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Abstracts of the Immature Beetles Meeting 2015
October 1−2, Prague, Czech Republic

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Two years after the last get-together and following the biennial tradition, the sixth Immature Beetles Meeting was held in Prague on October 1–2, 2015. Similarly as two years ago, it took place at the Faculty of Science of the Charles University in Prague and was organized in the cooperation with the Department of Entomology of the National Museum and the Crop Research Institute in Prague. In total, 55 participants from Europe, North and South America and Asia attended the meeting (Fig. 1), including a large Brazilian delegation comprising students and scientists from three different universities. Nearly half of the participants attended the meeting for the first time, and we were again pleased to host not only the leading experts in beetle systematics (e.g., Paweł Jałoszyński, Jolanta Świętojańska, Josef Jelínek, Eugenio Nears, Nathan Lord and others), but also many pregraduate students. Seventeen oral lectures and two posters were presented, covering a wide spectrum of topics concerning nearly all major clades of beetles (Adephaga, Hydrophiloidea, Staphylinoidea, Scarabaeoidea, Elateroidea, Coccinelloidea, Cucujoidea, Chrysomeloidea and Curculionoidea), as well as possible Palaeozoic beetle larvae and methodologies of larval studies. As in previous years, the discussion about beetle topics continued even over the glass of Czech beer during both evenings. We hope that the meeting again served well its main purpose – to get together people with an interest in beetle systematics and start or maintain contacts and cooperation between coleopterologists across countries and generations.

The next meeting is planned for autumn 2017 and will be held at the Charles University in Prague again. It will be organized by a new team consisting of Emmanuel Arriaga Varela, Matthias Seidel and Dominik Vondráček, who will kindly take over our roles. We believe that involving younger generation will not only make the organization better and more flexible, but will also allow to incorporate new ideas and make the next meeting again attractive again for both established scientists and students starting with their careers. All three of us will continue in our support of the organizing team, even though from the more backstage position.

On the behalf of organizers of the last six Immature Beetles Meetings, we would like to thank again all participants and colleagues who attended the meetings between 2006–2015, supported the idea of organizing them, and contributed to a really nice and friendly atmosphere during all get-togethers. It was a nice experience for us, and it was great to meet you all!

organizers of the Immature Beetles Meeting

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We are greatly indebted to all colleagues and students who supported the organization of the Immature Beetles Meeting 2015 by providing the oral presentation or presenting a poster, taking care of the refreshments and drinks for the attendants of the meeting, providing free accommodation to some of the students, and taking over our duties during the week around the meeting. The authorities of the Department of Zoology, Charles University in Prague kindly supported our initiative to organize the meeting, and our dear halves kindly tolerated our mental and physical absence from our homes during the evenings and nights. The meeting was organized as a part of the research activities of the organizers under a partial support of the grant of the Ministry of Culture of the Czech Republic (DKRVO 2015/14, National Museum, 00023272) to M. Fikáček, grant No. RO0415 of the Ministry of Agriculture (MZE ČR) to J. Skuhrovec, and the institutional resources of the Ministry of Education, Youth and Sports of the Czech Republic for the support of science and research to P. Šípek.

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ORAL PRESENTATIONS

Egg cocoons and larvae of *Hydrochus* Leach (Coleoptera: Hydrophiloidea)

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There is very little information available on the immature stages of *Hydrochus* Leach. Richmond (1920) gave an account of the egg cocoon and first instar larva of the American *H. squamifer* LeConte, 1855, but nothing has been published since and I know of no records of *Hydrochus* larvae having been taken in the field.

In the 1980s I obtained egg cocoons of six European *Hydrochus* species, *H. flavipennis* Küster, *H. crenatus* (F.), *H. elongatus* (Schaller), *H. ignicollis* Motschulsky, *H. brevis* (Herbst) and *H. megaphallus* van Berge Henegouwen, as well as first instar larvae of *H. crenatus*, *H. elongatus* and either *H. brevis* or *H. megaphallus*. The egg cocoons are placed on vegetation in the water. Those of the first four of the species listed above are similar to that of *H. squamifer* as described by Richmond (1920), with an egg-bag containing a single egg and a mast whose length ranges from 1 to 5 mm. The egg cocoons of *H. brevis* and *H. megaphallus* consist of an egg-bag containing 2 eggs lying beside each other, and lack a mast.

