scrophularia, Verbascum, Fraxinus.*

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).

CUTICULAR COMPOUNDS OF SIMULIUM LINEATUM (DIPTERA: SIMULIIDAE) ACT AS SEX PHEROMONE

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Sex pheromones (known as cuticular hydrocarbons) are present and/or identified in some Diptera species (e.g. Ceratopogonidae, Drosophilidae, and Muscidae), no data exist on the presence of sex pheromones in simuliids. However quantitative differences in cuticular hydrocarbons of *Simulium damnosum* species complex were revealed. Search for chemicals involved in aggregation of egg-laying females were carried out in *S. damnosum* species complex, but pheromone was not identified. Obvious sexual dimorphism of cuticular chemistry is known in eurygamous *S. equinum* as well.

Bloodsucking and multivoltine *S. lineatum* species was chosen as a model species for investigations into mating chemicals. High and stable mating activity of stenogamous *S. lineatum* during all daytime under laboratory conditions was suitable peculiarity in chemical ecology research.

The aim of the present study was to compare the chemical composition of extracts in *S. lineatum* males and females as well as to estimate the effect of *S. lineatum* females' cuticular compounds on conspecific males' precopulatory behaviour.

Chemical analyses by GC-MS. Obvious differences in chromatographic profiles of *S. lineatum* males and females extracts were established for 27 compounds: 15 substances differ qualitatively (female-specific) and 12 substances differ quantitatively (2 were in much higher amounts in males, 10 in females). Five of female-specific chemicals were branched hydrocarbons with 26 - 32 C-atom chains. One straight hydrocarbon identified as Δ-heptadecene is female-specific. The four branched hydrocarbons with 30 - 37 C-atom chains were found in higher amounts in female extracts compare to male.

Bioassay of female cuticular chemicals. In *S. lineatum* female's cuticular chemicals affect precopulatory behaviour of conspecific males during the final phases of courtship (touching and attempting to copulate). The effect is dose dependent. The activity of chemicals is species specific, as those: chemicals of phylogenetically closest *S. equinum* females do not affect precopulatory behaviour of *S. lineatum* males.

The cuticle of *S. lineatum* females contains chemicals, which act as a sex pheromone. Sex pheromone in *S. lineatum* females is the first sex pheromone found in the family Simuliidae.

ON THE CULICOIDES OBSOLETUS GROUP BITING MIDGES IN LITHUANIA: THE FAUNA, SEASONAL ACTIVITY AND DIVERSITY

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The genus *Culicoides* is represented by 1260 species some of which are involved in the transmission of orbiviral diseases, such as blue tongue, affecting livestock. 24 species of biting midges of genus *Culicoides* are known in Lithuania. *C. obsoletus* group is very common in Lithuania. It made up to 49,5 - 58,6% of all *Culicoides* collected by light trap. The imagines of *C. obsoletus* group can be found from middle April till the end of October in Lithuania.

Six species from the *Culicoides obsoletus* group are listed in Europe: *C. abchazicus, C. obsoletus*, *C. scoticus, C. chiopterus, C. dewoulfi* and *C. montanus*. *C. montanus* biting midges are detected in Spain, so we do not expected to collect them in Lithuania. *C. abchazicus* is known from Germany, Poland, Romania and Slovakia. *C. dewoulfi* is known from Poland, but it was not detected in Lithuania. *C. chiopterus* (Meigen, 1830), *C. obsoletus* (Meigen, 1818) and *C. scoticus* Downes et Kettle, 1952 are known from Lithuania.

C. scoticus and *C. chiopterus* are not very common in Lithuania. *C. scoticus* biting midges were colected in May and in the first part of August. *C. chiopterus* were collected in April, May and in August. *C. obsoletus* is one of the most widespread species of bloodsucking midges around the Europe as well as in Lithuania. Adult *C. obsoletus* were found from the 22nd of April till the 30th of October and it had four flying peaks during the season.

The identification of the species of *Culicoides obsoletus* group is very complicated, so the molecular data are getting more and more important tool to the taxonomy of these insects. A 458-bp fragment of the COI gene was sequenced from the total 40 biting midges. Two haplotypes of *C. scoticus* were determined, one of them was identical to haplotype from UK. *C. scoticus* biting midges were detected in April. Five haplotypes of *C. obsoletus* were determined, one of them was identical to haplotype from Spain.

RESPONSE OF WALKING SPRUCE BARK BEETLE (*IPS TYPOGRAPHUS*) TO BARK ODOURS OF NORWAY SPRUCE (*PICEA ABIES*)

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The spruce bark beetle *Ips typographus* is the most economically important pest of Norway spruce (*Picea abies*). One of the possible ways to decrease the risk of plant damage by the pest is selection of more resistant and less attractive tree genotypes for planting. The aim of our study was to examine the attraction behaviour of spruce bark beetles to volatile spruce bark compounds, and to ascertain if Norway spruce trees differ in attractiveness to bark beetle males. Attractiveness of trees was evaluated by behavioural responses of walking beetles in the Y-tube olfactometer, in which beetles were free to choose between control and extract stimuli or between two different bark extracts. Hydrodistilation method was used for the extraction of components from bark samples of thirty-one- year-old trees. Sampled trees originated from seven different locations throughout the country (Prienai, Kazlų Rūda, Punia, Rietavas, Ignalina, Tytuvėnai, and Dubrava) and were planted as a collection in Vaišvydava forest, Kaunas district.

The choice behaviour of *I. typographus* in Y-tube olfactometer had a daily rhythm. Until noon (12 a.m.), spruce bark extract was unattractive to bark beetles. From 1 p.m. more beetles chose extract and the number of choices increased until 5 p. m. Thus, spruce bark extract was more attractive to spruce beetles in the afternoon. Behavioural responses of *I. typographus* to spruce bark extract also varied from June to September. In June and July, beetles chose spruce bark extracts more often than in September.

The test on choice between two bark extracts revealed that bark extracts from trees which originated from different localities in Lithuania differed significantly in attractiveness to *I. typographus*. The estimated attractiveness factor for each locality was used to range the following sequence: Rietavas < Kazlų Rūda < Dubrava < Tytuvėnai < Ignalina < Prienai < Punia. Consequently, spruce bark from Rietavas was the least attractive, and bark from Punia was the most attractive to the bark beetle *I. typographus*.

The data obtained prove that *I. typographus* males are able to distinguish the host tree by its volatile compounds in the bark.

BODY WEIGHT CHANGE DURING THE DEVELOPMENT OF PREDATORY WASP *SYMMORPHUS ALLOBROGUS* (HYMENOPTERA: VESPIDAE: EUMENINAE)

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We studied the change of body weight of eumenine wasp *Symmorphus allobrogus* during its development from egg to imago. Brood cells for the study were obtained using reed trap-nests in three localities of Lithuania in 2000-2006. Newly built nests were taken from the trap-nests every 7-14 days and dissected. We weighed the provision in fresh brood cells and measured weight and head width of wasp larva in older ones. A part of the developing wasp larvae was weighed and measured repeatedly every second day until the start of cocoon formation or defecation. Prepupae were reactivated in refrigerator at +4°C. We weighed the prepupae before and after reactivation, as well as pupae and freshly emerged imagos. Larval development of *S. allobrogus* included 5 instars; the growth of body weight was exponential. The larvae of the 3rd, 4th and 5th instars could be reliably distinguished by their head width. Male larvae of all instars had significantly smaller average head width than female larvae. On average, the female cells were provisioned with 27% larger amount of prey than male cells. However, the mean weight of fullgrown female larva was 37% larger than that of male larva. The relationship between larval body weight and weight increment per day was significantly different (Chow test), as well: female larvae of a certain weight had larger weight increment per day than male larvae. Thus, female larvae of *S. allobrogus* were growing faster and gaining more body weight per weight unit of consumed provision than male larvae. Relative loss of body weight of larva during spinning the cocoon and defecation was significantly higher in male than in female. In contrast, the relative loss of body weight during reactivation in low temperature was significantly higher in prepupae of females than in males. We conclude that at all stages from larvae to adults of *Symmorphus allobrogus*, there are significant differences between sexes in gain and loss of body weight.

