3rd International Symposium on Syrphidae

Leiden 2-5 September 2005

Programme and Abstracts

Edited by Menno Reemer & John T. Smit

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Contents

Itinerary

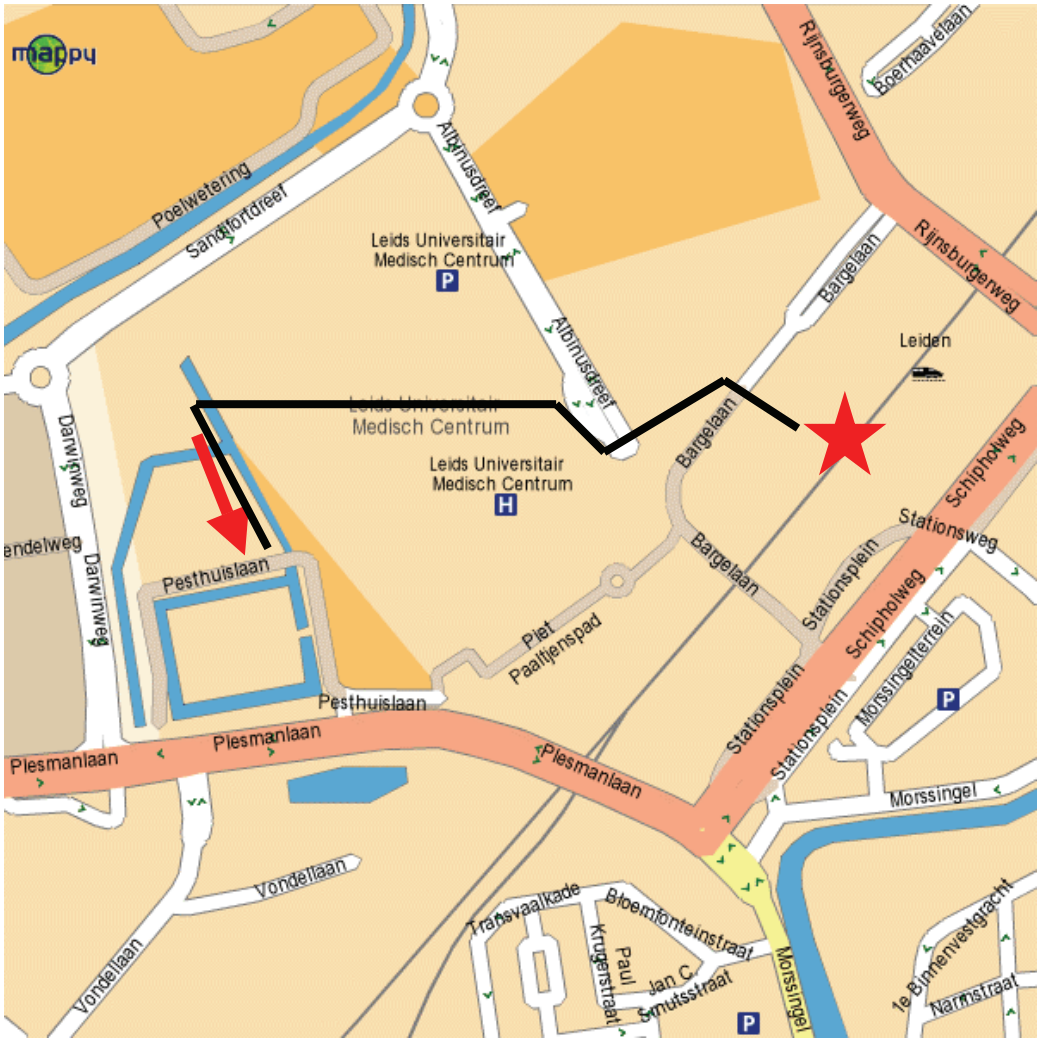
ROUTE FROM TRAIN STATION TO MUSEUM NATURALIS

From the train station is is a 5 minute walk to the museum. Take the exit (= uitgang in Dutch) 'LUMC' and 'Naturalis', which is the northwest side of the station. Outside there are signs 'Naturalis' all the way to the museum. You walk around the 'LUMC', there is a constructionsite on the other side, here you walk along this constructionsite at the left side.
Detailmap of the area of the train station (star) and the museum, entrance indicated with the red arrow. Mind you, you are not walking along the roads indicated at the map!

Entrance Museum

Train station

Walking route



General remarks

The Museum
It is not allowed to consume food outside the museum restaurant or the patio. The entire museum is smoke free, only outside the building are you allowed to smoke.

Important times
09.00 – 10.00: coffee on Saturday and Sunday
10.00: Begin symposium, except on Friday
11.00: opening on Friday
12.30: lunch
15.40: coffee / tea break
17.00: welcome drink on Friday
18.00: closing of the museum, we must be out by then! Except on Friday.

Badges
On registration you receive a badge with your name. This badge provides you an entrance to the conference room where the symposium is held. Besides, it provides a free entrance to the museum.

Alarm
The museum is set under alarm outside the normal working hours. Therefore it is not possible to stay long after the symposium in the museum. The opening hours during the symposium are 08.30 until 18.00. We absolutely need to be outside the museum before 18.00 except on Friday, we can stay until 19.00.

Money
The currency in the Netherlands is the Euro. For those of you who still need to pay the registration fee, or the excursion fee, we kindly ask you to pay this in Euros. We can't accept foreign currency.

E-mail and internet
During the symposium there will be a computer at your disposal for email correspondence.

Collecting permit
For the excursion on Monday the 5th, there is a permit to collect hoverflies.

Friday 2 September

08.30	Registration and coffee	
11.00	Welcome	
11.20	**S. Ball & R.K.A. Morris** Where will our hoverflies be in 2020? Some examples of potential responses to climate change	Faunistics & Biogeography
11.40	**A. Barendregt** National biogeography: distribution pattern of all Syrphids in the Netherlands	
12.00	**L. Marinoni** The Syrphidae community in five floristically different areas in Paraná, Brazil	
12.20	Lunch	
13.45	Newsflashes	
14.00	**P. Hondelmann** The hoverfly *Episyrphus balteatus*: biology and mode of life (DVD film)	Life History & Biology
14.20	**M.C.D. Speight** Why do females predominate in malaise trap catches of Syrphidae (Diptera)?	
14.40	**Pérez-Bañón, C., M.A. Marcos García & G.E. Rotheray** The preimaginal stages of *Callicera* species (Diptera, Syrphidae)	
15.00	**W. Renema & W. van Steenis** Are spring hoverflies changing their flight period?	
15.20	Break	
16.00	**F.C. Thompson** Where are we now: an overview of the systematics of flower flies	Systematics & Phylogeny
16.20	**D.-S. Choi** Molecular phylogeny of Palaearctic *Volucella* species	
16.40	**A. Vujić, A., G. Ståhls, S. Radenković & S. Simić** Subgeneric division of the genus *Merodon* Meigen, 1803 (Diptera: Syrphidae) – morphological and molecular evidence	
17.00-19.00	Welcome drink	

Saturday 3 September

09.00	Arrival and coffee	
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10.25	**J.-P. Sarthou, J.-P., L. Larrieu & A. Delarue** Ecological assessment with Syrph the Net: the case of four stands in a *Fagus-Abies* forest in Hautes-Pyrénées (South-Western France)	
10.45	**Marcos-García, M.A., C. Pérez Bañón & G.E. Rotheray** Saproxylic syrphids in Mediterranean ecosystems (Diptera, Syrphidae)	
11.05	**E. Castella & M.C.D. Speight** Sub-alpine syrphid communities analysed with the Syrph-the-Net database	
11.25	**A. Ssymank & T. Krause** The Hoverflies (Diptera, Syrphidae) in an alluvial system of the Rhine in the Urdenbacher Kämpe near Düsseldorf (Northrhine-Westfalia, Germany)	
11.45	**T. Gittings, J. Good & M. Speight** The use of hoverflies (Diptera, Syrphidae) as indicators of wetland habitat quality: a case study from Pollardstown Fen, Co. Kildare, Ireland	
12.05	**F. Dziock & J.-P. Sarthou** A review on the use of hoverflies as bioindicators (Diptera, Syrphidae)	
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13.45	Mystery Hoverfly Competition	
14.00	**J.-H. Stuke** The hoverflies (Diptera, Syrphidae) from Baltic amber	Systematics & Phylogeny
14.20	**J.T. Smit & A. Vujić** Preliminary results of a revision of the genus *Psilota* in the West Palaearctic region	
14.40	**H. de Jong & B. Brugge** The collection of Palaearctic Syrphidae in the Zoological Museum of the University of Amsterdam	
15.00	**G. Ståhls, X. Mengual & S. Rojo** Preliminary phylogeny of the predatory hoverflies (Diptera, Syrphidae: Syrphinae) using molecular data	
15.20	**P. Láska, J. Dušek, L. Mazánek & V. Bičik** Dušek & Láska´s (1967) system of Syrphini commented after 38 years	
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16.15	**A. Vujić, G. Ståhls, S. Rojo, S. Radenković & S. Šimić** Paragini Phylogeny (Diptera: Syrphidae) and Systematics: a combined approach of DNA sequences and morphology	
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16.55	**F. Verheggen, L. Arnaud, E. Haubrugge** Isolation of tomato plant volatiles and their antennal perception by the predator *Episyrphus balteatus* (De Geer)	
17.15-17.35	**A. Pineda Gomez & M.A. Marcos García** Several strategies to increase the number of aphidophagous hoverflies in Mediterranean greenhouses (Diptera, Syrphidae)	

Sunday 4 September

09.00	Arrival and coffee	
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10.25	**R.K.A. Morris & S. Ball** Estimating the populations of three species of *Volucella* in an English woodland	
10.45	**F. Arrignon, J.-P. Sarthou, M. Deconchat & C. Monteil** What should we know about *Episyrphus balteatus* to improve the modelling of its individual overwintering survival?	
11.05	**S. Pestov** On the hoverfly fauna (Diptera, Syrphidae) of the Priluzskij region of Komi Republic	Faunistics & Biogeography
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13.45	Newsflashes	
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15.00	**A.V. Barkalov& D.Yu. Kropacheva** The hoverfly fauna of the Altai mountains	
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16.15	**S.Yu. Kuznetzov** Taxonomic value of the immature stages morphology and phylogeny of Syrphidae (Diptera)
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16.55-17.15	Concluding remarks

Monday 5 September

Field trip

10.00 Bus leaving in front of the museum

The excursion will first go to 'Meijendel'. This is a dune area near the coast, with sand dunes and small pieces of forest. Here we will have about 2 hours to walk around and collect hoverflies. After that we will have lunch.

