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Abstracts of lectures and poster presentations

An evalution on Staphylinid beetles of Bozdağlar Mountain, Western Turkey, collected by different methods

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In this study, communities of Staphylinid beetles were studied in Bozdaglar Mountain, Western Turkey, during the years 2001-2006 by using different methods: pitfall traps, hibernation traps and collecting by sifter from dung of cow.

At the end of the study, a total of 70 species belonging to 34 genera in eight subfamilies have been recorded. The collecting methods have been compared and habitat density relations of Staphylinidae species have been evaluated.

A revision of Micrillus Raffray

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The main results of a recent revision of the paederine genus *Micrillus* Raffray are presented. Approximately 900 types and non-type specimens were studied; various body parts of almost 500 specimens were measured. Only 9 of the previously 25 valid species are confirmed; as many as 17 new synonymies are proposed and one name is resynonymised. Two new species are described and one species is transferred from *Scymbalium* Erichson, so that the genus now comprises a total of 12 species. These species are attributed to two species groups. In the Western Palaearctic region (including Middle Asia), the genus is represented by 10 species, two of which are distributed in the border zone between the southern West Palaearctic and the northern Afrotropical region; two species are recorded exclusively from the Afrotropical and the Oriental regions, respectively. The reasons for the high degree of synonymy in the genus are illustrated. Based on several examples, especially the widespread *M. testaceus* (Erichson), the - in some species enormous - extent of intraspecific variation is analysed. At least three species are wing-dimorphic or -polymorphic. A pronounced dimorphism of eye size was found in two species. Data on the zoogeography and ecology of the species are compiled and illustrated.

Life History and Habits of Rove Beetles (Coleoptera, Staphylinidae): Laboratory study

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Life history of most Staphylinidae is studied insufficiently. Only 5% of publications on systematics of Staphylinidae are devoted to studying preadult stages of beetles. Even in Central Europe preadult stages, development cycles, peculiarities of behavior and other features of life history of a lot of species are still unknown. Until now only larvae of approximately 300

Staphylinidae species have been described, which is 1% of the whole number of known imagines. Only the biology of *Aleochara,* being used in a number of countries as agents of biocontrol, has been studied in detail. For example, life history of *Aleochara bilineata* Gyll. has been studied in detail, and methods of rearing this species have been developed (Read, 1962; Whistlecraft et al.,1985).

We studied the biology of Staphylinidae under laboratory conditions in 1982-2005. Life history of 39 staphylinid species from 6 subfamilies has been studied. Methods of laboratory cultivation on natural media have been used (Tikhomirova and Melnikov, 1975; Babenko, 1991).

Each species of Staphylinidae has its own temperature limits of locomotion and feeding activity. Copulation of Omaliinae is observed at 10ºC, but for Xantholininae at 16ºC only. Most representatives of Xantholininae and Staphylininae subfamilies have high activity of males in the period of copulation and impulsive, with periods of depression, activity of females. Observing large representatives of Staphylininae (*Staphylinus fulvipes* Scop., *Creophilus maxillosus* L., *Philonthus politus* L., *Philonthus decorus* Grav., *Ontholestes tesselatus* Four.) has shown that contacts of specimens of the same sex reveal mutual aggression and beetles run away after a short fighting. The duration of copulation changes from 20 sec (*Trogophloeus bilineatus* Gyll.) up to 5 minutes (*Eusphalerum minutum* F.). *Philonthus dimidiatus* Sahlberg has the longest period of oviposition – more than four months. It has been observed that 5 females laid 496 eggs.

Large predators lay less eggs (*Staphylinus fulvipes* Scop. 15 to 24 eggs, *Philonthus decorus* Grav. and *Philonthus ebeninus* Grav. up to 65 eggs). Small rove beetles are characterized by higher fertility: *Oxytelus rugosus* F. and some *Megarthrus* spp. up to 80-100 eggs, and for *Aleochara bilineata* Gyll. a high production of eggs is observed: up to 1000 eggs (Adashkevich, 1972).

The places of ovioposition depend on rove beetles niche. Some species lay eggs open on the surface of soil and forest litter (*Drusilla canaliculata* F., some species of *Tachinus, Quedius*, *Philonthus*). Some beetles hide eggs as deep as 1,5 cm (the majority of *Staphylinus* and *Ocypus)* Representatives of *Oxyporus, Gyrophaena, Megarthrus* lay eggs inside mushrooms. Small beetles living under bark *(Nudobius lentus* Grav. and *Placusa)* lay eggs just in this place. Representatives of *Oxytelus* build cells in soft media. Some Staphylinidae are characterized by taking care for their offspring: e. g. the female of *Platystethus arenarius* Four. protects its eggs in special cells against predators trying to penetrate into the cell. It strikes them using mandibula and the top of the abdomen.

The development period of larvae and pupae depends on temperature and place of living. Most part of dung-living and mushroom-living Staphylinidae have the shortest period of larval and pupal development. Survival of larvae depends on what they eat during the first hours after their escape from eggs. Big representatives of *Philonthus* live without food up to 2 days, and larvae of older ages up to 7 days. When temperature decreases the period of development becomes longer in Staphylininae and Paederinae (2-3 times) and in Omaliinae and Oxytelinae (1,5 times).

The process of pupa construction takes place, as a rule, in the different shelters. For example, larvae of some *Aleocharinae* produce the pupa in a special silk cocoon, using small particles of sand and mushrooms. We studied the making of silk cocoons by larvae of *Oxytelinae, Aleocharinae* and *Staphylininae.* Larvae of *Atheta* sp., living in sulfur shelf mushroom, make cocoons in the lower part of the mushroom or, under laboratory conditions, in sand. First of all, a larva glues small parts of substrate making a circle-like wall, the diameter of which is approximately the same as the length of a larva's body. Then it makes a kind of net over the wall. The process of making cocoon by larvae of *Oxytelus sculpturatus* Grav. is simpler. They drill into the substrate and make a thin transparent cocoon around their bodies. Larvae of *Drusilla canaliculata* F. make cocoons like a net with big cells. This process takes place in cells in damp substrate. Big predators – *Ontholestes tesselatus* Four. and *O. murinus* L. – make cocoons with the shape of a cylinder. They were placed in small holes within the substrate which the larvae have made before.