DEPENDENCE OF BROOD CELL LENGTH ON NESTING CAVITY WIDTH IN SOLITARY WASPS OF GENERA *ANCISTROCERUS* AND *SYMMORPHUS* (HYMENOPTERA: VESPIDAE: EUMENINAE)

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Application of trap-nests for the studies of cavity-nesting Hymenoptera eventually implies a need for immediate nest identification using its structure. Possible nest characters that may be potentially useful for the separation of closely related species are body size-dependent metrical parameters of their brood cells. We studied the dependence of brood cell length on nesting cavity width in 10 cavity-nesting aculeate wasp species. Five alternative hypotheses were erected and tested: depending on the width of the nesting cavity, a wasp adjusts the length of a brood cell (1) maintaining the volume of the cell more or less constant, or (2) maintaining the internal surface area of the cell more or less constant, or (3) maintaining the area of the longitudinal section of the cell (product of its length and diameter) more or less constant, or (4) maintaining the perimeter of the longitudinal section of the cell (or the sum of its width and length) more or less constant; or (5) length of a brood cell is defined by the body length of wasp, and it does not depend on diameter of nesting cavity. We calculated the derived parameters of brood cells needed for testing the hypotheses and assessed the degree of fit of the actual data to the hypothesized dependences, applying correlation and linear regression analysis. The results demonstrate that most (but not all) cavity-nesting wasp species have an adaptable nesting behavior: they build shorter brood cells in wider cavities. Out of ten studied species, only two wasps (*Symmorphus crassicornis* and *S. gracilis*) seem to build brood cells of random length for their brood of both sexes in nesting cavities of any suitable diameter. In the other eight species, the degree of such adaptability (quantified as a cell length – cavity width regression coefficient) was statistically significant at least for the brood of one of sexes. The studied wasps seem to maintain constant the sum or the product of length and width of a brood cell rather than its volume. This statement is supported by 13 out of 20 analyzed datasets, or by 8 out of 10 studied wasp species whose nest building behavior supports the hypotheses (3) or (4). In 3 studied wasp species, the datasets of cells with brood of different sex demonstrated dependences of cell length on nesting cavity width supporting different hypotheses. We conclude that metrical differences among brood cells of related cavity-nesting species, if present, are more likely to be found in the sum of their length and width than in their volume.

SEED-BEETLES (COLEOPTERA: CHRYSOMELIDAE: BRUCHINAE) OF THE LATVIAN FAUNA

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There are data on Bruchinae Latreille, 1802 of the Latvian fauna summarized in current investigation. Seed-beetles are of a great economic importance. Some of them are dangerous pests of leguminous plants. In Latvia, *Bruchus pisorum* (Linnaeus, 1758) is reported as the pest of peas *Pisum*; and *Acanthoscelides obtectus* (Say, 1831) – as the pest of bean *Phaseolus*, it has been noted also as pest of peas (beetles were recorded inside a seeds).

Bibliography analysis on seed-beetles in Latvia is made for the first time. The first data on seed-beetles in Latvia were published in the beginning of the 19th century (Precht 1818). Subsequently, more than 15 works were published where information on Bruchinae can also be found.

Ulanowski (1883) reported *Bruchidius unicolor* (Olivier, 1795) from Rēzekne district, Ozolmuiža (Eastern Latvia). This species not mentioned in previous catalogues of Latvian Coleoptera.

During current research, occurrence of 10 species of seed-beetles was confirmed for the fauna of Latvia. Other 2 species are included in the list on the basis of bibliographic data. Material studied is stored in the collection of Daugavpils University Institute of Systematic Biology (DUBC, Daugavpils, LV) and the private collection of author (Daugavpils, LV). Two species, *Bruchidius villosus* (Fabricius, 1792) and *Spermophagus calystegiae* (Lukjanovitsh & Ter-Minassian, 1957), are reported for the first time for Latvia.

Overall, the list of Latvian Bruchinae includes 4 genera and 12 species. In adjacent territories, the number of registered species of this subfamily slightly varies: Belarus – 11 species of 5 genera are recorded, Estonia – 4 species of 1 genus, Lithuania – 9 species of 4 genera, Kaliningrad region – 8 species of 4 genera.

Bruchus loti Pk. and *B. atomarius* (L.) are most common species of seed-beetles in Latvia.

Externally, *Spermophagus calystegiae* (Lukjanovitsh & Ter-Minassian) is very similar to *S. sericeus* (Geoffr.). These close species authentically differ only by the shape of the aedeagus and the IX urite.

Analysis of the chorotypes of Latvian Bruchinae shows that the range of chorotypes is rather wide: Cosmopolitan – 2 species [*Bruchus pisorum* (L.), *Acanthoscelides obtectus* (Say)], Palaearctic – 1 species [*Bruchus rufimanus* Boh.],

Sibero-European – 2 species [*Bruchus loti* Pk., *B. atomarius* (L.)], Centralasiatic-Europeo-Mediterranean – 1 species [*Bruchus affinis* Frölich], Centralasiatic-European – 3 species [*Bruchus laticollis* Boh., *Bruchidius unicolor* (Ol.), *Spermophagus sericeus* (Geoffr.)], European – 1 species [*Spermophagus calystegiae* (Lukjanovitsh & Ter-Minassian)], and Centraleuropean – 2 species [*Bruchidius marginalis* (F.), *Bruchidius villosus* (F.)]. Classification of chorotypes follows as suggested by Taglianti *et al*. (1999).

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).

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PARASITES AND PREDATORY INSECTS OCCURRING IN *BREVICORYNE BRASSICAE* L. (HOMOPTERA: APHIDIDEA) COLONIES ON ECOLOGICALLY GROWN WHITE CABBAGE (*BRASSICA OLERACEA* L.)

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The investigations were carried out in 2003-2005 at the Lithuanian Institute of Horticulture. The occurrence of cabbage aphid (*Brevicoryne brassicae* L.) and parasite from Braconidae, predators from Syrphidae, Cecidomyiidae species was observed on the ecologically grown white cabbage, covered with agro-film and non covered plots were compared. During all period of observation most common were main aphid parasite *Diaeretiella rapae* M'Intosh (among Braconidae) and predator *Episyrphus balteatus* Deg. (among Syrphidae). The lowest degree of aphid parasitation by *D. rapae* was observed in cabbages with the highest number of aphids, in plots covered with agro-film. The highest parasitation was observed in the periods when the amount of aphids on the plants was the lowest, from the end of July until beginning of August at the end of their occurrence on the plants, in both plots. *Aphidoletes aphidimyza* Rond. (among Cecidomyiidae) was found in cabbage aphids in 2004, in cabbages covered with agro-film, but next year *A. aphidimyza* was found only in colonies of aphids in not covered plots. Covering with agro-film does not reduce the risk of *B. brassicae* infestation, moreover microclimate can become more favourable for pests and sometimes for predators to develop.

THE ANT-LIKE FLOWERBEETLES (COLEOPTERA: ANTHICIDAE) OF CURONIAN SPIT NATIONAL PARK (LITHUANIA)

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The most important information on fauna of Coleoptera of Curonian Spit was summarized in the monographs "Lietuvos vabalai" (Pileckis, 1976) and "Lietuvos fauna. Vabalai" (Pileckis & Monsevičius, 1995, 1997). In the period 2002-2009 new data of Curonian Spit National park Coleoptera was published by some other authors: Ferenca (2003, 2004, 2006); Ferenca et al. (2002, 2007); Ivinskis et al. (2003, 2009); Ivinskis & Rimšaitė (2005); Šablevičius (2003, 2004) Tamutis & Ferenca (2006). Anyhow information on localites and distribution of Anthicidae beetles in Curonian Spit still is poor. The aim of this study is to present abundance and distribution of Anthicidae species in Curonian Spit National Park.

Investigations and research on the fauna of Ant-like Flowerbeetles was performed during the period 2002-2009 in the shore of the Curonian Lagoon, also in the habitats of Baltic seashore and grey dunes covered with sparse grass. Insects were collected using Barber's traps and entomological net. Eight species of Anthicidae were established during the research: *Anthicus antherinus* L., *A. ater* Panz., *A. bimaculatus* Ill., *A. flavipes* Panz., *A. sellatus* Panz., *Cordicomus gracilis* Panz., *Omonadus formicarius* Goeze, and *Notoxus monoceros* L. According to the results of the investigation the most numerous and widely distributed in Curonian Spit species were *Anthicus antherinus* L., *A. flavipes* Panz., *A. sellatus* Panz. Two species - *Cordicomus gracilis* Panz. and *Omonadus formicarius* Goeze are little known in Lithuania and were discovered only in the shore of Curonian Lagoon.