After the lunch we will again go by bus to 'Kortenhoef, which is an area of fenland, typical for the Netherlands. Here we have about 2 hours to walk around and collect flies. After that we will go by bus to the museum again, arriving around 18.00 hours.

List of poster presentations

Abstracts of the posters can be found in the abstracts section.

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A new genus of hoverfly from China (Diptera: Syrphidae)

Choi, D.-S., K. Ôhara & H.-Y. Han
A description of a new *Volucella* species (Diptera: Syrphidae), with taxonomic discussion about the superficially resembling species from the Eastern Palaearctic Region

Gharali, B.
An interactive key for identification of Syrphidae genera based on Delta software

Gharali, B.
Hoverfly taxonomy in Iran: status and developments

Gittings, T.
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Ichige, K. & T.R. Nielsen
On a new *Melangyna* species (Diptera, Syrphidae) from Japan

Iliff, D.
Hovering activity of female Syrphinae (Diptera, Syrphidae)

Ludoski, J., A. Vujić & V. Milankov
Morphometric analysis of wing characters in populations of the *Cheilosia laticornis* group (Diptera, Syrphidae) from the Balkan Peninsula

Mazánek, L. & P. Láska
Upgrading of the checklist of the Syrphidae (Diptera) of the Czech and Slovak Republics

Mutin, V.
Hoverflies (Diptera, Syrphidae) of Komsomolsk-na-Amure.

Nielsen, T.R. & A.V. Barkalov
A new Palaearctic *Platycheirus* of the *manicatus* group

Pérez-Bañón, C. A. Vujić, S. Rojo, S. Radenković & T. Petanidou
West Mediterranean islands and biodiversity: an analysis of syrphid fauna (Diptera, Syrphidae) of Lesvos island, Greece

Popov, G.V.
Using K.B. Gorodkov's methods in the investigation of hoverfly ranges

Smit, J.T.
The hoverflies of Yemen (Diptera: Syrphidae)

Arrignon, F., J.-P. Sarthou, M. Deconchat & C. Monteil
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What should we know about *Episyrphus balteatus* to improve the modelling of its individual overwintering survival?

The presence of overwintering populations of adult *E. balteatus* may be helpful to regulate early spring aphid populations in crops. Individual overwintering success highly depends on the landscape structure since insects have to forage for food and shelter in a heterogeneous distribution of resources and ecological conditions. A spatially-explicit individual-based model with a modular Multi-Agents architecture is under construction to simulate *E. balteatus* overwintering and compare the influence of different landscape structures. The global model is composed of three blocks: Insect, Climate and Vegetation. Data on *E. balteatus* biology, have been split into two main groups related to physiological parameters (such as dispersal ability, perception range or mortality rate) and ethological parameters (such as foraging behaviour and protection behaviour). The optimal foraging model of McNamara and Houston was selected: each individual estimates its "optimal" gain rate from its past experience and decides whether it should leave or stay at its current location. The climatic thresholds of activity and mortality were adapted from published experimental results. Micro-climate conditions are derived from global conditions in each cell of the 20*20m grid of the model. No limit for individual dispersal ability was observed in the field. The uncertainty of the parameters was assessed according to their source (literature, expert knowledge or field measurements). Sensitivity of the model to some of them is presented.

Ball, S. & R.K.A. Morris
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Where will our hoverflies be in 2020? Some examples of potential responses to climate change

GARP (Genetic Algorithm for Rule-set Production) is a tool for Ecological Niche Modelling which was originally developed by David Stockwell of Environment Australia, subsequently enhanced at the San Diego Supercomputer Center, and has become very popular in the USA, Canada and Mexico.
GARP is an attractive method because it mimics the approach adopted by a field naturalist when visiting a site to predict whether he or she expects to find a given species. It attempts to formulate rules of the form "if altitude is less than 150m and July average temperature is between 16 and 23ºC and there is calcareous grassland … then you would expect the species to be present".
The information that is required, is a set of spatial co-ordinates for observations of the species under investigation and a series of "environmental layers". These are maps of environmental variables to which the distribution of the species may be related (e.g. climatic variables, land cover, altitude, soil type, distribution of other species such as larval foodplants, etc.)
The process starts by randomly generating a population of rule elements (e.g. "if altitude is less than 150m") which are termed "genes" and stringing them together into "chromosomes" by joining them with logical operators ("AND", "OR", "NOT" etc). The resulting rules are then subject to a fitness test (i.e. how well they predict the

observed distribution) and the fittest survive and are allowed to "breed" to form the next generation of rules. In forming the next generation, "recombination" and "mutation" of the rules can occur. Over a series of generations, the rules "evolve", through a process analogous to natural selection, until they produce the best possible fit between the environmental layers and the observed distribution. The resulting final set of rules can then be applied to the whole of the environmental layers to produce a predicted potential distribution map for the species.
By switching the environmental layers, for example to the values for weather variables predicted at some future date by climate change scenarios, it is also possible to investigate how this potential distribution would change under such a scenario.
Some examples of the potential distributions resulting from fitting GARP models to data for England and Wales from the British Hoverfly Recording Scheme will be presented and the effects of climate predictions for 2020 on the outcome of these models will be demonstrated.

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National biogeography: distribution patterns of syrphid species in the Netherlands

A map with the national distribution of one species might illustrate a biogeographical pattern. Since most species have their own (regional) pattern, it becomes difficult to combine dozens of maps. Moreover, in search for biogeographical districts all species should be incorporated. A method to analyse relations within a region is first to divide a map in grid cells and to draft a list of represented species per cell, and second to compute to relations between the cells. This can be performed in a cluster analysis, in this case with the program TWINSPAN, resulting in groups of comparable cells with the same represented species.
We used the dataset of the Dutch Syrphids with 320,000 records and selected from the 1591 grid cells of 5x5 km only the well-investigated cells with at least 60 records. Those cells were widely distributed over the Netherlands. The species lists of these 875 cells (in total 320 species) were clustered and the result was a subdivision of the whole dataset into 12 clusters. The differentiating species and the distribution of the cells illustrate a distinct biogeographical constellation in the Netherlands.
Five major groups can be pointed out. 1) a very selective group of species represented in the most southern parts; 2) a group of species represented in the south eastern parts of the Netherlands; 3) a group of species represented from the ice-pushed sandy hill ridges in the central and northern parts; 4) a group of species represented in the gradient around these ridges; 5) an (internationally important) group of species represented in the nutrient-poor fens in the western parts of the country. The seven other clusters appeared to be basic clusters derived from these 5 clusters. Only the dunes in the most western parts create a special cluster, however, without any characteristic species.

Barkalov, A.V. & D.Yu. Kropacheva
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The hoverfly fauna of the Altai mountains

The Altai Mountains are located in the Southwestern Siberian lowlands and, probably, by virtue of the extremely western position in the mountains of South Siberia, the fauna of these mouontains is very diverse in its origin. Some species and genera predominately occur in the mountains of Central Asia, while others are found mainly in the deserted steppes of Mongolia. The presence of high mountains in the Altai causes the presence of mountain tundras at the tops of mountains, which results in the presence of fauna elements of northern biotas, including species of various genera of Syrphidae.
In total the fauna of the Altai Mountains currently counts 354 recorded species, belonging to 64 genera. As in other areas, the genus *Cheilosia* is the most numerous with 54 recorded species. It is necessary to note that this genus contains the largest number of endemics of the Altai Mountains: 4 species. Most of these species have first been described in the last few years and recently collected material contains at least 3 more new species of *Cheilosia.*
The second genus containing endemics of the Altai Mountains is *Platycheirus*. At prestent, 35 species are known from the area. In our collection there are 3 more species which - according to a preliminary analysis - are new to science.
Besides these species-rich genera, a group of genera is known from the Altai which contain only 1-3 species. These genera contain endemics or species with limited distribution. Examples of such genera are *Rohdendorfia* Smirnov, *Pseudoplatychirus* Doesburg, *Portevinia* Goffe, *Chrysosyrphus* Sedman, *Tropidia* Meigen and *Spheginoides* Szilady.
Thus, the fauna of the Altai Mountains is a very interesting object for study, requiring careful further research, which we have planned on the nearest some years.

Bartsch, H.
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The Encyclopedia of the Swedish Flora & Fauna – Volume Syrphidae

The Swedish society wants to improve in handling Swedish nature and has – in the footsteps of Carl von Linné – taken action to provide the necessary information. The Swedish Species Project has started to describe and summarize what is known of 30,000 Swedish multicellular species in the Swedish Nature Encyclopedia and list the remaining 20,000 species. The first volume covering butterflies has been published, two more volumes will be published during 2005. The project will go on for 20 years and produce more than100 volumes. More information: www.slu.artdata.se and www.nationalnyckeln.se. First steps for the volume for Syrphidae started end of 2002. Since then most of the about 400 Nordic Syrphidae species have been described together with information about biology and distribution (including distribution maps covering the Nordic countries). More than 150 species have been illustrated so far. Final texts will be given in Swedish, keys in Swedish & English and short key facts also in English. The volume will be published in 2007. Examples of descriptions, illustrations and distribution maps will be shown.