Staphylinid beetle communities (Coleoptera, Staphylinidae) of virginal forests in the central Europe – endangered species and conservation measures

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Staphylinid beetle communities were studied in virginal forests on 3 localities: National Nature Reserves (NNR) in the Boubín massive in Šumava Mts. (NNR Čertova stěna – forest and stream, NNR Zátoňská hora – forest, NNR Milešický prales – forest, NNR Jilmová skála – forest, NNR Žofínský prales and NNR Hojná voda in Novohradské hory Mts. (forest, shore of a stream) and NNR Mionší in Beskydy Mts. (forest, artificial meadow).

Aim of the study was:

– to describe the community structure of staphylinids in virginal forest situated in Šumava Mts., Novohradské hory Mts. and Beskydy Mts.,
– to prepare a base for the next monitoring of staphylinids communities, to compare results with similar studies in Bavaria and Romania.Pitfall trapping and soil sampling with the sifter, individual collection (fungi, dead wood, etc.), shaking and slipping, collecting under the bark were used for beetles studying. The efficiency of used methods for the occuring of species in virginal forest (in %) was different and the combination of methods is needed for studies of biodiversity in virginal forest due to the numerous ecological strata (see following table).

Efficiency of used methods for the occuring of staphylinid species in virginal forest:

Shaking	Slipping	Pitfall trapping	Sifting	Collecting under bark	Other methods
19,27 %	21,69 %	6,02 %	32,63 %	15,66 %	4,42 %

The highest number of staphylinid species and species of the Red Book and Urwald indicator species (Müller et al., 2005) occurs in the Mionší NNR in Beskydy Mts.(110 species). This locality reaches by its biodiversity to the highest biodiversity of Urwald species known from the Rumanian virginal forests (see Müller et al., 2005). The number of species and rare and Urwald species known from the Šumava and Novohradské hory Mts. is similar with the natural forests in National Park Bavarian Forest (Germany) (50-70 species). The next rare and endangered staphylinids occur in studied localities: *Atrecus longiceps* (Fauvel, 1873), *Gabrius bescidicus* (Smetana, 1952), *Gyrophaena rousi* (Dvořák, 1966), *Lordithon speciosus* (Erichson, 1839) and *Olisthaerus substriatus* (Paykull, 1790). The last species is known from the Boubín massive in Šumava Mts. as the only one locality in the Czechia. The climatic change are the possible most dangerous cause for Urwald staphylinid species generally (shift of vegetational zones). The common studies are needed with Bavarian, Polish and Slovakian colleagues dealing with staphylinids as indicators of forest naturalness and human effect in the central Europe.

On the systematic position of Endeius Coiffait and Sáiz (Staphylinidae, Staphylininae)

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The Austral South American genus *Endeius* Coiffait and Sáiz belongs to the Philonthina, a very speciose subtribe of Staphylinidae, particularly in the tropics where many genera have not been revised since their original description. *Endeius*, as it is currently known, comprises eight valid species distributed from Chile and Argentina through Juan Fernández Is. and Galapagos Is.: *E. nitidipennis* (Solier), *E. punctipennis* (Solier), *E. loensis* Coiffait & Sáiz, *E. subpunctipennis* Coiffait & Sáiz, *E. franzi* Sáiz, *E. lugubris* Sáiz, *E. multipunctatus* Coiffait and *E. ovaliceps* Coiffait.

Coiffait´s treatment of the Staphylininae relied heavily on the structures of male genitalia, and affected the natural classification both at the generic and species level within the subfamily. The systematic position of *Endeius* was estimated by a cladistic analysis and its phylogenetic relationships with other representatives within Philonthina were evaluated. Twenty terminal units were included in the cladistic analysis, the eight species of *Endeius*, and twelve outgroup taxa. Chosen outgroups to root the tree were one representative within Xanthopygina, one within Quediina and ten representatives within Philonthina: one in the genus *Chroaptomus* Sharp, two in *Gabrius* Stephens, two in *Bisnius* Stephens, two in *Belonuchus* Nordmann and three in *Philonthus* Stephens. Fifty-six characters were used, from which 35 were derived from the external morphology, 19 from male genitalia and two from female genitalia. Twenty-one multistate characters were treated as unordered (non-additive). Two search criteria were used: a) equally weighted analysis (EW), and b) implied weighting method (IW, Goloboff 1993). Data matrix was analyzed with TNT (Goloboff 1999). The EW analysis of the data matrix produced one cladogram with 178 steps. Results from the IW analysis were congruent with those from the EW criteria.

The cladogram shows the eight *Endeius* species as a non-monophyletic group. Its comparison with a re-rooted tree supports this hypothesis. *Endeius* can be considered as a "natural group" only for four of its species including the type species, *E. loensis*. The group is defined by: second segment of maxillary palpus moderately to distinctly swollen, and more than five punctures at dorsal rows of pronotum.

Systematic Problems in the Euaesthetinae (Coleoptera: Staphylinidae)

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The subfamily Euaesthetinae contains approximately 800 described species in 27 genera (1 fossil, 2 undescribed), which are currently placed into 6 tribes: Austroesthetini (5), Alzadaesthetini (1), Euaesthetini (12), Fenderiini (2), Nordenskioldiini (3) and Stenaesthetini (4). This tribal classification was based on tarsal formula and the presence or absence of a margined abdomen and wings, and has been questioned by many authors. The monophyly of the clade Euaesthetinae + Steninae is well established, but recent published studies have suggested that Euaesthetinae is paraphyletic with respect to Steninae, as there are no known autapomorphies for Euaesthetinae. This talk reviews some major systematic problems within the clade Euaesthetinae + Steninae, pitches these problems within a phylogenetic context, and focuses on the south temperate endemic genera.