INVESTIGATION OF COLLEMBOLA IN ARENASOLS OF THE EAST LITHUANIA

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The investigations were carried out in the low productivity sand soils (Arenosols) of Gulbinai (Vilnius District), Turgeliai, Šalčininkėliai and Pakenė (Šalčininkai District) settlements. The data about 20 species of Collembola belonging to 9 families identified in 9 agricultural fields are presented. The aim of the present research is to compare the species composition of Collembola in fields fertilized with raw sewage sludge or compost made of sewage sludge and in unfertilized fields. The research material was collected in July-September, 2008, five times from each of the territories using a cenometer. Collembola were extracted from the soil by Tullgren-Berlese extractor. The finds spots and number of individuals of each species are indicated. The total of 1500 individuals of Collembola was found.

It was established that the structure of Collembola communities in the cultivated fields bears a monodominant character. *Parisotoma notabilis* (Schaeffer, 1896) or *Hypogastrura assimilis* (Krausbauer, 1898) are eudominants species. *Brachystomella parvula* (Schaeffer, 1896) and *Isotoma violacea* (Tullberg 1876) are rare species. *Podura aquatica* (Linnaeus, 1758) was identified for the first time in Lithuania

DISTRIBUTION OF TWO SISTER SPECIES LEPTIDEA SINAPIS AND L. REALI (LEPIDOPTERA, PIERIDAE) IN LITHUANIA

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The *Leptidea sinapis* (Linnaeus 1758) and L. *reali* Reissinger 1990 are two butterfly sister species of the *Pieridae* family. These can only be correctly separated by examination of the genitalia, morphological they are similar.

Recent research in Europe has shown that L. *reali* butterflys are distributed in Poland, Czech Republic, Slovakia, Germany, France, Spain, Austria, Italy, Switzerland, Greece, Romania, Balkan countries, Estonia, Latvia, Norwey and Russia.

Before 2004 only *L. sinapis* have been mentioned from Lithuania in faunistic literature (Palionis, 1932, Pruffer, 1947, Kazlauskas, 1984 and other). *L. reali* had been mentioned from Ltihuania by Ivinskis, Augustauskas (2004) first time.

L. sinapis and *L. reali* have been found in similar habitats: sheltered grassy sites at the margins of scrub and woodland, forest meadow, lakeside, riverside meadow and agro-ecosystem. The flight period also is similar: the first generation flying in April- May and the second – in July – middle of August. *L. sinapis* catarpilars feeding plants are *Lathyrus* spp., *Lotus* sp., *Vicia* spp., *Trifolium* spp., *Astragalus* spp. According Belin (1999) *L. reali* caterpillars was found on *Lathyrus pratensis* – wide distributed plant in Lithuania.

Studying the old and present collection material discovered that both species have been wide distributed in Lithuania. The first step in data analysis showed that *L. reali* was more similar in central and western part of Lithuania, *L. sinapis* was distributed in all part of Lithuania (Ivinskis, Augustauskas, 2004). Recent research has shown that two sister species *L. sinapis* and *L. reali* are wide distributed in Lithuania and it is impossible to determine any consistent pattern. Analysis of collection material show, that both species have similar abundance and frequency. Since *L. reali* looks and behaves like its close relative further research is needed to discover its true distribution.

DRAGONFLY (ODONATA) CONSERVATION IN LATVIA

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Key words: Odonata, threatened and protected species, Latvia

Until now, there are altogether 59 species of nine dragonfly families known in Latvia including one irregularly immigrated species – *Sympetrum fonscolumbii* (Selys, 1840) and one species with unclear status – *Aeshna caerulea* (Ström, 1783). Although dragonflies represent a faunistically well investigated group of insects in Latvia, the data of threatened and protected species regional distribution is still insufficient as compared with other dragonflies species. There is also few ecological data available on dragonflies of Latvia.

Published data, the collections of different institutions, the data collected during the project „*Analysis of the Specially Protected Nature Territories in Latvia and Establishing of EMERALD/Natura 2000 Network*" in 2001-2002 and material collected by Latvian entomologists up to 2009 have been used in the analysis of the distribution and habitat preference. Data on dragonflies were collected by using a hydrobiological net or entomological net, or by direct observations. The material was collected from 1998 to 2009. Both historical and recent data, totally 10885 records of all dragonfly species, were included in a Microsoft Office Access database hold by the author.

There are altogether 16 species are protected by national and European legislation or included in Red Data book of Latvia. They are: *Lestes virens* (Charpentier, 1825), *Ischnura pumilio* (Charpentier, 1825), *Pyrrhosoma nymphula* (Sulzer, 1776), *Nehalennia speciosa* (Charpentier, 1840), *Aeshna mixta* (Latreille, 1805), *Aeshna isosceles* (Müller, 1767), *Aeshna viridis* (Eversmann, 1835), *Anax imperator* (Leach, 1815), *Gomphus flavipes* (Charpentier, 1825), *Ophiogomphus cecilia* (Fourcroy, 1785), *Cordulegaster boltonii* (Donovan, 1807), *Epitheca bimaculata* (Charpentier, 1825), *Libellula fulva* (Müller, 1764), *Leucorrhinia albifrons* (Burmeister, 1839), *Leucorrhinia caudalis* (Charpentier, 1840), *Leucorrhinia pectoralis* (Charpentier, 1825).

Specially protected natural areas of Latvia are geographical territories, that are under special state-level protection, in order to safeguard and maintain biodiversity of nature – rare and typical ecosystems, habitats for rare species, landscapes, that are peculiar, beautiful and characteristic for Latvia, geological and geomorphological formations, as well as territories, significant for recreational and educational purposes. The protected areas are classified according following categories: strict nature reserves, nature parks, nature reserves, national parks, biosphere reserves, natural monuments, areas of protected landscapes. Altogether in Latvia there are 684 (excluding nature monuments – veteran trees) specially protected natural areas certified by law or regulations of the Cabinet of Ministers. The half of these protected areas has been established as Natura 2000 – protection areas of European level also.

ARACHNOLOGY IN FINLAND. 1. FROM LAXMANN TO PALMGREN

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Only little has been published on history of arachnology in Finland. The activity of Finnish-born arachnologists during two centuries from the time of Clerck and Linnaeus (when Laxmann described *Aranea singoriensis)* to Palmgren (and his "Die Spinnenfauna Finnlands und Ostfennoskandiens I-VIII") is briefly dealt with here. The following persons have been included: E. Laxmann (1737-96), P. Forsskål (1732-63), A. von Nordmann (1803-66), F.W. Mäklin (1821-83), K.E. Odenwall (1873-1965), T.H. Järvi (1877-1960), R. Krogerus (1882-1966) and P. Palmgren (1907-93).

INVESTIGATION OF FLEAS (INSECTA: SIPHONAPTERA) IN LITHUANIA

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The distribution of flea species in Lithuania is not clear. An initial list of Lithuanian fleas was provided from publications and two collections in 2004 (Pakalniškis, 2004). Many fleas can only be studied and identified properly if they are mounted on slides. Infestation rates and indices of infestation by fleas in small rodents in Lithuania were studied. A total of 259 fleas identified on rodents belong to three families: Ceratophyllidae, Ctenophthalmidae and Hystrichopsyllidae. Several species: *Ctenophthalmus agyrtes*, *Megabothris turbidus, M. walkeri*, *Hystrichopsylla talpae* and *Ceratophyllus sciurorum* were described. Infestation rates and indices of infestation by fleas in small rodents in Lithuania were studied. Six species (*Apodemus agrarius*, *Apodemus flavicollis*, *Myodes glareolus*, *Microtus agrestis*, *Microtus arvalis*, *Sciurus vulgaris*) of 163 rodent specimens were caught in 5 locations. The rodent infestation by fleas was different depending on rodent species and district of capture.

ADDITIONAL NOTES ON BIOLOGY OF THE SCARCE FRITILLARY (EUPHYDRYAS *MATURNA* L.) IN ESTONIA

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The scarce fritillary *Euphydryas maturna* (L.) ranges from Europe through Central Asia to Mongolia. Estonia is situated near the northern boundary of the distribution area of *E. maturna.*

This species is protected in all EU countries according to the 1992 European Community Council Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (EU directive 92/43/EEC). In Europe, *E. matruna* (L.) has declined over the past few decades. It has become extinct in Belgium and Luxenburg. *E. matruna* (L.) is still relatively common species in SE Finland and distribution has remained stable over several decades. There is no comparable data on distribution trends of *E. matruna* (L.) in Estonia concerning past decades. Occasional observations have shown that this species is still relatively common in some areas in Estonia.