Castella, E. & M.C.D. Speight
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Sub-alpine syrphid communities analysed with the Syrph-the-Net database

During summer 2004 a study of the syrphid fauna was carried out on three sub-alpine heath and grassland sites in the French Alps (1700 – 2200 m asl). These sites exhibit habitats considered as of European importance on the basis of their plant species composition. The aim was to provide information on whether the syrphids of these sites reflected an equivalent level of faunistic interest and, if possible, management recommendations for the sites. Thirteen Malaise traps set up for two and a half months revealed a depauperate syrphid fauna, both in terms of species richness (59 spp, i.e. 20% of the regional pool) and abundance. Analysis with the Syrph-the-Net database revealed a low representation of the potential fauna for almost all on-site habitats in the three sites. In almost all habitats, species with phytophagous larvae, living in association with herbaceous vegetation, proved the least well represented. Hypotheses are raised concerning 1) the impact of climatic conditions experienced during the summer of 2003 on the subalpine insect fauna of 2004, and 2) the impact of the past and current grazing history of the sites on their present insect fauna.

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Syrphids (Diptera: Syrphidae) as bio-control agents in organic lettuce on the central coast of California, USA

We present a review of the economically important syrphids in organically-grown romaine lettuce on the Central Coast of California, USA. Syrphids are the primary biological control agent in organic romaine lettuce suppressing the pest, *Nasonovia ribis-nigri* (lettuce aphid). We are currently evaluating habitat enhancement such as insectary strips and hedgerows that may impact syrphid activity in commercial fields. The following species of syrphids have been reared from romaine lettuce: *Allograpta obliqua, Eupeodes fumipennis, Eupeodes volucris, Platycheirus stegnus, Scavea pyrastri, Sphaerophoria pyrrhina, Sphaerophoria sulphuripes, Toxomerus geminatus, Toxomerus marginatus,* and *Syrphus opinator*.

Cheng, Xin-yue - (POSTER PRESENTATION)
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A New genus of hoverfly from China (Diptera: Syrphidae)

A marvelous flower fly from China is described as a new genus and a new species, which belong to Microdontinae of Syrphidae [*Furcantenna* gen. nov., type species: *Furcantenna yangi*, sp. nov.]. A key to genera of Microdontini is also given.

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Molecular phylogeny of Palaearctic *Volucella* species

Phylogenetic relationships of the Palaearctic *Volucella* species (Diptera: Syrphidae) were investigated using morphological and molecular characters. For the morphological cladistic analysis, the ground-plan characteristics of the genus *Orinidia* were used to root the 17 Palaearctic species included. We found that the resulting cladistic tree were heavily influenced by the characters of color or color pattern. For the molecular analysis using the mitochondrial 16S rRNA and COII genes, 16 *Volucella* species, five non-volucelline syrphid species were analyzed using Lonchopteridae as an outgroup. The molecular and morphological results were compared to infer phylogenetic relationships among the Palaearctic *Volucella* species. Some important findings from our results are as follows: (1) monophyly of the genus *Volucella* is well supported within the limit of the dataset; (2) monophyly of the *Volucella pellucens* group (tentative name) is strongly supported; (3) within the *V. pellucens* group of 16 species, five major lineages were recognized but relationships among them are vague; (4) within the Palaearctic *Volucell*a, three major lineages were recognized (the *V. pellucens* group, *V. suzukii* + *V. discolor*, and *V. inflata* + *V. inanoides*); and (5) comparing to the color characters, male genitalic characters tend to be more congruous with the molecular results. Therefore, we suspect that such color characters are highly homoplastic.

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A description of a new *Volucella* species (Diptera: Syrphidae), with taxonomic discussion about the superficially resembling species from the Eastern Palaearctic Region

A new Far Eastern species of *Volucella* is described, illustrated, and distinguished from closely resembling species. This species is currently known as *V. matsumurai* Han & Choi as a new name for *V. pellucens* var. *japonica* Matsumura. The following characteristic can be used to distinguish it from the related species: (1) 2nd abdominal tergite 2.4 times longer than wide; (2) male basoflagellomere slightly constricted in middle; (3) female eye densely pilose; (4) basal epandrial lobe absent; (5) surstylus not expanded posteromedially; (6) paramere not segmented. A lectotype is designated for *V. pellucens* var. *japonica*, which is a mere variant of *V. pellucens tabanoides* Motschulsky. We provide a full description of the new species based on both sexes from Korea and Japan. In addition, we conducted a comparative study of three closely resembling species occurring in the same distribution range and provided a key to distinguish them.

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A review on the use of hoverflies as bioindicators (Diptera, Syrphidae)

Bioindicators (from the latin "indicare") are species or species groups that reflect a set of particular environmental conditions through their presence/absence, abundance or condition. The medieval wine tasters or the canaries used to indicate air quality in coal mines are historical examples of bioindicators.
Three different goals can be defined:
1. **environmental bioindication** - indication of an abiotic or biotic state. In most cases a very precise definition of the factor to be indicated is possible (e.g. inundation frequency in floodplains, oxygen content).
2. **biodiversity indication** - indication of biodiversity of one or more taxonomic groups by one species or group of species
3. **indication of conservation value** - in a first step parameters are defined that will be used for assigning a "value" to a species (legally protected species, red list species, number of species, rarity, attractiveness of species etc.). Secondly values are assigned to these value-free parameters.
We analysed 68 papers on bioindication studies using hoverflies. The concepts employed in the different studies are compared and discussed with a special emphasis on functional group approaches and the use of species lists as predictive tools for environmental management.
Further research needs are identified and some recommendations for the use of hoverflies in environmental assessment are given.

- the goal of the bioindication process should be precisely defined and analysed in relation to what hoverflies can indicate
- the use of single bioindicator species should be kept to a minimum, it is preferable to use the information of the whole species list or species groups (e.g. functional groups, Syrph the Net approach)
- use an appropriate number of sites (one per habitat type is not enough)
- record as much detailed information on environmental variables and habitat as possible

use as much biological information on the species as possible (preferably in the analysis, at least in the discussion).

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Pollen supply and feeding preferences of syrphids in shrub/herb vegetation boundary by feces analysis

It is hypothesized that seasonal variation in the flower presence of plant species and the daily rhythm of the availability of pollen and nectar are the key determinants in the diet composition of syrphids. In a vegetation transect of 100 m by 2 m with herbs and grasses, and up to shrubs of 4 m height, the type and frequency of pollen in the feces of 40 syrphid species are analysed. With the exception of the very fluid feces of *Eristalis* species

and *Volucella zonaria* Poda, the feces of all other species is sufficiently consistent to be collected without problems.
In general, the number of feces produced per time unit by females is significantly higher than that of males, but not different with regard to plant species visited. Plant species with pollen size of more than 0.1 mm such as *Malva moschata* L. and *Geranium pratense* L., are not visited for pollen consumption. Syrphids visiting flowers that are open in the morning, e.g. *Lapsana communis* L., or releasing pollen early on the day, e.g. *Plantago lanceolata* L., switch to other pollen sources in the afternoon, as shown by slowly defecating species such as *Episyrphus balteatus* Degeer. Syrphids do not only consume pollen of flowers they visit, but also pollen of anemogamous species, e.g. *Pinus sylvestris* L., *Populus nigra* L., or *Urtica dioica* L. and of spores of imperfect fungi, being deposited on open entomogamous flowers, and of pollen transfered by bumblebees and bees across plant species. Based on the seasonal and daily availability of pollen sources, none of the investigated syrphid species has a preference for a certain pollen source of open flowers.

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An interactive key for identification of Syrphidae genera based on Delta software

Identification of specimens is one of the applied aspects of Syrphidae taxonomy. Nowadays this is done mostly by printed keys, which are unidirectional and solid and usually time consuming. This means that the user must follow couplets inevitably and that there isn't any flexibility for users in the order of the characters which must be checked. On the other hand rapid development of computer and communication world necessitates adaptation of identification means with so rapid changing conditions. This subject promoted construction of an interactive key for identification of Syrphidae genera based on Delta software. The main diagnostic characters are selected from available literature and sorted as unordered/ordered multistate, real/integer numeric and text ones and entered into Delta editor software. A character state matrix has been filled for each genus separately and some notes were added when necessary. The key is armored with additional scanned drawings and some available photos. Characters with diagnostic identity of suprageneric categories such as postpronotum are used as filter characters. File translated into intkey format and initialization file ran. High flexibility, being user-friendly and comparison of selected taxa with others automatically based on included characters are characteristics of resulted key. Brief and diagnostic descriptions of genus beside available photos are simultaneously presented by key as well.

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Hoverfly taxonomy in Iran: status and developments

Iran is one of the countries in the Middle East that has a wide range of climatic conditions from dry and very hot areas in southern parts to wet and cool locations in the north. This variation causes many different macro- and microhabitats and very diverse flora. It can be expected that the syrphid fauna of Iran must be rich in species, but a review of a few scattered papers resulted in a short list of species hitherto known from this country, the majority of which are common predatory and saprophagous species. The reasons for this condition and the difficulties in identification of hoverflies in Iran are

discussed. The status of Syrphidae taxonomy and developments since 1989 are reviewed. A checklist of Syrphidae of Iran, a map representing investigated areas and some notes about species composition of collected material are being prepared as well.

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The hoverfly (Diptera, Syrphidae) fauna of a plantation ancient woodland (Ballyannan Wood, Co. Cork, Ireland)

Ballyannan Wood is an ancient woodland that has been heavily modified by planting and invasion of exotic species. I surveyed the hoverfly fauna by Malaise trapping and hand-netting between 2003-2005. Despite the predominance of non-native species in the canopy, the wood has a high representation of the predicted fauna associated with native oak (*Quercus* sp.) woodland. However, species associated with grassy clearings are under-represented in the fauna compared to those tolerant of closed-canopy conditions. My results suggest that the standard nature conservation management prescription for this type of woodland (conversion of the canopy to dominance by native species) may not have any significant benefit for the hoverfly fauna. Instead management to enhance the hoverfly fauna may be more productive if it is focused on controlling the invasive bramble (*Rubus fruticosus* AGG.) to create grassy open spaces.