Almost half of the known euaesthetine genera and two of the tribes (Austroesthetini, Alzadaesthetini) are endemic to the south temperate region and the relationships of these genera to each other and to other genera are unknown. Some major morphological characters are reviewed, including potential autapomorphies for Euaesthetinae, and using recent adult morphological data some new hypotheses for generic relationships are explored. It is suggested that Alzadaesthetini, most of the genera of Austroesthetini, and Stenaesthetini may be more closely related to each other than to members of any other tribes. Two new undescribed genera and their systematic placement are briefly discussed in light of these other hypotheses. It is concluded that phylogenetic studies of the Euaesthetinae will be significantly hampered by the dominance of homoplastic characters, reductions, and parallel changes related to the specialized habitats of these beetles. A phylogenetic reclassification of the subfamily will likely require the input of molecular data and high-density taxon sampling across all genera to reach stability, and still seems to be a distant reality.

About *Stenus* aggregates on top of Mt Borail (Assam, India)

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The Mt Borail is located in North East India in the South of the State of Assam (Axom). This about 1800 m high mountain is still densely covered with lush forests. On the 17th of October 2005, I climbed it together with Alessandro Marletta (Catania, Italy) and my Hado Kookie friend Chungkholien Lhouvum (Notun Leikul, Assam). We reached the summital clearing at 2.30 PM. It was cloudy with almost no wind. There, our attention was casually drawn onto the base of a nearby tree at the forest edge by dozens of tiny dark mobile spots contrasting with its pale bark. Giving the tree a closer look, I soon realised that the dark spots were adults *Stenus* Latreille (Coleoptera Staphylinidae Steninae). They were present in such a number that they could be found almost everywhere on the trunk up to 1.5 m high, as well as on the surrounding couple of square meters of vegetation. They were all together well above 5'000 specimens as if uniformly scattered at a 3-5 cm distance from each other on the bark and leaves of the tree, as well as on neighbouring mosses, ferns, grasses, branches and other vegetational debris on the ground. Density of individuals was particularly high underneath some recurved dead broadleaves and in shallow cavities of the trunk, where they could form a nearly compact layer exceeding 5 individuals / cm^2. Most individuals appeared moderately active, and they were many couples *in copula*. I sampled several hundreds of specimens of various sizes, all of which proved later to belong to an undescribed species of *Stenus* resembling *S. stigmaticus* Fauvel (V. Puthz pers. com.). The aggregate was still going on when we left the place at 3.30 PM. The next morning we returned to the summital clearing and decided to stay there for a couple of nights. The top of Mt Borail was in the clouds at our late morning arrival and by noon a gentle drizzle started moisturing the place. We couldn't find even a single *Stenus* on or near 'the' trunk before rain poored on us from 3 PM until late at night. The 19th of October was sunny until the late morning formation of a thick layer of altostratus, which obscured the sun throughout the afternoon. It was about 1 PM when we first noticed adults *Stenus* gradually turning up again near the same particular tree, as if they were materialising from nowhere. In the matter of half an hour the aggregate resumed exactly at the same place as two days before and with a similar intensity. At around 4 PM, the attendants at the aggregate appeared to have significantly decreased in number, and they were all gone before sunset a 4h30 PM. I returned to Mt Borail in 2006 and camped on its summital clearing from November 15 to 29. Moderate drought conditions due to a deficient monsoon allowed me to experience mostly sustained winds without altostratus cover, and only two night showers. This abnormal climate for the season might eventually explain why I hadn't the chance to observe an other *Stenus* aggregate throughout this second and much longer stay on top of Mt Borail.

This is only the eighth aggregate of Staphylinidae reported since Léon Fairmaire first mentioned the phenomenom in 1856. Six of them consisted in *Stenus* and one consisted in *Dianous* Leach, with figures ranging from several hundreds to more than 30'000 individuals. So far the only aggregate of Staphylinidae reported out of Steninae consisted in several hundreds of *Ilyusa fugax* Erichson (Aleocharinae) observed in 1955 by Henri Coiffait near the entrance of a cave in Lebanon.

This phenomenom, which seems quite rare and unpredictible, is apparently associated with reproduction, but the precise factors (seasonal, weather conditions, topography, etc.) leading occasionally so many individuals of a single species of Staphylinidae to gather together in such a way remain unclear.

Species diversity of Staphylinidae in the Neman river basin in Belarus

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Natural features of European floodplains are the result of dynamic geomorphological processes that lead to a high habitat diversity of these ecosystems. Floodplain management and conservation requires a sound understanding both of species-environment and species-species relationships in the communities, guilds etc. So, there is a need to collect so much as possible quantitative rather than qualitative data, first of all on the population dynamics and energy flow. It is important to clear up the role of physical and biotic factors, and how these interact among the different levels of riverine study (from one well-defined habitat to river basin).

Presented data were collected in course of the study of staphylinid assemblages in the floodplains in Belarus. Material was collected during 2005 – 2006 in the floodplains of Neman river and its right tributary – Shchara river. The Neman river flows in the north-western part of Belarus in general East to West direction.

The main objectives of this study were to find out changes in the staphylinid assemblages structure in the spatial gradient from river source to middle river course and to define the structure of staphylinid assemblages in the open versus forested habitats in floodplains of the studied rivers. To solve this problem, material was collected in 9 study sites along the entire courses of Shchara and Neman rivers. The study was carried out in the context taking into account the structure of vertebrate predator (amphibian) assemblages. Therefore, habitats with concentrations of feeding amphibians were selected. Forested habitats sampled were mostly black alder forests and floodplain oak forest patches. Floodplain meadows were selected as open habitats.

Beetles were collected by pitfall trapping and soil sampling. Plastic cups with an opening diameter of 75 mm and a volume of 250 ml were used as pitfall traps. A formalin mixture (4 %) was used as a fixing agent. Fifteen traps were located in every site in the open and in the forested habitat. The traps were serviced once in 3 weeks during the period from May to October each year. Soil samples were collected only in the forested habitats and sampling was done only at a depth of forest litter. Samples at eight 25x25 cm plots were collected at every site. Substantial amount of specimens was collected, and this material was identified and analyzed only partially as of today. In the presentation, we used the soil sample data from 2 sites in the Shchara river floodplain and from 3 sites in the Neman river floodplain. The Neman data used are from the upper and middle river courses collected in spring (May – early June).