Until recently the ecology of *E.maturna* was not investigated in Estonia and still relied on accounts of the species ecology from other countries. The ecology of butterfly species, particularly the host plant species utilized, can change much over a distribution area from Europe to Eastern part. In Central Europe, in southern part of distribution area, eggs are laid on large bushes or small trees of the species *Fraxinus excelsior*, *F. angustifolia* or occasionally *Viburnum opulus*. The larvae is overwintering on the ground. In spring the postdiapause larvae feeds mainly on herbs *Melampyrum pratense* L. seedlings in Sweden, *Plantago spp*. and *Veronica spp*. in Germany or on small bushes such as *Lonicera xylosteum* in Germany. In Eastern parts of distribution area the host plants where eggs are laid are *Fraxinus*, *Syringa*, *L. xylosteum*, *Populus tremula*, *P. alba* and *Salix spp*. After hibernation larvae is changing the food plant to *Scabiosae*, *Veronica*, *Salvia*, *Plantago*, *Viola*. In contrast to the Southern European countries, the main larval host plant is *M. pratense* in Finland as well as in Sweden. Other host plants recorded are *Veronica longifolia* L. and *V. opulus*, occasionally also *L. xylosteum*.

In Estonia the first food plant is *F. excelsior*. The nests have been found from near the ground up to 3 meters on the young trees. The food plant for caterpillars right after hibernation is not *M. pratense* as in Finland. The reason is that *M. pratense* plants are not found near habitat area. The host plants of caterpillars during this period are not known. Latter caterpillars change the food plant and move to the leaves of *L. xylosteum*.

In Finland this species is always found along forest edges, where it occurs in small colonies. It is also similar in Estonia.

The duration of flight period of the adults is similar in Estonia and in Finland. It lasts for about a month, but starts earlier, at the end of May in Estonia and in mid-June in Finland.

It is not clear yet, but apparently there is one year life cycle in Estonia, as in most southern countries, and not facultative two year life cycle as it is in Finland.

The strong invasion of caterpillars by the predatory pentatomid *Picromerus bidens* (L.) was observed in the territory of Central Bohemia. Natural control by *P. bidens* can be a very important factor for the survival of a population of *E. maturna* in these areas. In Estonia pentatomid bug *Pentatoma rufipes* (L.) was found near all the nests with caterpillars. The direct attacks on caterpillars have not been fixed during observation period.

ABUNDANCE AND SPECIES DISTRIBUTION PECULIARITIES OF ORIBATID MITES (ACARI: ORIBATIDA) IN THE REGENERATING FOREST SOILS

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We investigated abundance, diversity, and community structure of soil mites (Acari: Oribatida) in the regenerating forest soils. The morphologically highly diverse oribatid mites constitute the order richest in species in the subclass Acari: by their very numbers, both individual and specific, they are among the most important terricolous arthropoda groups: their activity might be of decisive importance in the life of the soil and processes of energy turnover.

The study of oribatid mites complex in soil of the 16 year-old pinewood showed that their abundance was 29.7 thousand ind. m^{-2} on average. 7 species of orbatid mites were detected. Analysis of the dominant structure of oribatid mites revealed distinct eudominance of one species *Oppiella nova* which constituted 55.3% of the whole community of oribatid mites. *Tectocepheus velatus* and *Brachychthonius* sp. remain dominant species. Subrecedent species are not numerous.

The study of oribatid mites complex in soil of the 40 year-old pinewood showed that their abundance was 60.5 thousand ind. m^{-2} on average. 35 species of orbatid mites were detected. *Oppiella nova* constituting 44.0% of all oribatid mites is a eudominant specines in soil. *Tectocepheus velatus*, *Suctobelba* sp., *Suctobelbella* sp., *Medioppia obsoleta*, *Microppia minus* are subdominant. Recedent and subrecedent species formed the remainder of the community of oribatid mites.

HOW MANY SPECIES ARE THERE IN THE *XESTIA RHAETICA* SPECIES GROUP (LEPIDOPTERA, NOCTUIDAE)?

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The *Xestia rhaetica* (Staudinger, 1871) species group was still in the 1990s often considered to be composed of one species with several subspecies. However, Lafontaine et al. (1998), when treating the species groups of genus *Xestia* subgenus *Pachnobia*, listed five species, one of them undescribed. The present revision lists seven species, five of them found in Northeastern Siberia, and two occur exclusively in the southern mountains. Two species are described as new, and two more arise from the elevation of two earlier subspecies of *X. rhaetica* to species level. The only Nearctic species of the group, *X. homogena* (McDunnough, 1921, is for the first time reported from the Palaearctic side (as the northern subspecies, *conditoides* Benjamin, 1934). Two northern species occur as disjunctions also in the southern mountains. In both continents, the *Pachnobia*s turn browner or even redder to the east which is extreme in the Japanese taxon of the group. Comments on the zoogeography and the size variation of the moths are given.

SPECIES COMPOSITION AND ABUNDANCE OF CLICK - BEETLES (*COLEOPTERA: ELATERIDAE*) IN AGROBIOCENOZES

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The species composition and abundance of click-beetles (*Coleoptera: Elateridae*) in agrobiocenoses were examined. The research was carried out in four localities of the Southeast Lithuania with different soil conditions. The following agrocenoses were distinguished for research: natural meadow, newly-established meadow, cereals after perennial meadow, and cereals after cereals. All agrocenoses were selected considering to different soil types: *Hypostagnic Luvisols, Eudocaleari-Epihypogleyic cambisols, Eutri–Haplic Arenosols, Dystri–Haplic Arenosols.*

A total of 687 click beetles (elaterids) individuals representing 13 species were collected during the sampling period. Species *Zorochros dermestoides* Herbst. was detected in Lithuania for the first time. All detected species belong to 10 genera: *Actenicerus, Agriotes, Agrypnus, Adrastus, Cidnopus, Hemicrepidus, Oedestethus, Negastrius, Selatosomus, Zorochros.* The most numerous species was *Selatosomus aeneus* - Brilliant Click Beetle (156 individuals, D=22.7%). The second dominant recognised *Agriotes lineatus* - Lined Click Beetle (141 individuals, D=20.5%). *Agriotes obscurus* (112 individuals, D=16.3%) and *Negastrius pulchellus* (106 individuals, D=15.4%) as well belonged to eudominants. Species *Oedostethus quadripustulatus* (62 individuals, D=9.0%) was referable to dominants. Several species were qualified as subdominants: *Hemicrepidius hirtus* (22 individuals, D=3.2%), *Agrypnus murinus* (23 individuals, D=3.34%), *Agriotes sputator* (21 individuals, D=3.05%), *Actenicerus sjaelandicus* (23 individuals, D=3.34%). *Cidnopus aeruginosus* (8 individuals, D=1.16%), *Hemicrepidius niger* (12 individuals, D=1.74%) assigned to recedents. The rest of the species - *Adrastus limbatus* (1 individual, D=0,14%), *Zorochros dermestoides* (2 individuals, D=0,29%) - belonged to subrecedents.

COCCINELLIDS OF AZERBAIJAN (COLEOPTERA, COCCINELLIDAE) AND THEIR APPLICATION IN BIOLOGICAL CONTROL OF PESTS

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The lady – bird (Coleoptera, Coccinelidae) have a high impact in regulation of density of hemipterans and ticks. The first information about Coccinellidae of Azerbaijan was given in Q. Q. Yakobson (1905-1915), A. V. Bagachov (1934), N. H. Samadov (1963), A. M. Mehdiyev (1967), A. E. Aliyev, Z. M. Mammadov (1970) publications. According the Azerbaijan Science Academy Zoology Institute's materials and research carried out last years 92 species of lady-birds (Coccinelidae) have been recorded in Azerbaijan (L. M. Rzayeva, G. A. Mustafayeva 1995; 2001). Three species *Rhizobius lophanthae, Coccinella septempunctata* and *Chilocorus bipustulatus* were investigated comprehensively and bread in laboratory conditions.