My larvae, mounted on slides, cannot be found at the moment, but there are 2 *H. angustatus* Germar larvae, 1 first instar and one 3rd instar, reared from eggs by J. Balfour-Browne,

Fig. 1. Participants of the Immature Beetle Meeting 2015, Prague, 1st October 2015.

in the Natural History Museum in London. These larvae are broadly similar to Richmond's description of the *H. squamifer* larva, but the antennae have a field of short setae on the inner face of the basal segment, not figured by Richmond. I remember a similar field on the antennae of my larvae, but had great difficulty focusing on just the antennae of my preparations. Fortunately the antennae of the third instar *H. angustatus* larvae are each positioned to one side of the head and do not overlie the mouthparts.

Of my larvae, those of either *H. brevis* or *H. megaphallus* (from Catfield Fen, Norfolk, where both species occur) differ from the others in having a prominent bristly nasale in the middle of the head-front. The other larvae have the head-front more or less straight, as in Richmond's illustration of *H. squamifer*.

RICHMOND E. A. 1920: Studies on the biology of the aquatic Hydrophilidae. *Bulletin of the American Museum of Natural History* **42(1)**: 1–93 + 16 pls.

New discoveries on feeding habits and behavior of immature handsome fungus beetles, including potential cannibalism (Coccinelloidea: Endomychidae, Anamorphidae)

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Until recently, Endomychidae was composed by 12 subfamilies combined under the collective common name of Handsome Fungus Beetles. A recent phylogenetic analysis by Robertson et al. (2015) showed the polyphyletic nature of this heterogeneous group, rising the subfamilies Anamorphinae, Mycetaeinae and Eupsilobiinae to a family level. As their name suggests Handsome Fungus Beetles typically feed on several types of fungi (Shockley et al. 2009). Endomychids feed mainly on spores and hyphae of Basidiomycetes, while anamorphids are apparently obligate sporophages. The bionomics of members of Eupsilobiidae are poorly known; some have been collected in association to ants, and other in groundtraps baited with banana, meat and feces. The family Myceteaeidae is composed only by two genera; the species of *Mycetaea* often occur as pests in granaries and warehouse, causing minor damage, while almost nothing is known about the habits of *Agaricophilus* species. However their main food source of members of these two families seems to be fungi (Tomaszewska 2011).

Noteworthy, other sources of food have been found for a few species of Endomychidae, like aphidophagy and acarophagy in predatory adults of *Saula* spp. (Endomychinae). Also, facultative phytophagy and necrophagy have been suggested for other endomychids. Unfortunately, the knowledge on the habitats and habits of most members of this and other fungus beetles families, especially from tropical areas, remains poorly known, and most of all of immature stages (Arriaga-Varela et al. 2007).

The present contribution summarizes interesting discoveries on the natural history of the immature stages of various species of Endomychidae and Anamorphidae inhabiting Mexico. This work is based on the field work performed by the first author and colleagues mainly in the states of Jalisco and Veracruz over the last ten years.

Reports on the feeding source of larvae of tropical Endomychidae are scarce. Here we report the incidence of *Stenotarsus* larvae feeding directly on mushrooms, like *Stenotarsus latipes* Arrow on *Stereum ostra* (Stereaceae), and *S. thoracicus* and *S. incisus* Arriaga-Varela et al. on *Ramaria* sp. (Gomphaceae). At the same time, larvae of *Epipocus* species have been found on a variety of fungi: *Epipocus gorhami* Strohecker on *Schizophyllum communae* (Schizophyllaceae) and *Epipocus subcostatus* Gorham on *Psatyrella* sp. (Psatyrellaceae). *Epipocus* spp. larvae are usually found on dead fungi-infested logs and subcortical environments (*Epipocus gorhami*, *E. subcostatus*, *E. brunneus*, *Epipocus* spp.) or on rotting banana leaves (*E. tibialis* (Chevrolat)), however the precise food source of them is hard to determine.

Epipocus and *Stenotarsus* species pupate below rocks or fallen trees, or directly on persistent resupinate fungi, most frequently in habitats occupied also by adult specimens. Among the most surprising and intriguing new discoveries there is the evidence of *Epipocus tibialis* larva feeding on the prepupa of *Epipocus* sp. These immature beetles were found in the same spot with five adult specimens of *Epipocus rufitarsis* (Chevrolat) and one meter away from an adult of *E. tibialis*. They were placed, along with leaf litter from the site, to a plastic container where this behavior was observed after two days of captivity. The biological implications of this event may differ due to unknown species identity of the eaten specimen. If they were conspecific, that would denote the first known case of cannibalism among Endomychidae. In the case that the eaten prepupa was that of *E. rufitarsis* this would be a new record of predation in the family, and could have interesting implications for the interspecific relationships of these, often cohabitating, species.