The Upper Neman river floodplain was considerably affected by drainage melioration, therefore floodplain meadows are substantially anthropogenically transformed. Nevertheless, they are under an impact of seasonal flooding that influences the Staphylinid species composition. The forested habitats there primarily represented by black alder forests. The upland dry pine forests and mixed forests including pine, spruce, birch, aspen and other deciduous trees grow on the upper layers of river terraces.

Open habitats in the Middle Neman (the second study site) and in the Shchara river mouth were represent by typical floodplain meadows. Plots on the elevated parts of floodplain meadows are not subjected to flooding. The species composition at those sites includes xerophilous and even steppe elements. The forested patches in the floodplain were represented by old growth oak or black alder forests. These forests are affected by seasonal flooding during most of the years. There are numerous temporary pools in the floodplain, many of which may persist till the middle or even the end of summer. The mature oak forests in the Middle Neman region are under legal protection by the state.

According to the soil sample data, the most common species in the forest litter are *Geostiba circellaris* and *Atheta fungi*. They were found in all studied sites and their densities were from 2 to 58 specimens/square meter. The most diverse species composition of staphylinids was found out in the black alder forest in the Upper Neman. The hygrophilous species from the genera *Gabrius, Philonthus, Stenus, Carpelimus, Dochmonota clancula* were diverse in the alder forest. Mesophilous forest species *Xantholinus linearis, Othius myrmecophilus, Othius punctulatus, Anthobium atrocephalum* and *Cypha longicornis* were more common in the floodplain oak forests.

Similarity analysis of staphylinid assemblages in the floodplain forests has revealed that staphylinid assemblages from the same forest types are more similar. No any other pattern was found out in the similarity of staphylinid assemblages according to the quantitative data.

Staphylinid species composition as identified by pitfall trapping was much more diverse in comparison with the soil samples data. 83 species were identified. One of the most interesting faunistic discoveries was *Xantholinus dvoraki* recorded for the first time on the Belarusian territory. This species is regarded as stenotopic inhabitant of floodplain meadows, but I didn't collect this species during my previous 8-year-long studies in the riverine habitats in Belarus. 10 specimens of this species were collected in 2006 on a floodplain meadow in the Middle Neman. *Ischnosoma longicorne* was collected there too. This hygrophilous eurytopic species, inhabiting swampy forests and wetlands in floodplains is found much rarer than *Ischnosoma splendidum*, which is common in different forested and open habitats. Two species rare in Belarus were found in the Upper Neman study sites. *Carpelimus elongatulus*, a species of swampy meadows and banks of ponds, rivers etc. was collected on the meadow site, and *Tachinus rufipennis*, wet forest and meadow species, was found in black alder forest. This latter species overwinters in subterranean nests of mammals, moles in particular, and I collected a single specimen of it. It is the second record of *T. rufipennis* in Belarus. Formerly the species was recorded in the north of Belarus, in Vitebsk region.

The species composition and the dominance structure of staphylinids differed considerably between the Upper and Middle Neman and between open and forested habitats. The most diverse staphylinid assemblage, 38 species, was found at floodplain meadows in the Middle Neman. Four of those species were dominants [*Xantholinus dvoraki* Coiff., *Lathrobium impressum* Heer, *Carpelimus corticinus* (Grav.), Aleocharinae gen. sp.]. Only 21 species were recorded in floodplain oak forests, also with 4 dominants [*Gyrohypnus angustatus* Steph., *Anthobium atrocephalum* (Gyll.), *Geostiba circellaris* (Grav.)]. Abundance of the eurytopic hygrophilous *Drusilla canaliculata* accounted for more than 25% of specimens collected there.

The highest species numbers in the Upper Neman were found in the black alder forest – 33, with 6 dominant species [*Ocypus nero* (Fald.), *Quedius fuliginosus* (Grav.), *Stenus humilis* Er., *Ischnosoma splendidulum* (Grav.), *Tachinus corticinus* Grav., *Tachinus signatus* Grav.]. Only 22 species were found in meadows there, also with 6 dominants [*Gabrius breviventer* (Sperk), *Staphylinus erythopterus* L., *Stenus circularis* Grav., *Stenus juno* (Payk), *Anotylus rugosus* (F.), *Mycetoporus lepidus* (Grav.)].

The highest similarity both in the qualitative data and in the species composition was discovered between assemblages from the open and forested habitats independently of assemblage location in the Upper or Middle Neman. As it was pointed out above, the similarity degree of the staphylinid assemblages in all sites was low and did not exceed 20 – 25%.

The structure differentiation of staphylinid assemblages in the floodplain ecosystems of Neman and Shchara rivers shaped primarily by the degree of floodplain development. In the Upper River courses, in the poor developed floodplain the structure of staphylinid assemblages is very similar to the structure in the surrounding landscape elements. Instability of hydrological regime determines the prevalence of hygrophilous elements in comparison to the lower river courses. In the lower river courses, staphylinid assemblages more stable in terms of species composition and ecological structure are observed under conditions of developed floodplains. Meadow beetle assemblages include mesoxerophilous and even xerophilous elements inhabiting open drier patches in the floodplains, characterized by warmer temperature conditions during the summer period. Forested ecosystems in floodplains are characterized by mixed structure of staphylinid assemblages, which include typical forest elements and species of open areas. This mixed structure is caused by large-scale mosaics of the forested biotopes in the floodplains in Middle Neman and in Low Shchara and by development of ecotone effects here.

Thus, in the floodplains of the flatland forest zone rivers like Neman or Shchara, the structure of staphylinid associations is relatively homogeneous along the spatial gradient from the river source to the mouth and is determined by local habitat mosaic. Considerable changes in the association's structure take place under the influence of large-scale mosaic of adjacent to floodlands landscapes.

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Phylogeny of the tribe Athetini Casey, 1910: a combined morphological/ molecular approach

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The goal of the project is to infer the phylogeny of the tribe Athetini (Coleoptera: Staphylinidae: Aleocharinae) using combined morphological and molecular datasets. The aim is to test whether the currently recognized subtribes are supported by phylogenetic analysis, and to study in more detail the phylogenetic relationships within the genus *Atheta*.