Rhyzobius lophanthae Blaisd. is Australia origin. It was used to biological control in California and Italy. *R. lophanthae* was introduced from Italy to Georgia in 1947. In Azerbaijan this lady-bird is using in biological control of hemipterans – *Parlatoria oleae* Colvee*, Aspidiotus nerii* Bouche*, Pseudaulacaspis pentagona* (Targioni Tozzetti). Nowadays, this insect is rearing in laboratory of Zoology Institute during implementation the program "Introduction of useful insects and scientific items of biological fight" and is used against Diaspididae (Hemiptera).

Coccinella septempunctata Linnaeus is polyphagous insect. They have 2 generation per year. In laboratory condition this lady-bird was incubated with infected plants.

Chilocorus bipustulatus Linnaeus is using in biological control of *Aspidiotus nerii* Bouche*, Parlatoria oleae* Colvee*, Diaspidiotus caucasicus* (Borchsenius)*, Diaspidiotus perniciosus* (Comstock), *Pseudaulacaspis pentagona* (Targioni Tozzetti)*,* and play great role in the regulation of pests. Just one adult insect of *Ch. bipustulatus* kills 20-25 hemipteras per day, larvae of this insect kill 14-22 hemipterans per day. It is possible to increase number of this insect on the infected potato in laboratory circumstances.

SUSCEPTIBILITY OF CONIFEROUS FOREST DEFOLIATORS TO ENTOMOPATHOGENIC FUNGI

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Bordered white moth, *Bupalus piniarius* (L.) (Lepidoptera: Geometridae) larvae were reared under laboratory conditions feeding with Scots pine (*Pinus sylvestris* L.) twigs collected in nature. Thirty-six fungal strains were isolated from cadavers of naturally infected *B. piniarius* larvae. The most often recorded isolates were tested on coniferous forest defoliator *B. piniarius* (L.) and the most active isolate on common pine sawfly, *Diprion pini* L. (Hymenoptera: Diprionidae) (larvae 2nd and 3rd stage). The highest mortality (lethal mortality time LC_{100} – 12 days) of *B. piniarius* larvae was caused by *Beauveria bassiana* (Bals.-Criv.) Vuill. Mortality of 60.5 and 100% within 12 and 18 days, respectively, was caused by *Metarhizium anisopliae* (Metschn.) Sorokin. The lowest effect, i.e. mortality of 16.67% within 7–18 days was recorded after treatment with for *Paecilomyces farinosus* (Holmsk.) A.H.S. Br. & G. Sm. After repeated spraying with *P. farinosus* conidia (after 7 days of incubation) the larvae mortality increased to only to 56.67%. More active against *B. piniarius* larvae isolate – *B. bassiana,* was tested on *D. pini* larvae and caused their mortality of 85% within 32 days. Results obtained suggested that the most pronounced effect of *B. bassiana* in *B. piniarius* control. *B. bassiana* isolate can be used in *D. pini* control as well.

Keywords: Entomopathogenic fungi, coniferous forest defoliators, *Diprion pini*, *Bupalus piniarius.*

THE EFFECTS OF PREY ABUNDANCE ON NESTING BEHAVIOUR OF PREDATORY WASP *SYMMORPHUS ALLOBROGUS* (HYMENOPTERA: VESPIDAE: EUMENINAE)

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It has been demonstrated that species richness and diversity of trap-nesting Hymenoptera community are sensitive to a wide range of human-caused environmental changes, therefore this community may be considered a potential bioindicator of anthropogenous impacts at habitat or landscape scale. We may expect that, in addition to presence and abundance, some other parameters like body size, sex ratio and nest size can reflect the effects of environmental changes on the state of species populations. The current experimental study aimed to ascertain whether progeny size, sex ratio and number of cells per nest depend on prey abundance in the environment and may be used to estimate the wasp population state. We conducted a laboratory experiment with inseminated females of *Symmorphus allobrogus*, an abundant in Lithuania solitary wasp species. Each female was kept in a transparent plastic 5 litre container with food (honey solution), water, nesting places (reed stem internodes) and material for building cell partitions (clay) available. Wasps were provided with different amount of prey: 5, 10 or 20 specimens of leaf-beetle *Gonioctena quinquepunctata* or *Linaeidea aenea* larvae per day. A total of 37 wasps were used in the experiment. The content of 154 nests built during the experiment was examined. Wasp females responded to a higher amount of available prey by building nests with a higher number of brood cells. The wasps that received 20 prey items per day produced approximately twice as many cells per nest (3.9 ± 0.4) as the wasps receiving 5 prey items per day (2.1 ± 0.1). The amount of available prey did not affect the progeny size: both male and female progeny had the same average body mass irrespective of the number of prey specimens given to the mother wasp. Results of our experiment did not confirm the hypothesis that a higher availability of provision would lead to a higher proportion of the larger (female) sex in the progeny produced by the mother wasp: the proportion of female progeny per nest was approximately equal in the nests produced by the wasps receiving 5 and 20 prey items per day. However, the wasps that were provided with 10 prey items per day produced nests with a significantly lower share of female progeny. The reasons of such U-shaped dependence of the proportion of female progeny in a nest on the amount of prey remain unclear.

MORPHOMETRIC DIFFERENCES BETWEEN THE EUROPEAN CUCKOO WASP SIBLING SPECIES OF THE *CHRYSIS IGNITA* GROUP (HYMENOPTERA: CHRYSIDIDAE)

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Our study aimed at detection of morphometric differences between 10 European sibling species of *Chrysis ignita* (Linnaeus, 1758) group: *Ch. angustula, Ch. ignita* forms *A* and *B, Ch. impressa, Ch. leptomandibularis, Ch. longula, Ch. mediata, Ch. schencki* and *Ch. solida*). We studied 16 morphometric measures as follows: ARW (width of apical rim of the 3rd gastral tergite at the base), BOL (brow ocellar line), F2L (length of the 2nd flagellomere), LF (length of face), MBW (thickness of basal part of mandible), MMW (thickness of middle part of mandible), MPL (combined length of mesoscutellum, metanotum and propodeum), OOD (oculo-ocellar distance), PAW (width of pronotum posteriorly), POD (post-ocellar distance), PPW (width of propodeum posteriorly), PSL (length of the lateral margin of pronotum), T2AW (width of the 2nd gastral tergite posteriorly), T1PD (width of the largest punctures on the 1st gastral tergite), T2PD (width of the largest punctures on the 2nd gastral tergite), WH (width of head). The measures were analysed applying discriminant and cluster analyses.Using morphometric characters, the sibling species of *Ch. ignita* group can be distinguished with a reasonable reliability. The discriminant functions for separation of females of sibling species of *Ch. ignita* group include 13 morphometric characters (MMW, MBW, T1PD, T2PD, T2AW, ARW, OOD, PAW, PSL, LF, F2L, WH, MPL). The most significant features of them are the relative width of middle part of mandible (MMW) and the relative size of the largest punctures on the second gastral tergite (T2PD). The result of our study is a key to species of the *Ch. ignita* group (at the moment females only) based on morphometric measurements.

TOWARDS A MOLECULAR PHYLOGENY OF THE ALEOCHARINE TRIBE OXYPODINI (COLEOPTERA: STAPHYLINIDAE)

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The Oxypodini Thomson, 1859 are one of the most challenging tribes of the staphylinid subfamily Aleocharinae. Both their morphological diagnosis and classification in five subtribes are based on systematically weak characters, and no autapomorphies has been forwarded yet for the Oxypodini. We study the phylogeny of the group through using a total sequence of 4615 bp including two nuclear (18S rDNA, topoisomerase) and four mitochondrial (16S rDNA, NADH1, COI, COII) genes. Oxypodini are shown to be non-monophyletic with regard to the subtribe Tachyusina. The strongly supported sister group relationship between the myrmecophile genera Dinarda (subtribe Dinardina) and Thiasophila (subtribe Oxypodina) suggests that myrmecophyly in this clade has evolved only once. However, the phylogenetic relationships between the Oxypodini and most other aleocharine tribes as well as most relationships of the taxa within the tribe remain unresolved.

THE SEASONAL PATTERNS OF THE MACROINVERTEBRATE DRIFT IN THE STRIKUPE STREAM IN LATVIA

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Drift samples were collected at Strikupe stream near its mouth in river Gauja. Strikupe is a medium sized silicate type salmon stream with catchments area of 85.84 km^2.