Handsome Fungus Beetles have evolved different defensive strategies. Among Endomychidae five genera are known to show reflex bleeding, mainly from tibiofemoral joint: *Endomychus* (Endomychinae), *Lycoperdina* (Lycoperdininae), *Rhanidea* (Leiestinae), *Corynomalus* (Lycoperdininae) and *Eumorphus* (Lycoperdininae) (Shockley et al. 2009). Our observations indicate that both adults and larvae of several Mexican species of *Epipocus* and *Stenotarsus* exude some hemolymph cocktail, which is whitish in the first genus and orange in the second.

Debris cloaking by larvae as a defense from predators was reported by Leschen & Carlton (1993) in their newly described species *Bystus decorator.* Here we report this behavior for larvae of another two *Bystus* species from Mexico, *B. limbatus* (Gorham) and *B. fibulatus* (Gorham), and in larvae of another Anamorphidae genus and species, *Catapotia laevissima* Thomson.

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ARRIAGA-VARELA E., TOMASZEWSKA K. W. & NAVARRETE-HEREDIA J. L. 2007: A synopsis of the Endomychidae (Coleoptera: Cucujoidea) of Mexico. *Zootaxa* **1594:** 1–38.

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Diversity, vertical and horizontal distribution of white grubs (Coletoptera: Melolonthidae) in the soil of canefields of Mato Grosso do Sul State

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Larvae of Melolonthidae are present in cane sugar cultivation in many countries, some species being important pests. The objective of this work was to study the diversity and vertical and horizontal distribution of white grubs in cane fields of Nova Andradina and Naviraí, Municipalities of Mato Grosso do Sul State, Brazil. Insects were sampled every two weeks through trenches held in the soil, from May 2012 to April 2013. Of the eight species of white grubs that were found, four were present in both municipalities (*Paranomala testaceipenis*, *Leucothyreus alvarengai*, *Cyclocephala paraguayensis* and *Ataena* sp.). Two species were found only in Nova Andradina (*Anoplosiagum macrophyllum* and *Liogenys suturalis*) and other two species only in Naviraí (*Cyclocephala* aff. *melanocephala* and *Cyclocephala forsteri*). Larvae were concentrated in the cultivation lines, close of the plant roots. *Anoplosiagum macrophyllum* stood out for its high abundance, with observed variations of its positioning in the soil profile during its larval development. This information may help in the control of this group of pests in the culture of cane sugar, providing the time and the place for its monitoring and control.

Biological aspects and root consumption of cane by larvae of *Anoplosiagum macrophyllum* (Coleoptera: Melolonthidae)

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Phytophagous larvae of Melolonthidae can cause damage to different crops in Brazil. This study aimed to evaluate biological aspects and the root consumption of the white grub *Anoplosiagum macrophyllum* in sugarcane seedlings. The insects were collected in the Nova Andradina municipality and reared in the entomology laboratory of Embrapa Agropecuaria Oeste, using pots containing soil and sugarcane seedlings. The root consumption was measured by the three-instar larvae under laboratory conditions (T = 25°C). The life cycle of *A. macrophyllum* was univoltine with occurrence of adults from July to September. The mean of the head capsule width were 1.47, 2.86 and 4.00 mm for the first, second and third instar, respectively. First instar larvae has fed on root hairs and fine root. The second and third larval instar intaked of 685.2 and 916.0 mg of roots during a period of six days.

Utilizing larvae to understand Holarctic concepts for *Limonius* sensu Candeze (1860) (Coleoptera: Elateridae)

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With species that have formerly been placed into the genus *Limonius* Eschscholtz 1829, there is a disconnect in generic concepts between the Palearctic and Nearctic faunas. In many cases, the same name has been used for vastly different groups of species. Many of these species, particularly in the Nearctic, are of economic importance, while others are at risk of potential extinction. Larval characters appear to be helpful to group the species between the two faunas; highlight areas that require further study; and form distinct meaningful groups to help us understand the ecology of these species of concern. This talk will highlight these issues for targeted future research.

How to prepare larvae for scanning electron microscope

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Scanning electron microscope (SEM) offers visualization of objects in very high resolution and with preserving of 3D effect. What are the limitations for preparing the samples for SEM? How to clean, dehydrate or fix the specimens? This presentation is aimed especially at preparing of the beetle larvae for the SEM, with some of the tips and specific methods how to clean and dehydrate the specimens to be examined.