Preliminary results, based on the current molecular dataset, are presented. Cytochrome oxidase 1 and 2 (CO1, CO2) genes for 69 samples covering 45 aleocharine and one tachyporine species were obtained and analyzed. Additionally, ribosomal subunit genes 16S and 18S were sequenced for several taxa. CO1 and CO2 genes evolve too fast to help resolving relations between subtribes, but they might be useful for analyzing relations within younger clades. Tree support is improved by inclusion of 16S and 18S. The focus of future work is sequencing of three nuclear genes: wingless, CAD and Elongation factor 1α.

Variability of separate species of genus *Carpelimus* and the problems connected to it (Coleoptera, Staphylinidae)

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Variability of attributes of some species of *Carpelimus* creates certain problems in classification of the genus. Distinctions in coloration, length of elytra, proportions of the body and microsculpture form the basis for the erroneous description of new species.

Examples of the wide variability of two species of *Carpelimus* are demonstrated: *C. politus* (Kiesenwetter, 1850) and *C. atomus* (Saulcy, 1864). Variability concerns not only body size, coloration and length of wings, but also the structure of the aedeagus.

As a result of the studies on variability five species have been shown to be synonyms: *Carpelimus gradensis (= C. foveolatus)*; *C. leederi (= C. despectus)*; *C. variegatus, C. ruandanus, C. maroccanus (= C .atomus)*. Two species will be synonymized in the near future: *C. tenerepunctus, C. zlobini (= C. politus)*.

A review of Nearctic leptotyphlines (Coleoptera: Staphylinidae: Leptotyphlinae). Using ecological niche modeling to predict geographical distributions of leptotyphlines in America north of Mexico

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Geographical distribution of leptotyphlines, both worldwide and in North America, is reviewed. Collecting methods are discussed, with particular reference to soil flotation. An introduction to ecological niche modeling and its use for predicting of geographical distribution is presented. The approach is extended to predict distribution of supraspecific taxa including multiple species, similar ecologically. Using Desktop GARP, a model predicting distribution of leptotyphlines in North America is developed.

The genera Lispinus and Tannea (Osoriinae) in Costa Rica – Ecological and Zoogeographical remarks –

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The information labelled on *Lispinus* and *Tannea* specimens from Costa Rica deposited in several museums is exploited concerning the collecting locality and ecological remarks. In total, 15 species of each genus with 458 specimens of *Lispinus* and 817 specimens of *Tannea* have been available for the study.

Whereas *Lispinus* was mainly recorded from the under bark habitat, *Tannea* was found in the forest litter. The species of the two genera seem to differ also in their feeding habit. Intestines of both *Lispinus* and *Tannea* contained mainly fungus and arthropod remnants respectively. Altitude distribution results in 4 species occurring over the whole gradient and 15 species restricted to special life zones in the altitude gradient. Two species are only known from an elevation higher than 2000 m. One species shows an adaptation to the high altitude habitat by reduction of hind wings.

Seven species seem to be endemic in Costa Rica reflecting elements of the Talamanca-Chiriqui region. Two species represent the Central American fauna, 6 species a Central-America – Andean distribution, 8 species a Central-American – Circum Amazonian distribution, and 4 species a Pan-Neotropical distribution. Furthermore, the central mountain range separates some species with a more western or more eastern distribution, which might referred to wetter or drier conditions of the mountain slopes.

A Revision of the Neotropical Genus Acalophaena Sharp (Coleoptera: Staphylinidae: Paederinae)

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The staphylinid genus *Acalophaena* Sharp, 1886 currently includes 15 known species (*A. macularis* (Erichson, 1840), *A. angularis* (Erichson, 1840), A. *polita* (Sharp, 1876), *A. pagana* (Sharp, 1876), *A. germana* (Sharp, 1876), *A. picta* (Sharp, 1876), *A. basalis* (Lynch, 1885), *A. compacta* Casey, 1905, *A. horridula* Casey, 1905, *A. laevipennis* Bernhauer, 1908, *A. argentina* Bernhauer, 1912, *A. bruchi* Bernhauer, 1927, *A. bruchiana* Bernhauer, 1933, *A. daguerrei* Bernhauer, 1933 and *A. longipennis* Bernhauer, 1933) and one variety (*A. polita* var. *obscurior* Bernhauer, 1933), all of them described between 1840 and 1933.

In the present contribution the genus *Acalophaena* is revised based on the study of 666 specimens obtained from several American and European museums, and field samples. Lectotypes have been designated for the following species: *A. argentina, A. bruchi, A. germana, A. pagana* and *A. polita*. Four species are placed into synonymy: *A. laevipennis* and *A. longipennis* with *A. basalis*; *A. daguerrei* with *A. bruchi,* and *A. picta* with *A. pagana*. *A. polita* var. *obscurior* is regarded as a distinct species and the valid binomen is *Acalophaena obscurior* Bernhauer, 1933. The genus and 12 known species are redescribed, 12 new species are described.

A key for the identification and distribution maps for all the species are provided. The genus is recorded for the first time for 9 countries. Although, the genus is distributed mainly in the Neotropical region, three species had been recorded in the Nearctic region. The highest diversity was found in South America with 15 species whereas 9 are reported for Central and North America. The genus occurs at altitudes ranging from sea level to 3000 m. The species inhabit under stones in moisture habitats near to any kind of water reservoirs. Twelve of the 24 species recognized are associated with nests of ants or termites, or both. Nevertheles, the bionomic information of the species is scarce.

These preliminary results are part of a PhD. research project and other topics such as phylogenetic and biogeographical analyses are in progress.

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Microbiotopical aspects of Staphylinids dwelling in Central Asia

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Kazakhstan has a very rich and ecologically various fauna. Almost all suprageneric taxa of Palearctic Staphylinidae are represented. According to my calculations about 2000 species of Staphylinidae live in Kazakhstan. In soil ecosystems of Kazakhstan Staphylinidae make a significant part (from 9,8 up to 44,4 %) of the arthropod population, especially in arid areas.