Samples were taken six times over a 24 hour period downstream two different habitats (sand/detritus and sand/macrophyte habitat). Totally 144 samples were collected per spring, summer and autumn seasons of 2007. The mesh size of drift nets was 0.5 mm, frame size – 0.25 x 0.25 m^2 and exposure period - 30 min. Also current velocity and water temperature was measured.

The drift intensity and species composition varied seasonally. Dominant taxa in spring and summer seasons were mayflies Ephemeroptera and black flies Simuliidae while mayflies, stoneflies Plecoptera and beetles Coleoptera were dominant in autumn samples. The highest drift density for aquatic insects as well as for terrestrial insects was observed at the night time. The less intense drift of macroinvertebrates was at the autumn season. The results could be explained by individual life cycles and behaviour of drifting invertebrates.

CITOCHROME OXYDASE I SEQUENCES ANALYSIS OF *ELACHISTA* (LEPIDOPTERA: ELACHISTIDAE: ELACHISTINAE) SPECIES

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The use of short DNA sequences from a standardized region of the genome, has recently been proposed as a tool to species identification and discovery. In Lithuania we use molecular methods for identify Elachistinae moths. The *Elachista* Treitschke is the largest genus in the subfamily Elachistinae. Belong small and very small moths with wingspan from 5 to 14 mm. Forewing pattern mainly consists either a white fascia and spots on dark background or fuscous marks on light background or moths are unicolour (white, yellowish or cream). Their larvae feed on leaves as miners on plant of the families *Poacea*, *Cyperaceae* and *Juncaceae*. The aim of this study was to select convenient methods for molecular studies, identification of *Elachista* moths and to test mtDNA sequence of the COI gene. We used pined specimens and specimens which were stored in 96% ethanol. DNA was extracted usually from head or thorax using the Nucleospin Tissue Kit (Machery-Nagel, Düren, Germany). The polymorphism of sequenced mtDNA segments of the cytochrome oxidase I (COI) gene was assessed in 31 specimens of 11 species. PCR amplification of genomic DNA with COI primer in each of the samples across the 11 species yielded specific fragment of 700 bp corresponding to position 2239–2944 of sequence. After purifying the products to remove unincorporated primers and dNTPs, each of the amplified fragments was directly subjected for automated sequencing from both the ends to obtain overlapping sequence data of COI gene in each species. The tree was constructed using Neighbor-Joining (NJ) method, Kimura 2–parameter model. Analysis of the COI sequenced 31 samples of 11 Elachistinae species produced a 640 bp sequence alignment. The total nucleotide diversity and genetic divergence obtained for the Elachistinae moths, contrasting with the 229 divergent sites. Maximum parsimony analysis revealed 182 parsimony informative characters. This data would therefore allow an entomologist to distinguish between Elachistinae species, in cases where morphological differentiation was difficult.

Key words: *Elachista*, identification, COI gene, sequencing.

PREDACEOUS DIVING-BEETLE ASSEMBLAGES OF FLOODED WETLANDS IN RELATION TO TIME, WETLAND TYPE AND BTI-BASED MOSQUITO CONTROL

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Published in Hydrobiologia (2009) 635: 189-203. DOI 10.1007/s10750-009-9911-9

We investigated the abundance and taxonomic composition of the aquatic predatory insect fauna, with focus on adult diving beetles (Coleoptera: Dytiscidae), in eight temporary flooded wet meadows and two alder swamps in the River Dalälven floodplains, central Sweden 2002 to 2006. Diving beetles are generalist predators and often abundant in various waters, including temporary wetlands. In the River Dalälven floodplains, recurrent floods induce massive hatching of floodwater mosquitoes (Diptera: Culicidae), which constitute a patchy and irregular food resource for aquatic predatory insects. Our aims were 1) to characterize the assemblage of adult diving beetles occurring in the wetlands during floods in relation to time and wetland type, and 2) to evaluate the effect on the aquatic predator assemblage of strongly reducing the abundance of a potential prey, flood-water mosquito larvae (Diptera: Culicidae) with *Bacillus thuringiensis var. israelensis* (Bti) during floods. We found diving beetles to be the dominating aquatic predatory insect taxa in all ten wetlands. There was difference in Dytiscidae species richness after rarefaction but not in diversity between wet meadows and alder swamps. The cluster analysis based on dytiscid species and abundances showed very high similarities between the wetlands. The variance component analysis was unable to distinguish any factor that could explain more than 7.4% of the variation in the dytiscid species assemblages. The only effect of Bti-treatment against flood-water mosquito larvae, potential food for the predatory dytiscids, was a slight increase in abundance of the medium-sized dytiscid species. Our results are in accordance with previous studies, suggesting that irregular and recurrent flood dynamic structure the dytiscid fauna more than food limitations and environmental factors.

HOMOPTERA SPECIES COMPOSITION FROM CULTIVATED STRAWBERRY

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Altogether 32 homopteran species belonging to 3 suborders (Auchenorrhyncha, Aphidoidea, Aleyrodoidea) and 5 families were found on cultivated strawberry. The great majority of them are linked to suborder Auchenorrhyncha (23 species or 79% from all homopteran species). Insects of suborder Auchenorrhyncha belonged to 3 families (Delphacidae, Cercopidae, Cicadellidae). From them family Cicadellidae had the highest number of species (19 or 71,9% from all Auchenorrhyncha species collected on strawberry). The most abundant on cultivated strawberry throught vegetation period 1999 was polyphagous cicada species *Macrosteles laevis* (34.9 - 93.9% from all collected Cicadellidae species). Species, *Empoasca pteridis* was dominated in June (11,1%) and September (31%). *Megophthalmus scanicus* - in July (20,9%), *Aphordes bicinctus* – in July (19,8%). Several species Cicadellidae were found in very low numbers, especially in imago stages. Family Cercopidae represented by one species, *Philaenus spumarius*, which was dominated in July 1999 (19,8%). Family Delphacidae represented by 3 species, and from these species *Javesella obscurella* was dominated in July (87,5%).

Suborder Aphidoidea is represented by only one family - Aphidiidae which contains eight aphid species. Aphid species, *Acyrthosiphoh malvae, Aulacorthum solani* and *Macrosiphum rosae* are known as serious pests, especially as vectors of the strawberry viruses. The number of infected by aphids plants were small and theirs population density on strawberry leaves was also in low level.

Suborder Aleyrodoidea is represented by family Aleyrodidae and by one species, *Aleyrodes lonicerae,* which was found on strawberry in very low number.

Sweep netting was used for collecting insects.

Key words: strawberry, cicads, aphids, aleirodid.

SAPROXYLIC BEETLES IN HOLLOW TREES - STUDY IN HELSINKI METROPOLITAN AREA

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Urban and semi-urban areas are important for nature conservation. There are areas or habitats suitable for rare species even in the biggest cities. For some species, urban areas can offer one of the best or the only places to live. In traditional cultural landscapes fauna and flora is often altered and may have been preserved constant for centuries. This can be seen for example in manor parks where old, hollow trees have continued to exist for a long period of time.

Many saproxylic insects are specialised on hollow trees. In later life, some temperate deciduous tree species, such as linden and oak, will become hollow. Inside a tree cavity is wood mould ”mulm”, including bird nests and litter. Many of the species specialised living in mulm are endangered.

We studied which insect species occur in hollow trees in five parks in Helsinki metropolitan area, Finland. We used three trap types, window, aluminium foil, and pitfall traps, to ensure catching as many species as possible. There were six traps, two of each trap type, in every tree. We found *Eucnemis capucina* (Elateridae) and other rare and specialised species. Like *E. capucina*, many of the species have already been found earlier in Helsinki or surrounding urban areas. The sampling summer 2006 was especially dry, which may have had an effect on the species assemblage we caught.

We conclude that hollow trees in urban areas are important for many saproxylic beetles. The trees that are in urban and semi-urban areas can offer suitable habitat also for rare and endangered species. Information of species living in hollow trees is very important for the conservation of the species. One of the final aims of this study is to share information with different organisations working with hollow urban trees and to apply the information in to practise.

THE SEASONAL COLD-HARDENING OF THE CARABID BEETLE *PLATYNUS ASSIMILIS* PAYK.