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Effects of afforestation on hoverfly (Diptera, Syrphidae) biodiversity

Afforestation may have negative effects on biodiversity through loss of open habitats and positive effects through creation of forest habitats. We examined the effects on hoverfly biodiversity of Sitka spruce (*Picea sitchensis*) afforestation in Ireland. We studied the hoverfly fauna of pre-afforestation sites, five year old plantations (before canopy closure), mature plantations and open spaces within plantations. Sitka spruce afforestation does not seem to create forest habitat with high forest hoverfly biodiversity value: the hoverfly fauna of mature plantations is mainly composed of generalist species, and conifer-specialist aphid feeding species appear to be very rare. Pre-afforestation sites can support rare and threatened species and afforestation of semi-natural habitats is likely to cause a reduction in overall hoverfly biodiversity. However, open spaces within the plantations can retain a significant component of the open space fauna. Afforestation on intensive farmland may increase hoverfly biodiversity.

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The use of hoverflies (Diptera, Syrphidae) as indicators of wetland habitat quality: a case study from Pollardstown Fen, Co. Kildare, Ireland

We studied the hoverfly fauna of fen margin habitat at Pollardstown Fen as part of a monitoring programme to detect impacts from road construction. We surveyed ten locations, using Malaise traps, during the period 1999-2004, of which four locations were surveyed during three-five years. These locations had varying representation and quality of limnocrene habitat. The number of limnocrene spring species recorded per year in sites with extensive limnocrene spring habitat was always three or more, while no more than two per year were recorded from historically dewatered sites. The individual limnocrene species differed in the frequency with which they occurred at the limnocrene sites compared to the dewatered sites. Ordination analysis showed differences in the overall alkaline fen hoverfly assemblage between the limnocrene sites compared to the dewatered sites. Our results show that hoverfly assemblages are sensitive to variations in wetland habitat quality, and that Malaise trap surveys can detect differences between sites located a few hundred metres apart in a permeable habitat matrix.

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The hoverfly *Episyrphus balteatus*: biology and mode of life

Episyrphus balteatus DeGeer (Diptera: Syrphidae) is one of the best-studied aphidophagous hoverflies. It is used in biocontrol strategies against aphid pests in greenhouses and in crops like cereals it is the most effective natural enemy against economically important aphids. Nevertheless, several behavioural and developmental characteristics had rarely been observed and documented due to their rapidness, small size, and hidden action. Here, the video technique offers a suitable solution for the study of species like this. In this video film of about 10 minutes, almost all essential "events" belonging to a complete life cycle of *E. balteatus* are presented. Starting point is the oviposition in aphid colonies, followed by emerge of larvae, larval development to L_3, pupation, puparium development and finally the emerge of the adult fly. In this life cycle, behavioural reactions as larval moultings, wing unfolding, or final defecation from pupating larvae are shown for the first time. An additional focus lies on prey catching and handling of the larvae (e.g. prey seeking, use of mucus). All takes were recorded in digital video quality; macro-shots were done using a binocular dissecting microscope.

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On a new *Melangyna* species (Diptera, Syrphidae) from Japan

A new *Melangyna* has been found in Japan. The species has hairy eyes and resembles *M. lasiophthalma* (Zetterstedt, 1843), but occurs in two annual generations. The poster presents a comparison between the two and a key for Palaearctic *Melangyna* species with hairy eyes.

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Hovering activity of female Syrphinae (Diptera, Syrphidae)

Some of the literature on Syrphidae published in the UK has conveyed the impression that hovering is an activity exclusive to the males. The poster illustrates and discusses examples of hovering by the females of several species of the Syrphinae.

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The collection of Palaearctic Syrphidae in the Zoological Museum of the University of Amsterdam

The Section Entomology of the Zoological Museum of the University of Amsterdam (ZMA) accommodates a large and important collection of Syrphidae.
ZMA's Diptera collection is arranged according to biogeographic region, and contains a separate collection of Diptera originating from the Netherlands. Besides its important Oriental section, which contains types of the about 130 species of Oriental and Australasian Syrphidae described by J.C.H. de Meijere, the collection is especially valuable by its extensive Palaearctic material. This part of the collection contains more than 150,000 specimens of about 950 Syrphidae species occurring in the region, representing virtually all syrphid genera and subgenera known from the Palaearctic. The majority of the Palaearctic Syrphidae specimens originate from the Netherlands and the Mediterranean, with a focus on the faunas of Spain, Italy, the Balkans and Turkey. This part of the collection contains about 830 types of 100 species of Syrphidae. As such, the ZMA collection of Palaearctic Syrphidae is one of the richests in the world.
The base of the collection was laid by the first generations of Dutch dipterists, especially by F.W. van der Wulp and J.C.H. de Meijere. The most substantial additions to the Syrphidae collection were made in the second half of the last century by the late Volkert S. van der Goot (about 25,000 specimens) and by the recent acquisition of the huge private collection of Jan A.W. Lucas (about 100,000 specimens).
At the moment an inventory is being made of the non-De Meijere types of Diptera in the ZMA-collection, including the types of the Syrphidae. Data on all ZMA-Diptera types and an overview of all Palaearctic Syrphidae species represented in the collection will be made available on the internet shortly.

Recently, ZMA's collection of Palaearctic Syrphidae has been rearranged. Like any decent natural history collection, the ZMA collection of Palaearctic Syrphidae primarily is a tool for faunistic, systematic, biogeographic, and biodiversity studies and the participants of the symposium are kindly invited to visit the collection.

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The Syrphidae community in five floristically different areas in Paraná, Brazil.

Insects of the family Syrphidae were surveyed in five floristically different areas within Vila Velha State Park in east central Paraná, southern Brazil. Areas were classifed as edge, araucaria, early, middle and late vegetational succession, in which Malaise traps were used, with weekly collections (From September/1999 to August/2000). Nearly 300,000 Diptera were collected, in order of abundance in Araucaria area (n = 74,331 individuals, 25% of the total), early (73,782; 25%), late (59,339; 20%), middle (53,623; 18%) and edge (38,796; 13%). A total of 1.345 insects in the family Syrphidae, including 97 species, were identified. In this family, the greatest abundance and richness were both observed in the edge (n = 684 specimens in 54 species), followed by early (n = 250, 51 species), araucaria (162, 34 species), late (146, 31 species) and middle succession area (103, 27 species). Syrphidae abundance was uncorrelated with Diptera abundance in the five areas. Syrphidae was greatest in the edge, while the greatest abundance of Diptera was found in the araucaria and the least was in the edge area. Syrphinae (82% of all Syrphidae collected), Microdontinae and Eristalinae were collected in the five areas. In the three successional stages areas (early, middle and late), Syrphinae was greatest in early, and more or less equally low in middle and late. Nearly half (26 of a total of 60) of the known Neotropical genera were found in these areas. Also, a first record of *Eumerus obliquus* (Fabricius, 1805) for the Neotropics is reported here. *Toxomerus* Macquart, 1855 was the most abundant genus with 370 individuals and the greatest richness was due to the genus *Ocyptamus* Macquart, 1834 with 24 species. Of the 97 identified species, only seven were common to the five areas. The greatest number of unique species was found in the edge (28), followed by early (11), Araucaria and late (both with four) and middle (three). The greatest abundance and richness occurred in most anthropogenically disturbed areas (edge and early), while the least occurred in the best preserved areas (middle and late succession). Cluster analysis showed that the two later successional stages were most similar, and the edge was the least similar to all the other areas.

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Taxonomic value of the morphology of immature stages and phylogeny of Syrphidae (Diptera)

The taxonomic value of the morphology of the egg chorion and the 1st instar larva have been checked. Using optimization methods, evolution of some egg chorion and 1st instar larva morphological and biological characters of the group is hypothesized, and possible developmental mechanisms of evolutionary changes are inferred, and the resulting selected taxa were analysed cladistically.

The morphological characters of the egg chorion and the 1st instar larva are currently assumed to be probably close to ancestral in pipizines. Models of its subsequent evolution consider some modality of evolutionary change: some of the characters would have been progressively lost and restored in multiple syrphids lineages. A phylogenetic test of this hypothesis is presented here. The morpho-functional types of the egg chorion structures and the 1st instar larva respiratory system have been optimized on the cladistic phylogenies of monophyletic syrphids clades, and parsimonious evolutionary scenarios of the evolution of the egg chorion and 1st instar larva respiratory system in these clades have been derived.
The phylogenetic patterns thus obtained support the hypothesis that the 1st instar larva posterior respiratory process has been lost and restored several times convergently in syrphids. They indicate, however, that the loss of the posterior respiratory process could be reversible, and that several modalities of evolutionary change exist for the posterior respiratory process. Phylogenetic analysis thus reveals an unsuspected complexity in the evolution of egg chorion structures and 1st instar larva morphological and biological characters in Syrphidae.
A parsimony analysis based on selected taxa from Syrphidae and Platypezidae with approximately 49 egg chorion and 1st instar larva morphological and biological characters, gives the following results.
A. Syrphidae is monophyletic group.
B. *Microdon* (Microdontinae+) is the sister group of all other Syrphidae.
C. *Pipiza* + is the sister group of the rest of the family.
D. *Syrphus*+ (Syrphinae) is the sister group of the rest of the family.
E. *Volucella* is the sister group of the rest of the family.
F. The latter consists clades of the rest Eristalinae..