In the forest steppe zone litter has the richest staphylinid population. Its complex structure is sharply divided in layers and microhabitats.

In the deserts, especially in the saline desert, it is extremely difficult to find Staphylinidae, even in spring. Exception: the complex of nidicolous species. In some places there are pastures and therefore koprobionts are here.

The desert often adjoins to the shore of water reservoirs. There, Staphylinidae can live only on a narrow strip of often only a few meters. In Kazakhstan there are three greater lakes, but staphylinid distribution at their shores do not differ from all other reservoirs in the arid zones. Lake deposits have the richest staphylinid fauna.

The Ile river is one of the largest rivers of Kazakhstan. The ecosystem of its riversides is very diverse and has a big variety of staphylinid fauna. Coastal woods, the so-called "tugai", are very well developed.

The supralitoral zones of rivers have special habitats. We have made attempt to allocate them in a cross-section. The change of staphylinids' habitats follows two vectors:

horizontal. In arid regions the hydrothermical conditions sharply change with the distance from an edge of water, and appreciable changes occur within several centimeters.

vertical. Conditions change depending on vegetation, capacity of layers, structure of ground, depth of dwelling, etc. Thickness of a grassy layer changes from several millimeters to 30-40 cm. Its width may reach 10-100 cm from border of waters.

In arid low mountains staphylinids are located along the rivers and streams. Along the average watercourse Oxytelinae and the some Staphylininae reach average densities of 8,9 spec/m^2 already at the end of February. The maximal number of Staphylininae is observed from May till end of September. The staphylinids' density in biotops of bottomlands is rather non-uniform. In many places sands closely adjoin to the river, and it is possible to find Staphylinidae only on a narrow strip of the banks. For example, on extensively inundated meadows the density of Staphylinidae reaches up to 300 specimens on 1 m^3.

The majority of Staphylinidae is closely connected to widespread organic substrata. Excrements of various vertebrata have a very specific Staphylinid population. The structure of the Staphylinidae community is subjected to a natural succession which is 3 days in desert till 8 days in mountains. The spatial distribution of Staphylinidae in dung is rather interesting. In cow dung Staphylinid localization varies within a day and is depending on weather. The steppe is used for pasturing, and the koprobiontic complex is rather stable for all steppe and forest-steppe zones. It rather precisely differs from koprobionts in a mountain zone. With increasing altitude the number of Staphylinids falls, because of a lower intensity of pasturing and noticeably decrease of the quantity of cattle excrements. Changes of coprobiontic staphylinid fauna depending on height show a number of features in each ridge and in each gorge. Density varies insignificant within the limits from 120 up to 110, but at heights about 3000 m and above sharply falls and averages 25 specimens/dm^3.

In mountain woods mycetobiontic and corticolous Staphylinidae appear, while in arid zone they are absolutely absent. 55 species from 6 subfamilies are found in mountain fur-tree and mixed woods of Ile and Kungei Alatau on the supreme basidial mushrooms. The relations between mycetobiontic Staphylinidae and mushrooms as habitats or food are various and in some cases not clear. The overwhelming majority (75-99,1 %) are obligate mycetobionts of the genera *Gyrophaena* and *Bolitobius*. Many mushrooms have a specific smell at last stages of decomposition and include representatives of copro- and even necrobiontic complexes.

Conditions for dwelling on the edge of the mountain rivers strongly change depending on height. On banks with various size of stones a community of hygrophilous Omaliini, some species of Oxytelini and Aleocharinae is living. Digging *Taenosoma, Carpelimus, Bledius cribricollis, B. dissimilis* and *B. litoralis* live in low mountains on sandy strips which have been deposited behind pebbles. Here appear *Thinodromus* and the some species of *Stenus*. Under large stones *Philonthus* spp. and *Quedius* spp., which are completely absent in the plain, are frequent. Plant deposits frequently accumulate on pebbles. They are populated by saprophagous Oxytelinae, Paederinae and Aleocharinae.

The influence of temperature of water and air is remarkably. Thus when moving downstream, *Geodromicus hauserianus, G. convexicollis* and *G. plagiatus* live more deeply under stones or in a mix of stones and pebbles. For example, on the river Dolajty in Ketmen-tau in its top part (3550 m) *G. hauserianus* keeps on the internal side of small stones (5-10 cm), and in lower parts (2100 m) it has been found only on depth of 20-40 cm from a surface of a mix of stones and gravel. Also, the part of thermophilic Staphylininae, Paederinae and Steninae sharply decreases at heights more than 3000 m.

It is possible to divide the ripicolous mountainous Staphylinids of Kazakhstan into following ecological groups:

- petrophilous ripicols, uniting *Geodromicus, Lesteva, Lathrobium, Thinodromus, Calodera* and other inhabitants of stone looses on the supralitoral;
- digging ripicols, preferring small sandy beaches and deposits of sand on pebble islands (*Bledius* and the some species of *Trogophloeus*);
- nivicols, living at the edges of glacier fields and streamlets rising from the snow. In the region the group is represented by *Coryphium, Coprophilus, Geodromicus* and *Lesteva*.

The group of the high-mountainous species living above 3000 m, consists of specialized Omaliinae, Aleocharinae amd Staphylininae. Species of the genus *Geodromicus* are most numerous at snow fields of Kungei, Ile, Ketmen and Dzhungar ridges.

Morphological and ecological diversity of rove beetles of the genus *Stenus* (Coleoptera, Staphylinidae)

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The staphylinid genus *Stenus* comprises more than 2500 species and is therefore one of the largest beetle genera on earth. The members of this genus are characterized by a highly specialized labial prey-capture apparatus, which is protruded rapidly by haemolymph pressure towards the potential prey. The paraglossae at the distal end of the labium are modified into sticky cushions, whose surface is differentiated into terminally branched setae. If the prey adheres to these sticky pads, the labium is instantly drawn back, and the beetle can seize the prey with the mandibles. The sticky pads obtain their adhesive function via an adhesive secretion that is produced in special glands within the head capsule and secreted onto their surface.