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Carabid beetles are species rich and abundant, due to their predatory polyphagous nutrition potentially important as natural pest control agents. Insect seasonal adaptation depends on many components, including resistance to dryness and cold. Cold-hardiness can be measured by supercooling points (SCP) – the temperature at which spontaneous freezing occurs. The aim of present research was to study seasonal cold adaptation dynamics of the ground beetle *Platynus assimilis* Payk. (Coleoptera, Carabidae). For measuring SCP carabid beetles were anesthezised by ether. The beetles positioned so that its integument (thoracic tergit) was contacted with the copper-constantan thermocouple, placed in a glass vial, and then transferred to the circular bath (Ministat 230w-2, Huber, -33°C to +200°C). SCP was determined using a 0.5°C min^{-1} cooling rate. Seasonal changes in mean SCP values in *P. assimilis* were determined as follows: −8.7°C (in February 2007), −6.8°C (in June 2007) and −9.3°C (in October 2007) (P□0.05). According to Hawes and Bale (2007) classification *P. assimilis* proved to belong to the cold-hardy freezing-tolerant insect group (they survive ice formation in body tissues). The current research was supported by projects ESF7130, ESF6781 and SF170057s09.

Key words: *Carabidae*, cold-hardiness, *Platynus assimilis*, seasonal dynamics, supercooling point.

MITOCHONDRIAL CO1 GENE SEQUENCE IN EUROPEAN EUMENINAE WASPS (HYMENOPTERA: VESPIDAE): INTRA-SPECIFIC DIVERSITY AND APPLICABILITY FOR SPECIES IDENTIFICATION

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The aim of the study was to estimate the intra- and interspecific genetic variability within selected European Eumeninae wasps and to test if partial sequence of the mitochondrial cytochrome oxidase subunit 1 gene (CO1) is useful for species identification and for assessment of intra-specific population structure at geographic scale. Wasps of six cavity-nesting Eumeninae genera were reared from trap-nests exposed in 13 European countries (Austria, Estonia, France, Germany, Greece, Hungary, Italy, Lithuania, Poland, Serbia, Spain, Sweden, United Kingdom). The studied specimens represented 19 species: *Ancistrocerus antilope*, *A. claripennis*, *A. gazella*, *A. nigricornis*, *A. parietinus*, *A. trifasciatus*, *Discoelius dufourii*, *D. zonalis*, *Euodynerus notatus*, *E. posticus*, *E. quadrifasciatus*, *Leptochilus regulus*, *Symmorphus allobrogus*, *S. bifasciatus*, *S. crassicornis*, *S. debilitatus*, *S. gracilis*, *S. murarius*, and *Tachyancistrocerus rhodensis*. DNA was extracted from wasp thoracic muscles according standard protocols. The amplified partial sequence of the CO1 gene (672 bp) corresponded to positions 1828-2497 in mitochondrial genome of *Apis mellifera ligustica*. For 17 species, these sequences were established for the first time. They were compared using neighbour-joining (NJ) analysis, implemented in MEGA2.1. The haplotype networks for polymorphic species were constructed using the software TCS 1.13. Most of the studied European species demonstrated very limited intraspecific variation and formed discrete clusters in the NJ tree. Out of them, the highest haplotype diversity was found in *Discoelius zonalis* and *Symmorphus bifasciatus*. Haplotypes of some species, like *Ancistrocerus trifasciatus*, were linked to particular areas of species distribution range, however, in *Discoelius zonalis* and *Symmorphus bifasciatus*, the intra-specific variability did not display clear geographic patterns. Previously published partial sequences of the CO1 gene of other (mostly Nearctic) eumenine species were retrieved from the GenBank database and included into NJ analysis. Overall NJ analysis of distances among all representatives of the subfamily with known CO1 gene sequence resulted in a well resolved tree, with only two clades including more than one species. Our results demonstrate that the mitochondrial CO1 gene sequence of Eumeninae wasps is useful for species identification and barcoding and, for some species and at some geographic scales, may be applied for the intra-specific diversity studies.

NOTES ON FUNGUS GNATS (DIPTERA, MYCETOPHILIDAE) OF LITHUANIA

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The first data on Lithuanian fungus gnats (*Diptera, Mycetophilidae*) was given in checklist of Lithuanian Diptera where 3 species of fungus gnats have been mentioned (Pakalniškis, Podėnas, 1992), for 12 species of fungus gnats Lithuania was given as distribution region in Catalogue of Palaearctic Diptera (Hackman et al. 1988), 2 additional species was given in Fauna Europaea Web Service (Chandler, 2005). The comprehensive investigation of fungus gnats was carried out from 1997 year. Trophic relations with fungi of various taxa, relations with parasitoids *Orthocentrinae*, seasonal activities and habitat distribution have been investigated. According original investigation data and published material 187 species of fungus gnats have been recorded in Lithuania. The family Mycetophilidae is divided in 7 subfamilies, representatives of 5 subfamilies have been found in Lithuania: 25 species of *Gnoristinae*, 7 species of *Leiinae*, 113 – *Mycetophilinae*, 26 – *Mycomyinae*, 16 – *Sciophilinae*. Trophic relations have been established between fungus gnats larvae of 42 species and fungi of the order *Agaricales*, larvae of 15 species and fungi of the order *Boletales*, larvae of 3 fungus gnats species and fungi of the order *Hymenochaetales*, larvae of 9 species of fungus gnats and fungi of the order *Pezizales*, larvae of 10 species of fungus gnats and fungi of the order *Polyporales*, 19 species of fungus gnats and fungi of the order *Russulales*, 2 species of fungus gnats and fungi *Thelephorales*, and 1 fungus gnats species with fungi of order *Tremellales*. The following species of fungus gnats prove to be of the widest trophic specialization: *Mycetophila fungorum* (De Geer), *Sciophila lutea* Macq., *S. pseudoflexuosa* Kurina, *Allodia lugens* (Wied.), *A. grata* (Mg.), *Exechia fusca* (Mg.), *Leia bimaculata* (Mg.), *Tarnania fenestralis* (Mg.). The gnats *Mycetophila alea* (Laff.), *M. laeta* (Walk.), *M. blanda* Winn., *Allodia barbata* (Lundst.), *A. neglecta* Edw., *A. silvatica* (Landr.) are classed as more specialized species.

The most widespread fungus gnats species in Lithuania are *Mycetophila fungorum* (De Geer), *Sciophila lutea* Macq., *S. pseudoflexuosa* Kurina, *Allodia grata* (Mg.), *A. ornaticolis* (Mg.), *A. lugens* (Wied.), *Boletina trivittata* (Mg.), *B. basalis* (Mg.), *Tarnania fenestralis* (Mg.).

INFLUENCE OF HYDRATION STATE ON GAS EXCHANGE PATTERNS OF THE PINE WEEVIL *HYLOBIUS ABIETIS* (L.) (COLEOPTERA: CURCULIONIDAE)

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The metabolic rate and respiratory patterns of adults of the large pine weevil, *Hylobius abietis* (L.) (Coleoptera: Curculionidae) was compared in hydrated and dehydrated conditions using a constant volume electrolytic respirometer-actograph combined with an infrared actograph. The weevils displayed continuous pumping movements in hydrated conditions (hydrated individuals) while the cyclic gas exchange was entirely lacking or only unclear small releases of CO_2 (bursts, B) were observed. However, when a short period of quiescent state (tonic immobility) was artificially induced by a mechanical stimulus, 3–6 clear cycles of gas exchange appeared, with the frequency of 14–18 cycles per hour, i.e. the discontinuous gas exchange cycles or DGCs were displayed. These were recognized as CFO (closed, flutter, open) type of gas exchange cycles known by closed-flutter-open phases of spiracular movements without active ventilation, i.e. pumping movements, during the bursts. At 0 ^{o}C, when the muscular activity was suppressed, all the hydrated weevils showed CFO cycles, nearly one burst per hour. When *H. abietis* adults were kept in dry conditions without food for 3 days (dehydrated state), CFV (closed, flutter, ventilation) cycles appeared with the frequency of 5–6 cycles per hour, while the bursts were associated with the pumping movements of the abdomen. Dehydration caused lengthening of the flutter period nearly two times. During the flutter, regular miniature inspirations were recorded. After being in the dehydrated state for 5 days, the adults of *H. abietis* displayed CFO and CFV cycles with a frequency of about one cycle per hour, while during the extremely long interbursts periods clear inspiration movements were recorded. Metabolic rate in the hydrated weevils was 0.36 ± 0.05 ml O_2 g^{-1} h^{-1}, but after they had been kept in dehydrated conditions without food for 5 days, metabolic rate decreased essentially, being only 0.16 ± 0.02 ml O_2 g^{-1} h^{-1}. The authors suggested that in hydrated *H. abietis* adults the lacking of clear cyclic gas exchange was due to the almost continuous pumping movements, or active ventilation, externally not observable. The active ventilation without DGC was obviously a normal mode of respiration in the hydrated weevils. However, the hydrated weevils were able to display the cyclic gas exchange during the forced quiescent periods but the artificially evoked tonic immobility was considered as a stress state. Thus our results supported the hypothesis that DGC is a water conserving mechanism in beetles.The research was supported by projects ESF6781, ESF7130 and SF170057s09.