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Dušek & Láska´s (1967) system of Syrphini commented after 38 years

The present status of generic classification is difficult for all spheres of syrphidology and there is a need to make generic classification as uniform as possible. The establishment of distinguishing enough characters is essential and the importance of previous work is emphasized. As an example we use Lundbeck´s (1916) work in which the differences between *Epistrophe* Walker, 1852 and present *Eupeodes* Osten Sacken, 1877 are distinguished by the width margin of wing outside marginal veins. Each taxonomic proposal has to be supported by study of more sources of diagnostic characters e.g. larvae and/or puparia, male genitalia and external adults characters as is used in our discussion. Recent analysis of DNA is important.
Lapposyrphus Dušek et Láska, 1967 was classified as subgenus of *Eupeodes* by Dušek & Láska (1967) and Vockeroth (1969), but as subgenus of *Scaeva* Fabricius, 1805 by Hippa (1968). Torp (1984, 1994) treated *Lapposyrphus* as separate genus; and we agree with this treatment. *Meligramma* Frey, 1946 is classified by us as a genus according to striking larval morphology. *Epistrophella* Dušek et Láska, 1967 was absorbed into the genus *Epistrophe* or *Meligramma* and we now propose to be a separate genus. *Fagisyrphus* Dušek et Láska, 1967 was classified as species of *Meligramma* or *Melangyna* Verral, 1901. This classification was initially based on misidentification published in Heiss (1938). We still propose to classify *Fagisyrphus* as separate genus, until better ranging is worked out. *Xanthogramma* Schiner, 1860 and *Olbiosyrphus* Mik, 1897 could be congeneric as well as *Leucozona* Schiner, 1860

and *Ischyrosyrphus* Bigot, 1882. The degree to which *Didea* Macquart, 1834, *Megasyrphus* Dušek et Láska, 1967 and *Eriozona* Schiner, 1960 are related is also discussed. *Episyrphus* Matsumura et Adachi, 1917 and *Meliscaeva* Frey, 1946 are already generally accepted even though *M. auricollis* (Meigen, 1822) has different characters from *M. cinctella* (Zetterstedt, 1843) according to larval morphology.

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Morphometric analysis of wing characters in populations of the *Cheilosia laticornis* group (Diptera, Syrphidae) from the Balkan Peninsula

A geometric morphometrics analysis using the coordinates of ten (10) landmarks located at vein intersections of the right wing was conducted in eleven populations of the *Cheilosia laticornis* species group (*C. cumanica*, *C. hypena*, *C. laticornis*) from eight geographical regions on the Balkan Peninsula: Vrsacke planine Mt (Serbia, E 21°20', N 45°08'), Dubasnica Mt (Serbia, E 21°59', N 44°01'), Kopaonik Mt (Serbia, E 20°40', N 43°15'), Durmitor Mt (Montenegro, E 19°00', N 43°11'), Moraca Canyon (Montenegro, E 19°26', N 42°45'), Morinj (Montenegro, E 18°40', N 43°29'30''), Javor Mt (Bosnia and Herzegovina, E 18°57', N 44°05'), Prespansko Lake (FYR of Macedonia, E 21°40', N 40°55'). In total, 422 wings were examined: 208 of *C. cumanica* (183 ♂ and 25 ♀ wings), 172 of *C. hypena* (105 ♂ and 67 ♀) and 42 of *C. laticornis* (32 ♂ and 10 ♀). Landmark coordinates were analysed using TPS programs (Rohlf, 1998) and statistical analysis were done using SPSS 12.0 (SPSS Inc., 2004).
The ANOVA of the centroid size indicated significant differences of the wing size among all three analysed species. Similarly, the population of *C. cumanica* from Durmitor Mt highly differed from those from Dubasnica and Vrsacke planine Mts. Registered differences are likely to be caused by the small analysed sample size. Also, a consistent sexual size dimorphism was revealed in both analysed populations of *C. hypena*.
Furthermore, a principal component analysis of the weight matrix indicates that first six relative warps using $\alpha = 0$ explained 60.61% of the shape variance among the specimens (RW1 17.37%, RW2 10.36%, RW3 9.71%, RW4 8.61%, RW5 7.73%, RW6 6.83%). These values indicate that the data are not strongly determined, that is, there is no single dominant aspect of shape variability between analysed populations but a number of smaller ones of similar importance.

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Saproxylic syrphids in Mediterranean ecosystems (Diptera, Syrphidae)

Saproxylic syrphids in Mediterranean ecosystems are poorly known and little studied. In Spain this fauna includes several endangered species that are in the Spanish Invertebrate Red Data Book and which have never been reared. We investigated the fauna mainly by searching for possible breeding sites and rearing larvae.

The work took place in the Cabañeros National Park, a typical Mediterranean ecosystem where four species of *Quercus* are well represented. This Park is located in the centre of Spain and preliminary results of one year's work are presented.
Nine saproxylic species were reared, eight in tree holes and one in exuding sap. These included common European species like *Myathropa florea* and *Ferdinandea cuprea* but also rare and Iberian endemics such as *Spilomyia digitata* and *Mallota dusmeti*.
The data we obtained on breeding site requirements such as microhabitats and tree species used provide important data not just for understanding the ecology of these saproxylic syrphids but also for conserving and managing Mediterranean ecosystems such as occur at Cabañeros.
(Financial assistance was provided by Park National Organism Nº 040/2002 (Environmental Ministry of Spain) and Generalitat Valenciana (GV04A-576)).

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Most abundant species of Syrphidae (Diptera) in Paraná, southern Brazil.

During a two-year (1986-1988) insect survey in eight locations in southern Brazil, 3,316 specimens of the family Syrphidae were collected. The five most-collected species comprising approximately half the total (n = 1,554) were: *Toxomerus procrastinatus* Metz (n = 572), *T. tibicen* (Wiedemann) (355), *Microdon mitis* Curran (268), *Leucopodella gracilis* (Williston) (187) and *Paramicrodon flukei* (Curran) (172). The two *Toxomerus* species were collected in all eight locations, yet were more abundant in colder areas of the state. Seasonality was similar in seven locations in having the greatest number collected in late spring and early summer, except for Fênix. *L. gracilis* was also collected in all locations, but was most abundant in areas with higher temperatures. While abundance patterns suggest that they are related to higher temperatures, the greatest number of captures were rather in the months with lower temperatures. *M. mitis* and *P. flukei*, both in the Microdontinae, ocurred essentialy in two locations: São José dos Pinhais and Telêmaco Borba. The possible variables responsible for the very different geographical distributions of these species and those of *Toxomerus* and *Leucopodella* are discussed.

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Upgrading of the checklist of the Syrphidae (Diptera) of the Czech and Slovak Republics

There is a long tradition in the Czech Republic of faunistic research on Diptera, and lists of the Czech and Slovak flies have existed for many years. The attractive hoverflies have been relatively well studied, with reliable information even in old papers and lists. About 400 original papers with faunistic notes on Czech or Slovak Syrphidae have been published by about 60 Czech or Slovak authors (see Czech and Slovak dipterological literature: *http://www.sci.muni.cz/zoolecol/inverteb/research.htm*).
The first comprehensive list of Czech Diptera was published by Vimmer (1913 + several appendices). In his *List of Bohemian Diptera*, 246 species of Syrphidae were listed with detailed locality data. Systematic interest in a collaborative checklist of Diptera in the former Czechoslovakia dates from 1969, when the first meeting of Czech and Slovak

dipterists took place: the checklist was eventually published by Ježek (1987), with the 373 species of Syrphidae assembled by Dušek & Láska. This checklist provided an important stimulus for faunistic studies in the Czech and Slovak Republics, and a new edition was published in 1997, edited by Chvála and prepared by 43 authors: 402 species of hoverflies were listed there by Holinka & Mazánek. Despite detailed attention to many published data, it was impossible for these authors (both students at the time) to evaluate critically all uncertain faunistic data, or to revise enough museum material, especially of problematic genera (*Cheilosia*, *Pipiza*, *Merodon*, *Eumerus* etc.).
A new edition of the checklist of the Czech Republic will be compiled soon, which will include numerous new faunistic records and taxonomic changes within the Diptera. At the present time, the provisional checklist of the Czech Syrphidae contains 401 species (424 species if combined together with the list of the Slovak Republic). Many faunistic data are still in need of revision, and recent taxonomic changes within the Syrphidae have yet to be incorporated. The authors invite discussion and comment on these tasks.

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Estimating the populations of three species of *Volucella* in an English woodland

Using mark-recapture techniques, we investigated the population dynamics of three species of *Volucella* (*V. bombylans*, *V. inflata* and *V. pellucens*) in Old Sulehay Wood near Peterborough. The results of this project showed that numbers of three species of *Volucella* (*V. bombylans*, *V. inflata* and *V. pellucens*) were remarkably high.
Turn-over of individuals within each population during early weeks was high, and each visit yielded comparatively small numbers of recaptured individuals. However, over the full period of each species' flight time, it became clear that the populations were remarkably high. Throughout the period, *V. inflata* was recaptured in relatively low numbers, whereas numbers of *V. pellucens* recaptured became more constant in the latter weeks; indeed, there were some sun-spots where the occupant could be reliably predicted as the summer progressed.
Data collected during the study showed that *V. inflata* had a life expectancy of between three and four weeks, whereas the expectancy for *V. pellucens* was between four and six weeks. The survey coincided with the latter end of *V. bombylans* and as a result data collected could not be interpreted so reliably.
This study gives a clear insight into the magnitude of populations of *Volucella* species. It shows that there is considerable scope for further investigation into population dynamics using mark-recapture and that the likely population of relatively small woodlands can be considerably greater than might appear at first sight.