Larvae of Mastigini (Staphylinidae: Scydmaeninae): morphology and biology

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The immature stages of only about 0.4% of all known species in the large staphylinid subfamily Scydmaeninae have been described so far. However, already this tiny fraction of known larvae shows an astounding diversity of body forms and structures, making scydmaenines unique among Staphylinidae. Many onisciform larvae in this group are presumably a result of a strict specialization toward feeding on armoured oribatid or uropodine mites. The feeding technique used by these scydmaeninae larvae requires curling around the ovoid prey, which is better attained if the predator's body is broad, short and flattened.

Some scydmaenine larvae, however, have retained a presumably ancestral, staphylinine-like body form, and these typically represent non-specialist, opportunistic predators. The tribe Mastigini, distributed in the Mediterranean basin and in South Africa, is one of such groups. The larvae of Mastigini are elongate and subcylindrical, with extremely long legs and antennae. The second and third instars of *Stenomastigus* and *Palaeostigus* show uniquely modified antennae, which are composed of five and not three antennomeres. This is a result of a subdivision of the antennomere II into three secondary subunits, a phenomenon not known in any other Staphylinidae. Another unusual character of the Mastigini larvae is an "evaporation apparatus" on the frons, a structure composed of a dense patch of modified setae located over a pair of glandular openings; its function remains unknown. Mastigini are also characterized by larvae with sternal plates subdivided into several paired sclerites, lack of urogomphs, a broad spectrum of variously shaped microtrichia and modified setae on their cuticles, and long spines on the antennae.

Despite apparently specialized structures (spiny and extremely long antennae, frontal glands with the "evaporation apparatus"), it was demonstrated that the larvae of Mastigini, like the adults, are non-specialized predators that rely primarily on their palps in recognizing the prey. Therefore the function of antennal and cephalic modifications, previously hypothesized to be used in prey capture, remain unknown.

Cerambycid larvae collected during the entomological expedition to Mongolia 2015

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About 10 different species of cerambycid larvae from entomological expedition to Mongolia with photos of their feeding grounds and habitats are presented and disscused. The larvae were collected from various host plants (e.g. *Caragana* spp., *Betula platyphylla*, *Larix sibirica*, *Salix* spp., *Prunus* sp., and *Padus* sp.) in various habitats like taiga or semi-desert zone. The material was preserved at the place. Poisoned with ethyl acetate larvae had been flooded with boiling water, then placed in a vials filled with Pampel's Fluid.

The material was initially determined by authors to the following species or genera: *Saperda* sp. (probably *S. scalaris hieroglyphica* (Pallas, 1773)), *Anoplistes* spp. (probably two species including *A. halodendri* (Pallas, 1776)), *Oberea* sp., *Mesosa myops* (Dalman, 1817), *Xylotrechus* cf. *pantherinus* (Savenius, 1825), *Leptura thoracica* Creutzer, 1799, and *Lepturalia* cf. *nigripes rufipennis* (Blessig, 1873). We were able to determine three taiga species from *Salix*, *Prunus*, and *Padus* only to a subfamily level (Cerambycinae), and they need a further determination.

Description of the larva of *Paraselenis* (*s. str.*) *normalis* (Coleoptera: Chrysomelidae: Cassidinae: Mesomphaliini): morphological changes related to the maternal care

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Cassidinae comprises around 6,319 species distributed worldwide and it is the second largest subfamily in Chrysomelidae. The species are phytophagous and there is a broad spectrum of host plants recorded. Cassidine larvae may be leaf-miners or exophagous feeders. Tortoise beetle larvae are usually exophagous, feeding on eudicots, their body is oval and there are lateral projections on the thorax and/or abdomen, called lateral scoli. At the end of the abdomen there is a long supra-anal process, which carries faeces and/or exuviae in order to provide a mechanical and chemical protection to the larvae.

The immature stages of many Cassidinae species are still unknown or poorly described. In the cassidine clade, only 254 (8.3%) of the species are described or illustrated, mainly the last instar larva. For the tribe Mesomphaliini, that comprises around 553 species, immatures of only 33 species have been described, most of them only superficially, except for three species. For *Paraselenis*, the only larva described is *P.* (s. str.) *axillaris*, but it is a superficial description of the last instar larva. *Paraselenis* is one of the three genera in Mesomphaliini with maternal care. This defensive behavior is probably responsible for the huge morphological changes in the larvae of the species with maternal care.