To date, the attractive forces during the predatory strike have only been theoretically determined. In the talk we present the first *in vivo* force measurements during the predatory strike. Furthermore we present results of biomechanical, electron-microscopical as well as histochemical analyses, which contribute to the knowledge of the functional principles of this unique capture apparatus.

Biosynthesis of Stenusine

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Most species of the rove beetle genus *Stenus* Latreille (Coleoptera, Staphylinidae) employ the spreading alkaloid stenusine (N-ethyl-3-(2-methylbutyl)-piperidine) as an escape mechanism on water surfaces. In the case of danger, they lower their abdomen and emit stenusine from their pygidial glands. Stenusine lowers the surface tension of the water; this effect drives the beetle rapidly over the water.

It is proposed that stenusine derives from the two amino acid lysine and isoleucine. To prove that hypothesis we conducted incorporation experiments. We fed *S. bimaculatus* with labelled amino acids. Using GC/MS analysis we could prove that lysine was incorporated. It forms the piperidine part of the stenusine molecule. So far we can not provide evidence that the *Stenus* beetle uses isoleucine for the synthesis of the side chain of stenusine. Further experiments are in progress and will hopefully reveal the total biosynthesis of stenusine.

The best type is the lost type?
Three taxonomic problems in the genus *Thinobius* (Oxytelinae)

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The type concept uses a single specimen as the objective standard for application of zoological names. These specimens usually bear characters that allows us to attribute them to recognized species. In rare cases, however, the specimen that should be considered to be the primary type, bears no such characters, belongs to a sex which is unidentifiable, may be incomplete, damaged or more or less completely lost. Three cases in the genus *Thinobius* (Oxytelinae) illustrate that the existance of a type specimen may even complicate the application of names, where without a geniune type there could be an easy solution.

1. *Thinobius bicolor* Joy, 1911 was described based on a female specimen, and belongs to a pair of species where only males can be satisfactorily identified. The existance of another type specimen cannot be excluded. For now, the interpretation of the species must be based on a study of the surroundings of the type locality (in Britain), where only one of the sibling species was so far found, therefore *T. bicolor* is considered to be the senior synonym of *T. linderianus*.

2. *Thinobius diversicornis* Fauvel, 1889 was described from an area, where the genus does not occur these days. The description is so weak, without a specimen the name could not be applied. The existing female type belongs to a taxon, to which 3 different names have been applied in the last 50 years. Thinobius diversicornis becomes the senior synonym of T. franzi (= *T. tatricus*, = *T. konecznii*).

3. *Thinobius delicatulus* Kraatz, 1857 was thought to be a well-applied name, until the female type of *T. helveticus* was studied and found to be a distinct species. *T. helveticus* was then collected in Maramures (East Carpathians) and after the detailed study of its males it turned out that *T. helveticus* and *T. delicatulus* are sibling species and many of the specimens earlier identified as *T. delicatulus* are in fact *T. helveticus*. The type of *T. delicatulus* is almost completely lost, what more, it now seems unsure whether this is the one of the two species

which actually occur at the type locality. Irrespective of the true identity of the type, it seems reasonable to maintain the use of *T. helveticus* and consider *T. delicatulus* as the other species, for which a neotype must be designated.

On the prey capture behaviour and other aspects in the life of some native Pselaphinae (Coleoptera: Staphylinidae)[1)]

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Of the species rich subfamily Pselaphinae, specimens of *Bryaxis puncticollis, Bryaxis bulbifer, Brachygluta fossulata, Rybaxis longicornis* and *Pselaphus heisei* were tested for their ecological preferences (temperature and atmospheric humidity). Furthermore, the prey capture behaviour of specimens of these five species and *Tyrus mucronatus* was observed and at least three different (species specific) strategies to get a first relatively firm contact to the prey could be distinguished: sticky maxillary palps, a grip with the mandibles or capture between femura and tibiae of the pro- and (sometimes) metathoracic legs (a schematic figure was given). The preferred prey size and prey capture success was tested for four of these species and found to be independent of the predators size, the success with significant differences between the species. The mating behaviour of *Pselaphus heisei,* different abilities of specimens of the first five species to walk on the water surface and, in addition, some new hints on the life cycle and a larger lifespan than previously assumed could be observed.

[1)]Summary of a diploma thesis at the Christian Albrechts University of Kiel, Germany (2006)

The high altitude fauna of the staphylinid subfamily Omaliinae (Coleoptera, Staphylinidae) of South Siberia

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Within the World fauna the subfamily Omaliinae is represented by 1458 species and subspecies in 125 genera (Herman, 2001), from which in the Palaearctic region the subfamily is represented by 1070 species and subspecies in 75 genera (Smetana, 2004). For the fauna of Russia 194 species and subspecies in 39 genera are known, for Siberia 73 species in 26 genera, East Siberia 68 species in 26 subgenera (Shavrin, 2006).

In the Baikal region the subfamily is represented by 58 species in 8 genera (Shavrin, 2006), the high mountains of Khamar-Daban Mts. (KhD) and Tunkinskij Mts. of East Sayan (ES) by 27 species in 17 genera and 20 species in 13 genera, respectively. The fauna of omaliines of Primorskij Mts., Bajkalskij Mts. and Barguzinskij Mts. are investigated very insufficiently, they are represented by 12 species in 10 genera, 7 species in 6 genera and 7 species in 5 genera, respectively. The other mountain ranges of Lake Baikal are absolutely unstudied. Thus, our knowledge of the staphylinid fauna of this territory is preliminary.

From KhD Mts. we know 27 species, seven of these have Holarctic distributional patterns, 3 are Palaearctic, 9 European Siberian, 8 East Palaearctic (3 widely distributed in the East Palaearctic region, 1 in the Baikal region, 1 in KhD and ES Mts., 3 KhD endemics). For ES 20 species are known: 10 Holarctic, 1 Palaearctic, 4 – European Siberian, 5 East Palaearctic (3 widely distributed in the East Palaearctic, 1 in KhD and ES Mts., 1 ES endemic). At present time, for high altitudes of KhD Mts. 3 endemic species are known: *Lesteva dabanensis* Shavrin et al., *L. czerskyi* Shavrin, *Boreaphilus komsomolkae* Shavrin et al. and for ES *Lesteva brathinoides* Zerche. *Coryphium nataliae* Shavrin is a common endemic for KhD and ES Mts. A large number of new taxa from the alpine zone of south Siberia may be discovered in the future, especially Coryphiini, *Lesteva* and *Eusphalerum*.