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The Japan Sea region as center of syrphid endemism and dispersal center of arboreal fauna

630 species of syrphids have been discovered within the Japan Sea region, which comprises territories around the Sea of Japan. The share of endemic species of the region

is 44,8% (282 species). 90 species (14,3%) among them inhabit both islands and the continental part of the region. The share of insular ("Japanese") species is 18,3%. The share of continental («Manchzhurian») species is 12,2%. The share of endemic species of the region is 25% in the fauna of Sakhalin and 35% in the fauna of South Kurils. There are 40% endemic species in the fauna of Hokkaido, 57% in the faunas of Honshu and Kyusyu, and 58% in the fauna of Sikkoku. The fauna of Middle Amurland (Amurskaya Oblast') contains 14% endemic species of studied region, fauna of Lower Amurland – 19%, Southern Primorie – 33%, Korea – 36%.

The distribution of endemic species within the region, possibly, reflects the dispersal directions of arboreal fauna from Korea and Honshu after the end of later-Pleistocene glacial stage. Directions of the dispersal were reflected, too, by areas of some sub-endemic species of region. Sub-endemic species, known in Southern Siberia (5,2%), penetrated westward from the Japan Sea region probably together with mixed forests during Holocene optimum (near 6000 years ago). Apparently, more cold-resistant species (4,6%) occupied widely the Far East and Siberia earlier, during the expansion of the boreal forest zone. Sub-transpalaearctic silvan species (2,2%) migrated westward, in my opinion, from the Japan Sea region, too. Some of them penetrated later (near 3500 years ago) into Central and West Europe and have been preserved there in the mountain forests till now.

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Hoverflies (Diptera; Syrphidae) of Komsomolsk-na-Amure.

Within the town boundary of Komsomolsk-na-Amure there are 210 species hoverflies, which compose 64% of the fauna of Lower Amurland. Mainly species, registered in Komsomolsk -na-Amure, are inhabitans of town forests and other natural biotopes, preserved here. Rather small number of syrphid species are connected with typical urban landscapes. 65 species were discovered in the zone of multi-storey construction. 43 species were discovered in the zone of one- and two-storey construction, 27 species were found in squares and parks of the town. We practically did not find early spring species from the genus *Melangyna* in typical urban biotops.

More species of the zone of multi-storey construction (56 species) are found on flowering *Crataegus maximowiczii*. It is notably that the share of xylophilous syrphids among them was constantly large (30-50%). The breeding sites of some species are found beside. They are mainly sup-runs and rot-holes on *Ulmus pumila*. In the zone of one- and two-storey buildings the number of saprophagous species among syrphids are noticeably higher than in other biotopes because of the variety of breeding sites.

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A new Palaearctic *Platycheirus* of the *manicatus* group

A new species from the Caucasus is figured and compared with resembling species; *Platycheirus cejensis* Kuznetzov, 1987, *P.cintoensis* van der Goot, 1961, *P. fasciculatus* Loew, 1856, *P. kashkarovi* Violovitsh, 1978 and *P. tarsalis* (Schummel, 1837).

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The preimaginal stages of *Callicera* species (Diptera, Syrphidae)

Callicera Rondani, 1844 only comprises nineteen species (Zimina, 1986) of which six occur in Europe (Speight 1991). They breed in water-filled cavities in a wide range of tree species. Larval *Callicera* are easy to recognise with a particular arrangement of thoracic hooks, fused prolegs and posterior respiratory process with transverse spiracular openings. European species are considered endangered and in need of conservation. Their presence at a site indicates that it is of high value for saproxylic organisms (Speight, 1989). Adult *Callicera* are elusive and species are often easier to record in their preimaginal stages. Hence an understanding of preimaginal stages and their biology will facilitate investigation of their status and importance.
We have studied the preimaginal stages of three species from the British Isles and have also reared and studied for the first time, the early stages of the European species, *Callicera macquarti* (Wiedemann, 1818) and the Neotropical species *Callicera duncani* Curran, 1935. Preimaginal stages are readily identified to species using in particular, respiratory organ characters. Life history data is also compared and contrasted.
Financial support was provided by Park National Organism Nº 040/2002 (Environmental Ministry of Spain).

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West Mediterranean islands and biodiversity: an analysis of syrphid (Diptera, Syrphidae) fauna of Lesvos island (Greece)

The Mediterranean Basin is considered as one of earth's hotspot areas. Mediterranean ecosystems are nutrient-poor, seasonally-stressed, yet species-rich ecosystems. Almost all taxa exhibit high levels of diversity. Moreover with almost 5000 islands and islets, the Mediterranean comprises one of the largest groups of islands in the world. The nine Mediterranean islands of over 1000 km^2 account for 83% of the total island area. Lesvos is the third largest island in Greece (70 Km. long by 45 Km. wide; altitude 947 m., 1630 km^2) and the largest, in the East Aegean. Though there are no permanent large rivers with a steady flow of water, there are abundant springs, and watercourses in winter and spring at least. It is estimated that the biodiversity of flora (about 1500 plant taxa) and fauna of Lesvos is greatly due to the variety of biotopes on the island, the particularity of its rock formations, the long-term effect of man's activity on nature, its proximity to Turkey coast as well as the recent, from a geological point of view, detachment of the East Aegean from the coasts of Minor Asia. The climate is characterised by strong seasonal and spatial variations of rainfall and high oscillations between minimum and maximum daily temperatures. Three climatic zones can be established in the island: the semi-arid in the West with an average annual rainfall of 415mm, the largest dry sub-humid zone in the East with 677mm and a transitional zone between the two (Kosmas et al. 2000).

This presentation shows the first data about Syrphidae biodiversity of Lesvos island. From 2001 several surveys have been conducted using both net and Malaise traps. More than 70 species had been sampled included extremely high biodiversity of genus *Merodon* Meigen 1803 (18 spp) and other taxa with special importance to habitat conservation like species of genus *Callicera* Panzer 1809, *Ceriana* Rafinesque 1815 and *Sphiximorpha* Rondani 1850. Syrphidae fauna is discussed with emphasis on habitat distribution and rare species. Finally proposals of conservation activities are briefly discussed.

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On the hoverfly fauna (Diptera, Syrphidae) of the Priluzskiy Region of the Komi republic

We carried out our researches in June, 2004. The area of research is in the northeast of the Russian plain, Luza river basin. The Luza river is inflow of the Jug river, and Jug runs into Vychegda. This territory is very interesting because it is situated on the border of many geographical areas. In a relief are allocated Northern hills (Severnye Uvaly). They are a watershed of pools of the large rivers of Kama, Vyatka and Vychegda. Here there passes a zero isotherm of mid-annual temperatures. The points of view of geobotanical division into districts the area of our research is in a middle taiga subzone. For the period from 3th June till 10th June the material is collected. For fauna of area Priluzskiy region it is registered 21 species of 11 genus and 3 subfamilies. The most plentiful sorts are *Melanostoma, Sphaerophoria* and *Neoascia.* All investigated ecosystems have been divided into 6 groups. upland-meadow, slope-meadow, water-meadow, coniferous forest, deciduous forest, cutting down. We mark the biggest specific diversity of species for slope meadows. In wood station we observed aggregations of some species hover-fly. In aggregations were only male. The ecological analysis (larval ecology) shows prevalence of predators and detritus consumers.

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Several strategies to increase the number of aphidophagous hoverflies in Mediterranean greenhouses (Diptera, Syrphidae)

Integrated Pest Management systems based on biological control need effective strategies in order to be implemented correctly, and for Mediterranean areas these strategies should be adapted to the extreme climatic conditions. Pepper crops are highly productive crops, of which the yield increases significantly when grown in enclosed conditions; here aphids are the dominant pest, but with a high spectrum of natural enemies. In greenhouses we have observed that syrphids are abundant predators of aphids, therefore by increasing these populations, biological control of aphids can be improved.
The experimental work was carried out in greenhouses from the agricultural cooperative SURINVER, S.C., located in the South-East of Spain (Alicante). The first objective of this research was to assess the effect of introducing flowering plants to the natural populations of syrphids. The second objective was to evaluate methods that increase the permanence time of releases of *Episyrphus balteatus* (De Geer, 1776) adults.

The results showed that flowers are an effective means to increase natural populations of syrphids, both adult and larvae, which perform the biological control of aphids. This strategy is a low-cost method that could also be used in others crops under cover. However, flower presence appears not to be effective in increasing the time permanence of adult releases when no aphids are present in the greenhouse. The fact the permanence time of adults is, in most cases, less than the time syrphid females need to be gravid, means syrphid releases as a preventive way in absence of aphid patches, could not to be effective.

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Using K.B. Gorodkov's methods in the investigation of hoverfly ranges

The knowledge about ranges enables to ascertain autochtonity of fauna, the ways of its forming, taxon origin, to settle particular biogeographical problems etc. However, the primary task is to choose a certain system of range nomenclature. We propose a scheme of Gorodkov (1984) suitable for using. For the range characteristic, the components which are sufficient in most cases are used in this scheme: *longitudinal* (differences in sizes) and *latitudinal* (zonal-climatic) for each species. The scheme is rather simple and at the same time it enables to unify data of different investigations for comparison. In Russia and Ukraine for about 15 years Gorodkov's scheme has been successfully used in syrphid fauna investigations, in particular in Yakutia, Trans Dnieper Ukraine, Crimea and Southern Trans Ural region. In Russian literature, also an very fractional scheme of A. F. Emelyanov (1974) is widely used. However, I consider using this scheme to be possible only in case all entomofaunas are sufficiently studied, which is too early to say in respect of syrphids, especially concerning many key territories (Nothern Africa, Caucasus, Middle Asia etc.).