Key words: *Hylobius abietis*, large pine weevil, hydration state, gas exchange cycles, CFO, CFV, muscular ventilation

LONGITUDIONAL GRADIENT OF CADDISFLY (TRICHOPTERA) SPECIES DISTRIBUTION AT MEDIUM SIZED LOWLAND STREAMS IN LATVIA

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The caddisfly communities were investigated in the territory of Latvia at nine medium-sized lowland streams in 2003. Hierarchical sampling design was applied for 27 stream reaches, of nine streams and of three river basins: stream reach (upper, middle and lower reaches), stream and river basin. Abundance of caddisfly larvae changed along the stream continuum. Statistically significant difference was found between the means of abundance at upper and lower reaches, but not between the means at middle and lower reaches. Statistically significant difference was not found between the means of the number of individuals at upper, middle and lower reaches. The abundance increased with increasing stream size. The most significant environmental factors, structuring caddisfly larvae communities, were: pH, alkalinity, ammonia ion concentration, mean depth, psammal and xylal substrates and catchments area.

FAUNA OF MILLIPEDES (DIPLOPODA) IN LATVIA WITH NOTES ON OCCURRENCE, HABITAT PREFERENCE AND ABUNDANCE

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Millipedes are common in different habitats and population density can be high. These animals are able to influence significantly the degradation of organic substances in soil and litter. The aim of current research is to clarify species composition of millipedes in Latvia, to estimate occurrence (frequency of records), habitat preference (number of records in the particular habitat) and abundance (or relative density) of species.

Millipedes were collected in different localities of Latvia mostly from 2003 to 2008. The following methods for collecting of millipedes were used: checking a dead trees at different stages of decaying; sieving of litter of forests through beetle-sieve and subsequent sorting out the animals; exposing of pitfall traps (diameter of 7.5 cm filled with 4% solution of formaldehyde, and exposed from one to four weeks); collecting of plant detritus and mushrooms with subsequent extraction on Tullgren funnels; collecting of visible millipedes on different objects.

In total, 31 Diplopoda species are known in Latvia. Of them *Archiboreoiulus pallidus*, *Boreoiulus tenuis* and *Choneiulus palmatus* are new to the fauna, *Mastigona* sp. and *Acanthoiulus fuscipes* are excluded from the faunal list.

A number of records of species in the particular habitat indicates habitat preference, a total number of records – occurrence. A number of found species and a number of records indicate value of the habitats for millipedes. Deciduous forests and anthropogenic habitats (parks etc.) are the richest, bogs and costal habitats – the poorest in species.

Craspedosoma rawlinsi, *Leptoiulus proximus*, *Polydesmus* spp., *Ommatoiulus sabulosus*, *Polyzonium germanicum* are ubiquitous species, but population density usually was relatively low. *Megaphyllum sjaelandicus* seems to prefer different meadows and fens.

The highest density and diversity of epigeic millipedes was found in the deciduous forests, calcareous fens and meadows. Two species *Rossiiulus vilnensis* and *Unciger fetidus* can establish very rich local populations. Typical saproxylic species as *Proteroiulus fuscus* can be collected by use of pitfall traps rarely. The lowest population density and species diversity of millipedes was found in the dune habitats and raised bogs. Thus, millipedes might be used as descriptors for the habitat value.

REVIEW OF *SCRIPTA*, *EXCISA* AND *ERECTILOBA* SPECIES GROUPS IN *TIPULA* SUBGENUS *VESTIPLEX* (DIPTERA, TIPULIDAE)

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Subegnus *Vestiplex* is phylogenetically young cranefly complex of the genus *Tipula*. Females of this subgenus have a specific ovipositor with strong and powerfully constructed, heavily sclerotized cerci and very small or rudimentary hypovalvae. This specialization is related to the transition of the females to living in xeromorphic conditions when ovipositor is used to lay eggs into dry and solid substrate. Male genital complex is very polymorphic.

There are 170 species and subspecies of subgenus *Vestiplex* described so far. They are found in Holarctic and Oriental zoogeographic regions with no specimens known from other parts of the globe. The majority of the species are associated with the mountain systems (Pyrenees, Alps, Caucasus, and Himalayas), where the formation of the subgenus took place.

The subgenus *Vestiplex* is divided into several species complexes. Allocation to these complexes was until now based mainly on the structure of the IX tergite of the male abdomen paying attention also to the structure of female VIII sternite and valves. Relationships between the species or species groups remain unclear because of the poor investigations on their morphology.

Morphology of the male genital complex of three closely related species groups – *scripta*, *excisa* and *erectiloba* is analyzed in this work. Illustrations of the genital structures are given, species group-specific features are discussed and their significance to the determination of relationships between the groups is evaluated.

SPREAD AND HABITAT PREFERENCE OF THE WASP SPIDER *ARGIOPE BRUENNICHI* (ARANEAE: ARANEIDAE) IN ESTONIA

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The wasp spider *Argiope bruennichi* (Scopoli, 1772) has been continuously expanding range from the warmer regions of central Europe northwards during the 20th century. Species, which disperses mainly by ballooning, is still spreading. The rapid dispersion of A. bruennichi is likely associated with climatic changes. It was first recorded for Sweden in 1989, for Denmark in 1992, for Lithuania in 2002, for Norway in 2004, for Latvia in 2004 and for Finland in 2005. It was newly found from the Estonia, Saaremaa island, in 2006. The species distribute toward north along coastal area of Baltic Sea, which support rapid spread by mild maritime climate and suitable conditions for ballooning.

In Estonia *A. bruennichi* is currently known to exist in 18 sites in the Saaremaa island and in coastal areas of western Estonia. Species prefer fully insolated dry habitats with locally warmer microclimatic conditions. In Estonia wasp spider has been found to inhabit unmanaged or slightly grazed calcareous grasslands, fallow fields and ruderal habitats. In many localities the densities of species are difficult to estimate since only occasional single specimens reported. In 2009, *A. bruennichi* was more throughly surveyed in western Saaremaa, where species occur in preferred habitats at densities of 0,01–0,12 adult females per m^2. The density was higher in unmanaged calcareous grasslands than in fallow fields and ruderal habitats.

TECHNOLOGICAL ASPECTS OF MODELING CLOSED AQUASYSTEM FOR KEEPING AND BREEDING *DYTISCUS LATISSIMUS* LINNAEUS, 1758 (COLEOPTERA; DYTISCIDAE) IN LABORATORY CONDITIONS

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During the process of studying the issues of keeping and breeding *Dytiscus latissimus*, we touch upon a very wide topic, including field studies as well as practical technical laboratory research. Taking into consideration the topicality of the tasks set under the framework of laboratory research, we have started the development of a universal aquarium system which provides for a study conditions of palearctic freshwater aquatics, both invertebrates and vertebrates (including some species of fish and amphibians).

We have divided the technical issues of implementation of the environmental model for keeping *Dytiscus latissimus* into the following three parts:

- First part which provides for imitation of the imago keeping conditions in the laboratory independently of season, including wintering conditions with gradual transition into a spring-summer season. This allows for provoking and observing the mating behavior and the breeding behavior of species;
- Second part which provides for observation of growing, development and behavior of larvae;
- Third part which ensures the process of larva metamorphosis into imago.

The examples of aqua systems constructions and methods of their preparation mentioned by us allow to create a similar laboratory as a part of any heated premises in temperate latitudes, where the study process of objects can be more feasible and comfortable. Some of these developments are only of an experimental nature and certain constructive adjustments might take place in some stages of technocenoses.

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