The inhabitants of the alpine zone are organised into three groups on the basis of their connections with this zone:

1. Eualpine species, living in alpine tundra under stones, near snowpatches, mountain streams and in wet mosses;
2. Montane species, found in the forest zone, but extending into the alpine zone (species inhabiting litter, floricolous species);
3. Polyzonal species, occasionally colonizing biotopes of the alpine zone (species connected with rotting organic material, such as *Omalium;* xylophilous and mycetophilous species).

Towards new classification of the tribe Staphylinini (Staphylinidae: Staphylininae)

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The tribe Staphylinini which includes 211 described genera, and more than 5,300 described species, is obviously monophyletic, worldwide distributed and very diverse group of rove beetles. It is important to have a phylogeny-based system for any reference and further study of the so large group of organisms. However, no special broad project focused on the phylogeny of Staphylinini has ever been undertaken.

The existing classification of the tribe is largely conventional and consists of nine vaguely delimited subtribes with unknown interrelationships. Preliminary large-scale phylogenetic analysis, based on the morphology of adults, conducted for the first time for the tribe, does not support this classification. It defines a new evolutionary pattern for the tribe, which seems to be consistent with the very fragmentary fossil record and current distribution pattern of Staphylinini.

The newly presented phylogenteic hypothesis helps to plan a larger study which would be based on the even broader taxon sample and a combination of adult and larval morphological, as well as molecular characters.

New data on the rove beetle fauna from Bucharest and adjacent areas

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The knowledge of the rove beetle diversity of the Romanian capital and the environs is a necessity because the available data are very poor and old and the multidimensional development of the area will produce a huge impact on the habitats and the floristic and faunistic patterns.

The lecture presents the faunistic data on the rove beetles of Bucharest and adjacent areas based on the material collected during the period 1955-2006 (137 species) and on the revised specimens in the collection of “Grigore Antipa” National Museum of Natural History (Montandon Collection, 45 species). A total of 164 species are recognized. *Astenus lyonessius* (Joy), *Plataraea elegans* (Benick) and *Gyrophaena hanseni* Strand are newly recorded for the rove beetle fauna of Romania (Stan, 2007, in press). The qualitative composition of the rove beetle communities of the study sites is presented.

Foreign-language skills in rove-beetles? Evidence for chemical mimicry of an ant alarm pheromone in myrmecophilous *Pella* beetles (Coleoptera: Staphylinidae)

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Pella beetles are myrmecophilous beetles living in the surroundings of *Lasius fuliginosus* colonies [1]. Using chemical analyses as well as behavioural tests in the laboratory and in the field, we tested the hypothesis that these beetles mimic alarm pheromone compounds of their host ant *L. fuliginosus* to avert attacks. The secretion of *P. funestus* and *P. humeralis* contains quinones and different aliphatic compounds, mainly undecane and 6-methyl-5-hepten-2-one (sulcatone) [2]. Both substances can also be found in *L. fuliginosus* pheromone glands [3]. Behavioural tests confirmed that undecane serves as an “aggressive alarm” stimulating pheromone in *L. fuliginosus*, whereas sulcatone most likely represents a “panic-alarm” inducing pheromone. The main tergal secretion compounds quinones and undecane as well as their mixtures caused aggressions in the workers of *L. fuliginosus*. When sulcatone was added to these compounds and mixtures, the space around the odour source was avoided and a reduced number of aggressive acts was observed. Obviously, sulcatone overrules the aggression-inducing effect of undecane and quinones. These results support the hypothesis that *Pella* beetles mimic an alarm pheromone of their host. In contrast to many publications, that center on the mimicry of cuticular hydrocarbons, the reported case represents a rare - if not the only - case of chemical mimicry in myrmecophilous insects where other pheromonal cues are used.

Literature:

[1] Hölldobler B, Möglich M, Maschwitz U, **1981**, *Psyche* 88: 347-374. [2] Steidle JLM, Dettner K, **1993**, *Syst. Entomol.* 18: 149-168. [3] Bernardi R, Cardani C, Ghiringhelli D, Selva A, Baggini A, Pavan M, **1967**, *Tetrahedron Lett.* 40: 3893-3896.

Aspects of the head morphology in staphylinid beetles

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Betz et al. (2003) published a study regarding the question of the widespread feeding type of sporophagy, which means feeding on fungal spores or on pollen. I investigate whether this specialized feeding type is mirrored by the head anatomy especially of members of the aleocharine subfamily.

To comparatively investigate a large number of species we use a novel technique, synchrotron x-ray micro-tomography, which will be shortly introduced. To give you an idea of the results achieved using this method, different examples like 3D models or virtual slices will be shown.

Both, the occurrence and the course of the muscles of the head and the conditions of the inner head skeleton (tentorium, sclerites) will be presented. In staphylinids the latter show an interesting diversity that appears to be hardly homologizable with the structures described for the orthopteroid groundplan (e.g., Snodgrass, 1993, Matsuda, 1965).

Synchrotron-µCT-Techniques in Arthropod Morphology

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Using Synchrotron radiation to solve protein structure (protein crystallography) is well known, whereas in other biological fields such as morphology or physiology this technique is not as yet very common.

Synchrotron X-ray micro-tomography (µCT) is a non-invasive technique that gives the researcher the possibility to obtain virtual thin sections of the object under study with a resolution close to that of the light microscope. These data can be reconstructed as 3D models, so that the scientist is able to study internal structures in their natural position.

We illustrate some examples from our own research using Synchrotron X-ray micro-tomography, e.g. the anatomy of beetle heads with respect to muscles and inner skeleton structures, and the reproductive system of oribatid mites with special attention to soft tissue.

We will finally compare histological sections with data obtained by using Synchrotron µCT techniques.