According to the results of my investigations (Popov, 2003) for all Syrphidae species of Crimean fauna (190 totally), longitudinal and latitudinal components of the ranges have been revealed (further, the number of species and percentage from Crimean fauna are given in parenthesis). 6 *basic* longitudinal range types are distinguished: Cosmopolitan (1; 0,5%), Multiregional (21; 11,1%), Holarctic (22; 11,6%), Palaearctic (33; 17,4%), Eurasian (107; 56,3%) and European (6; 3,2%). Such characteristics of *longitudinal* component as "Black Sea" and "Mediterranean" ranges are proposed to be used not as the basic characteristics but as ascertaining ones (they are included into different longitudinal types). According to the latitudinal component, the ranges of all species are referred to 10 *basic* types (the types proposed with me for the first time are given in italics): polyzonal (35; 18,4%), *temperate-mountainous* (59; 31,1%), temperate (8; 4,2%), *subboreal-subtropical* (23; 12,1%), *subboreal-mountainous* (15; 7,9%), subboreal (11; 5,8%), *nemoral-mountainous* (20; 10,5%), nemoral (2; 1,1%), steppe (12; 6,3%) and subtropical (5; 2,6%). In mountainous ranges the species are distributed in the corresponding climatic zone and in the mountains of subtropical zone.

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Are spring hoverflies changing their flight period?

While writing the species accounts for the Netherlands' atlas of hoverflies the question was raised whether the higher number of *Eristalis pertinax* early in the year was a 'real' phenomenon or an effect of changing recording activity.
With the database of the hoverfly recording scheme we tried to answer this question, and widened it a bit: has the flight period of early flying spring species changed during the last half century?
The method used is based on calculating the moment at which at least 5% of the records of a given species were done. Only species that had at least ten records in each year since 1960 were taken into account. The species were divided into three groups, based on their life-history: univoltine with a very early flight period, hibernating and early occurrences of polivoltine species with a long flight period.
Although an increased number of records certainly affects our data we can draw some cautious conclusions:
1) The flight period of univoltine spring species depends especially on weather conditions, and no change in flight period can be detected.
2) The number of records of hibernating species increased.
3) Early records of polivoltine species tend to become earlier in the year.

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Ecological assessment with Syrph the Net: the case of four stands in a *Fagus-Abies* forest in Hautes-Pyrénées (South-Western France)

The Syrphidae of a managed *Fagus-Abies* forest, in the department of Hautes-Pyrénées (South-Western France), ranging from 850 to 1100 m altitude and spread over an area of 1.000 ha, were sampled by Malaise trapping from the beginning of May to mid-October 2004. The traps were installed at four stations, with two traps per station.
The history of this forest is very well known: intensively used in the 18th and 19th centuries for charcoal making, it has then been used for firewood. It has been used for light cattle grazing these last two centuries. While the potential habitat is a mixed *Fagus-Abies* forest (category 43 in the CORINE system), the recent firewood management has led to four different stand types: (1) *Fagus-Abies*, almost unexploited during the last one hundred years with young, mature and overmature trees (considered as the present habitat reference); (2) *Fagus* with young, mature and overmature trees and with scattered mature

and young *Abies*, intensively exploited 50 years ago; (3) *Fagus* with young and mature trees and scattered young *Abies*, intensively exploited in the last 20 years; (4) man-made substitution acidophilous *Quercus* with young and mature trees, and scattered mature *Betula*, unexploited in the last 50 years. Thus, there is an increasing gradient of human impact upon the stand types from the first to the third/fourth, which has been analysed through the database Syrph the Net.
The total number of species observed is 88. The number of species per site, the number of predicted and observed species per site, the number of endangered (in Europe) species per site, the number of endangered (in France) species among the predicted and observed ones per site, all decreased with increasing human impact. When the data from all the sample stations were put together and compared to the potential habitat, less than 50% of the predicted species were observed. Most probably, all the species actually present have not been caught, but the percentage of endangered (in France) species among the predicted and non observed species is more than ten times higher than among the predicted and observed species, thus strongly suggesting that most of these endangered species have actually disappeared from this forest (even from stand type 1 whose habitat resembles the potential habitat).
From a functional point of view, the analysis shows that the non observed species, among the predicted ones, are mainly linked to some peculiar microhabitats: more than one third are linked to the herb layer (and mainly in the herb layer), then and equally to senescent tree features and mature trees, and to a lesser extent to understorey trees and shrubs/saplings. Conversely, few predicted and non observed species are linked to timber, since more than two thirds of these species have been caught. When looking at their traits, these predicted and non observed species are nearly all non migrant species and have only one or less than one generation per year for more than 80% of them.
Thus, the database/functional model Syrph the Net allows not only to grasp the differences in syrphid community structures between the current four stand types, but also to reveal the impact of the utilisation of the forest in the past (ended for charcoal production, still under way for cattle grazing).

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The hoverflies of Yemen (Diptera: Syrphidae)

A preliminary checklist of the hoverflies of Yemen is presented, based on an extensive survey with several different trap types over the past years and a review of literature. A total of 40 species are recorded from Yemen. Two species of the genus *Eumerus* and one species of *Paragus* are new to science. The following 12 species are recorded for the first time from Yemen: *Allograpta calopus* (Loew, 1858), *Asarkina africana* Bezzi, 1908, *Chrysotoxum continuum* Bezzi, 1915, *Eristalinus flaveolus* (Bigot, 1880), *E. megacephalus* (Rossi, 1794), *E. tabanoides* (Jeannicke, 1867), *Eumerus amoenus* Loew, 1848, *E. vestitus* Bezzi, 1912, *Paragus pusillus* Stuckenberg, 1954, *Phytomyia incisa* (Wiedemann, 1830), *Scaeva albomaculata* (Macquart, 1842) and *Syritta flaviventris* Macquart, 1842. Specimens of 6 species could not be identified to species-level; three species of *Eumerus*, one species of *Paragus* and two species of *Syritta*. The following previously recorded species are removed from the checklist; *Eumerus lunatus* (Fabricius, 1794) is a probable misidentification of one of the here new described species of *Eumerus* and *Melanostoma gymnocera* Bigot, 1891 is a probable misidentification of *M. bituberculatum* (Loew, 1858). Biogeographically the hoverfly fauna of Yemen is typically Afrotropical, 30 species have a pure afrotropical affinity, 8 species are widely distributed in de Afrotropics and in the Mediterranean part of the Palearctic

and only two species are only known from the Mediterranean (*Eumerus amoenus*, *Scaeva albomaculata*).

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Preliminary results of a revision of the genus *Psilota* in the Western Palaearctic region (Diptera: Syrphidae)

The genus *Psilota* is being revised in the western Palaearctic. A review of the genus in the Netherlands revealed that both *P. anthracina* Meigen, 1822 and *P. atra* (Fallén, 1817) are valid species. *Psilota rotundicornis* Strobl, 1898 is recognized as a junior synonym of *Pipiza quadrimaculata* (Panzer, 1804). Two species groups can be recognized among the Palaearctic species: 1) *atra*-group, face entirely shining, including the species *P. anthracina*, *P. atra*, *P. toubkalana* Kassebeer, 1995 and a yet unnamed species, and 2) *innupta*-group, face entirely dusted, including the species *P. brevicornis* Shiraki, 1968, *P. innupta* Rondani, 1857, *P. nigripilosa* Shiraki, 1968, *P. plumbella* Becker, 1907, *P. sibirica* Violovitsh, 1980 and possibly *P. dersu* Violovitsh, 1980 and *P. kroshka* Mutin, 1999.

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Preliminary phylogeny of the predatory hoverflies (Diptera, Syrphidae: Syrphinae) using molecular data.

The family Syrphidae (Diptera: Cyclorrapha) is traditionally divided into three subfamilies: Microdontinae, Eristalinae and Syrphinae. The subfamily Syrphinae includes the majority of predatory syrphids and the intra-subfamilial classification is in state of flux. There are several works that have generated different classifications; Goffe (1952), Glumac (1960) and Wirth et al. (1965) are examples. The most widely accepted classification of predacious Syrphidae is based on Dušek & Láska (1967) and Vockeroth (1969). On the basis of adult characters, four tribes are recognized in the Syrphinae: Bacchini, Paragini, Syrphini and Toxomerini (Thompson & Rotheray, 1998). Rotheray & Gilbert (1989, 1999) recognized five tribes using larval characters, including Pipizini (traditionally belonging to Eristalinae).
The preliminary results of the present study were obtained using only molecular data. A large fragment of the mitochondrial COI gene and the D2-3 region of nuclear 28S rRNA gene were sequenced for 66 species of 38 genera from all the biogeographical regions. Direct optimization, a maximum parsimony algorithm implemented in the computer program POY, was used for analyses. Eight equally parsimonious trees were obtained defining two topologies. These preliminary cladograms show a clade with the major part of the Holarctic Syrphini, and the establishment of Bacchini is questioned. The genus of Syrphini *Ocyptamus* Macquart, 1834 appears as a non-monophyletic lineage and some of its species are related with the monophyletic tribe Toxomerini. The placement of some genera and the tribe Paragini remain uncertain.

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Overview of the systematics of Syrphidae

Flower flies are traditionally classified into three subfamilies, 14 tribes, 11 Subtribes, and 293 extant genera. A hand-out will be provided to document the classification. This classification is based on the work of Vockeroth (1969) and Thompson (1972) and has been followed for most of the regional catalog treatments and the manuals of Nearctic and Palaearctic Diptera as well as the forthcoming one for Central America.
The history of supra-generic classifications of flower flies from Newman (1834) to the present is given. The critical characters which support supra-generic groupings are noted and weakly supported groupings are discussed. New molecular sequence information support some of the traditional groupings, but not others.

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Why do females predominate in Malaise trap catches of Syrphidae (Diptera)?

It can be shown that more female syrphids are collected by Malaise traps than males, not only in the catches of certain species, but in the catches of most species, in various habitats and at various times of the year. Is this because females are more numerous than males, or because behavioural attributes of the females make them more susceptible to capture? These questions will be explored, using available data sets.