Compared with the other larvae of Mesomphaliini without maternal care, *Paraselenis* larva has lateral scoli reduced in size and number, also the supra-anal process is shorter. Other features are setae on the head and dorsal side of the body reduced in size and number. The eyes are proportionally smaller. The only larvae described with maternal care are *Acromis spinifex* and *P.* (s. str.) *axillaris*. Since none of these descriptions are detailed, the only difference observed between *Acromis* and *Paraselenis* larvae is the number of lateral scoli, which are eight and ten, respectively.

About homology of *Haliplus* Latreille, 1802 larvae postanal process (Coleoptera: Haliplidae)

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Haliplus larvae are characterized by long postanal process, often forked at the tip. This process was interpreted as partially fused urogomphi (Vondel 2004, 2005, 2011, etc.; Beutel et al. 2011), or modified cerci (Jaboulet 1960). According to Seeger (1971), Spangler (1991) and Lawrence & Ślipiński (2013), abdominal segment X is expanded posteriorly forming a median process.

We have studied the structure of the terminal segment of the larvae of *Haliplus* s.str. and *Liaphlus* spp. on the series of sections 10 and 20 µm, stained with Mayer's haematoxylin.

Muscles of abdominal segments in *Haliplus* consist of muscle bundles that do not form bands or layers. The complexity of the muscular system of *Haliplus* is far inferior to that of the larvae of Dytiscidae (Speyer 1922) and approaches to the minimum set of muscles, known for smallest larvae of Ptiliidae (Grebennikov & Beutel 2002, Polilov & Beutel 2009).

In the abdominal segment VIII–IX *M. dorsales interni mediales* and *M. ventrales interni mediales* (nomenclature of muscles after Kemner 1913) are well developed, originating from the phragma and attached to the edge of the next segment. Typically, each of these muscles is represented by two pairs of bundles. Working as antagonists, they provide flexion and extension of the abdomen in the sagittal plane. External longitudinal muscles are absent.

Dorsoventral muscles of the segments are represented by two groups with different functions: oblique *M. urotergosternales interni* provide lateral flexion of the abdomen and, in part, act as synergists of longitudinal muscles; transverse *M. tergosternales externi* act as depressors of the segment. Each group of dorsoventral muscles is also represented by several bundles, so that the bundles of oblique muscles are able to act as their antagonists.

Musculature of the abdominal segment X is represented by 3–4 bundles of muscles, which originate on the dorsal surface and are inserted at the edges of the anal area. Anal area of *Haliplius*, like other cuticle, is strongly sclerotized and represented by two lobes bearing paired apodemes. Paired distal muscles (homologs of dorsal retractor – *M. retractores ani dorsales*) are attached to these apodemes, as well as 2–3 pairs of proximal muscles, interpreted by us as ventral retractors (*M. retractores ani ventrales*, *M. retractores bursarum analium*). Musculature of abdominal segment X in Adephaga larvae is formed exclusively by longitudinal muscles – the retractors of the anus, anal camera, or eversible appendages (Kemner 1913). Thus, it can be assumed that the longitudinal axis of abdominal segment X in *Haliplus* is heavily tilted, takes an almost vertical position and does not coincide with the axis of the postanal process, occupying the terminal position. Therefore, this postanal process should be considered as outgrowth of the dorsal surface of the segment X, not homologous to urogomphi or cerci.

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The intertidal larva of a new species of *Micronaspis* (Coleoptera: Lampyridae) from Northeastern Brazil