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The hoverflies (Diptera, Syrphidae) in an alluvial system of the Rhine in the Urdenbacher Kämpe near Düsseldorf (Northrhine-Westfalia, Germany)

In 2002 and 2003 investigations have been carried out on the Syrphidae (Diptera) of an old river arm in the "Urdenbacher Kämpe" of the river Rhine near Düsseldorf (Northrhine-Westphalia, Germany), using water traps, transect observations and individual observations. The investigation area represents a relict of formerly widespread alluvial areas along the lower Rhine with the largest natural remnants of alluvial forests and zonations of extensive mesic to wet alluvial hay meadows. In total 3235 hoverflies of 103 species could be observed. Species richness was highest in ecotones from mesic to wet hay meadows and along the border of the alluvial forests. The latter had a rich fauna of old and dead wood as for example *Temnostoma vespiforme*, *T. bombylans*, *Brachyopa scutellaris*, *Criorhina pachymera*, *C. ranunculi* and *Volucella inflata*. An analysis of 1490 flower visits observed revealed the richest guild of flower-visiting hoverflies with 32 species on *Aegopodium podagraria*, with a species composition typical for alluvial forests. A number of rare species were present as well as 12 species of the federal red data book and 9 potentially endangered species. The investigation area is of high dipterological interest for nature conservation.

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Cheilosia vernalis-complex: molecular and morphological variability (Diptera, Syrphidae)

The genus *Cheilosia* with more than 300 Palaearctic species is the most speciose group of hoverflies in Europe. One of the most widespread taxa with unsolved taxonomic status is *Cheilosia vernalis* (Fallen, 1817). This species shows great morphological variation in coloration and length of body pilosity (hairs), shape of facial profile, colour of antennae, structure of aristal surface and other characters. The taxonomic status of *C. vernalis* remains unclear. No satisfactory basis for subdividing the species has yet been demonstrated and the male terminalia of different morphological forms appear identical. The aim of this study was to explore the informativeness of molecular data for species-level relationships of *Cheilosia vernalis* and closely related species. DNA sequence data of fast evolving mitochondrial genes have proven informative for species delimitation in many insect groups. We sequenced a 698 bp fragment of the mitochondrial gene cytochrome oxidase subunit I of 43 specimens agreeing with traditional morphological interpretion of *Cheilosia vernalis* (Diptera, Syrphidae) from a broad geographic range in Europe. Additionally we included single representatives of 10 species of the *vernalis-melanura* complex. Parsimony analysis of the molecular data resulted in 24 equally parsimonious trees, and the result is presented as a strict consensus tree. *C. vernalis* specimens grouped in three different lineages. Two of these lineages are quite distinct in both molecular and re-evaluated morphological characters, one lineage agrees with the concept of *Cheilosia reniformis* Hellén, 1930 and the other lineage is presently unnamed. The third lineage comprises 33 individuals, and presents 8 different mitochondrial haplotypes, that differ only by 1-4 nucleotide changes. Of these haplotypes two are noteworthy, the C1 haplotype is widespread, a total of 8 specimens originated from Serbia to northernmost Finland, and the haplotype C2 comprised 14 specimens ranging from Sweden to Siberia (Russia). Based on the data at hand, it is premature to draw any precise conclusions of species hypotheses, as both molecular and morphological characters require careful evaluation. MtDNA will not always be sufficient to answer the many interesting questions asked of it. More genetic markers are needed, but morphological characters are of equal importance when inferring relationships between closely related species. Congruence between datasets provides strongest support for hypotheses of species delimitation.

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The flowerflies (Diptera, Syrphidae) of Nebraska

The flowerfly fauna of North-America as a whole is rather well known. However, the fauna of most of the states separately is much less known. For Nebraska (in the centre of the United States) the most recent overview dates back to 1922. In 2003/2004 the Syrphidae collection of the museum of the University of Nebraska State Museum has been revised. Extensive fieldwork has been done. The number of known species for the state has risen from 100 to 150. Distribution patterns and changes in species composition will be discussed.

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The hoverflies (Diptera, Syrphidae) from Baltic amber

The first part of the talk covers the history of research on hoverfly fossils in Baltic amber, giving an overview of the known syrphid species from this deposit. The difficulties of working with Syrphidae fossils are illustrated through some examples. The talk concludes by suggesting areas in which future research should be focused.

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Isolation of tomato plant volatiles and their perception by the predator *Episyrphus balteatus* De Geer

In a tritrophic interaction including tomato plant (*Lycopersicon esculentum* Miller), the herbivore *Myzus persicae* (Sulzer) and the predator *Episyrphus balteatus* (De Geer), the perception of the tomato plants produced volatile organic compounds (VOCs) by *Episyrphus balteatus* is investigated. In a first step, an odour sampling device has been set up aiming the headspace collection of the tomato plant VOC and their adsorption on Tenax adsorbent cartridges (Supelco®). Following desorption is held using a thermodesorption injector (Gerstel®) coupled with GC-MS. The isolated VOCs consist mainly of mono- and sesquiterpenes (such as α- and β-pinene ; α-humulene) as well as of C6-volatiles like cis-3-hexenol in case mechanical damaged. Once the tomato plants VOCs identified, they are tested for their perception by *Episyrphus balteatus* using electroantennography (EAG). Accordingly, an EAG device has been installed and configured for the study of VOCs using Diptera antennas. All the tested compounds showed good antennal responses, especially the defence semiochemical cis-3-hexenol, meaning that Syrphids are able to perceive plants volatiles.

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Subgeneric division of the genus *Merodon* Meigen, 1803 (Diptera: Syrphidae) – morphological and molecular evidence

With more than 170 species known (Vujić et al. in prep), *Merodon* is one of the largest genera of hoverflies. The majority of the species are Palaearctic, mainly Mediterranean and only few appears in Ethiopian region (especially in South Africa). Many species are poorly known and inadequately treated in publications. Hurkmans (1993) has recently clarified the nomenclature and status of 12 species groups (61 species). The remaining taxa of the genus will be revised in a near future (Vujić et al., in prep.).
The previous divisions of the genus are based on external morphological similarities (Becker, 1912; Sack, 1913; Paramonov, 1926), eventually also including male genitalia (Hurkmans, 1993). Until now, only one subgenus was formalized, based on the dichoptic condition in males, *Exmerodon* Becker, 1912.

The aims of this study were to investigate the subgeneric structure of genus *Merodon* based on morphological and molecular data. For this purpose 48 representatives of almost all known *Merodon* species groups were analysed. The morphological dataset is presented, including external characters and mainly male genitalia features. The molecular dataset comprised of 727 bp of the mitochondrial COI gene. Results of separate and combined parsimony analyses of these datasets, using *Platynochaetus setosus* as outgroup, will be presented and discussed. Based on combined analysis new subgeneric division of genus *Merodon* is proposed. The validity of previous divisions and names are discussed.

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Adult morphology and Phylogeny of Paragini: an analytical approach to species-groups relations

The monogeneric tribe Paragini comprises about one hundred species, distributed in all regions of the world except Antarctica and South America (Thompson 2004). It is a compact and distinctive member of the subfamily Syrphinae, the hoverflies with predatory larvae. Based on adult morphology, Stuckenberg (1954) established two subgenera, each with two groups of species. During last 15 years, however, several authors showed that a few Oriental (Thompson & Ghorpadé 1992) and Afrotropical species (Kassebeer, 1998, 1999; Whittington, 1998) do not fit either of Stuckenberg's subgenera or species-groups.
The aim of this paper is to study the species of Paragini and present a phylogeny of the tribe based on the morphological characters of adults. In the morphological cladistic analysis of Paragini, 25 characters of 26 species have been studied. In this paper, besides traditional characters, some new characters of male genitalia (the shape of ejaculatory apodeme, the relative position of elements of the aedeagal complex, shape of surstylar apodeme, shape of aedeagal apodeme) have been used in the definition of phylogenetic relationships of Paragini species. According to morphological data, several lineages have been recognized for Paragini.
The results of the present study, does not support the current taxonomical arrangement of Paragini.

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Paragini Phylogeny (Diptera: Syrphidae) and Systematics: a combined approach of DNA sequences and morphology

We studied the systematics and phylogeny of the tribe Paragini (Diptera: Syrphidae) based on molecular and morphological characters. The contribution presents parsimony analysis of partial DNA sequence data from mitochondrial cytochrome c oxidase I and nuclear ribosomal RNA 28S. The trees obtained from molecular data are compared with analysis of morphological data and both datasets combined. Our data show that Stuckenberg's concept of subgenus *Paragus* involves at least two different lineages, but three genera are proposed. The three clades that are unambiguously supported by both datasets we establish as different genera. The phylogenetic position of the single Afrotropical species

of the *bicolor*-group (*Paragus borbonicus* Macquart, 1842) is very variable, in separate analyses, and remains ambiguous. The analysis supported the monophyly of the *Pandasyopthalmus* clade, that must be considered more diverse than the current definition of it and include the species that fit neither of the species-groups of the current taxonomy of Paragini. The highest percentage of uncorrected pairwise sequence divergence between the sequenced taxa of *serratus*-group lineage was 13.4%, higher than distances within other Paragini lineages. Uncorrected divergences are also the highest between this lineage and members of all other Paragini groupings. A new arrangement of the tribe with four genera and two subgenera is presented. Finally within the biogeographical implications derived from this analysis, we postulate South Asia as the possible origin of this group of Syrphidae.

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Changes in abundancies of dutch Syrphidae

Based on the new database of dutch Syrphidae, changes in abundancies of the dutch Syrphidae are analyzed. For this, a new analytic method has been developed. Currently used methods either lack a statistically correct basis or are focusing on rare species only. A commonly used but statistical incorrect method of least squares regression is generalized to a non-parametric method (Spearman's correlation). In this way, we get a robust yet quite sensitive tool also capable of analyzing changes in abundancies for common species. Finally, an analysis is presented on extinct species and newcomers.
In general terms, species with larvae associated with wood show on the average a positive tendancy, whereas species with larvae associated with water show on the average a negative tendancy in abundancy.

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