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The monotypic firefly genus *Micronaspis* Green, 1948 (Lampyridae: Lampyrinae: Cratomorphini) is renowned by its intertidal immature stages. *Micronaspis floridana* Green, 1948 is reported for southern Florida, U.S.A. The new species inhabits rocky shores of the Serra Grande beach, Bahia, part of the Atlantic Rainforest biome of the Neotropical Region. GREEN (1959) distinguished *Micronaspis* from other lampyrid by pronotum not alutaceous, without median carina, prosternum distinctly emarginated medially and clypeus not connate with frons. The knowledge concerning immature stages of Lampyridae is still insipient and information about ontogeny of *Micronaspis* remains scanty. This study aimed to describe the larva of a new species collected on three campaigns in the rainy season from December 2014 to March 2015, deposited in Entomological collection Professor José Alfredo Pinheiro Dutra, Universidade Federal do Rio de Janeiro, and comprising 50 larvae. The larva of a new species of *Micronaspis* is distinguished by head with 2 vitreous areas convergent posteriad, each one as wide as antennomere II and strongly indented on the posterior margin; coronal suture almost reaching epicranial suture; stemmata moderately developed; antennomere I robust and membranous; mandibles symmetrical, narrow, sickle with apex weakly curved, with a fringe of bristles covering 2/3 of the mandible, and a duct opening externally, near to the apex; labial palp two-segmented, I globular, sclerotized and with distal bristles, II apically narrow; prothorax trapezoidal, 2× longer than wide, anterior margin slightly emarginated; abdominal terga I–VIII with four tubercles, two on the median posterior margin that is half than the pair on the posterior angles; abdominal sterna with a pair of setae in the posterior third. Here, we provide characters to distinguish the known larvae of the Cratomorphini, and report *Micronaspis* for the first time in South America. This is the first step towards a taxonomic review of the genus.

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Morphology and ecology of Central European species of Lampyridae (Coleoptera)

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From approximately two-thousand known firefly species, only three occur in the Czech Republic. While the descriptions of the adult morphology of *Lampyris noctiluca* (Linnaeus, 1767), *Lamprohiza splendidula* (Linnaeus, 1767) and *Phosphaenus hemipterus* (Geoffroy, 1762) are fairly known, the descriptions of their larval morphology are out-dated and detailed information regarding their ecology is either scattered or missing. The work presented provides detailed re-descriptions of mature-instar larvae of the three abovementioned species, together with photographic documentation. A general and a detailed key to Central European lampyrid larvae is compiled and provided in this work too. Habitus macrophotography are included, together with detailed images from scanning electron microscope. Information about life history, ecology and behaviour is then summarized for each of the species and correlated with the morphological features observed. All three lampyrid species of the Czech Republic occur sympatrically, but differ greatly in their morphology. The differences, next to general body shape, colouration, and position of photic organs, lie mainly in different types of setation, pattern of sensory organs on head appendages, morphology of mandibles and maxillae and many other small details described in the presented work. The significance of various morphological modifications is discussed in regard to the ecology of each species.

On some Permian and Triassic larvae of Holometabola: Beetles or not?

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So far there is little data about the early differentiations of Holometabola, particularly at larval stage. The oldest known larva of Holometabola – *Metabolarva bella* Kirejtshuk et al., 2013 (Nel et al. 2013) was described from the Carboniferous (Piesberg querry, Osnabruk Formation, Moscovian). Recently *Cavalarva caudata* Aristov & Rasnitsyn, 2015 was described as a holometabolan larva from Tshekarda (Uppermost Lower Permian, Kungurian), which have the 7-segmented abdomen bearing a pair of long multi-segmented caudal threads and legs with paired claws (Aristov & Rasnitsyn 2015), although it could, indead, present an adult of a group near *Permothemis* Martynov, 1932 (Palaeodictyoptera) without preserved wings. In the same outcrop other holometabolan larvae were found. At least two types of larvae

represented in these materaials – campodeiform with long walking legs (PIN1700/2204, 2206, 2207, 2208) and one print of eruciform larva or exuvium with short legs and setose area around anus (PIN1700/3188). Adults of the only coleopteran Tshekardocoleidae were recognised among mature holometabolans from Tshekarda, but also members of extinct Palaeomanteidea (Miomoptera), Glosselytrodea (Jurinida), Parasialidae and some Neuroptera and Mecoptera. Each of the mentioned groups can be a candidate to which the available larvae from the same outcrop belong. There is a small probability that both types of larvae could represent larval stages (disperal and feeding) of the same group (for example Tshekardocoleidae). In the latter case hypermetamorphosis could be interpreted as an initial type of development of the order Coleoptera, with further changes of this complex development in derived subgroups resulting in other types of development, and with some possible recurrences to the initial type in Archostemata and Polyphaga (and probably Strepsiptera).

In outcrops dated beginning from the Middle Permian to Upper Triassic, several holometabolan larvae showing structures characteristic of the two orders (Megaloptera and Coleoptera) were recorded. The known Middle Permian larva from Kargala (Russia, Orenburg Region; Middle Permian, Urzhumian Stage) treated as "*Permosialis*"* was recorded by Sharov (1953) as Megaloptera, recently transferred into Coleoptera (Gyrinidae) by Beutel & Roughley (1988) or Schizophoroidea (?Rhombocoleidae) by Prokin et al. (2013). This larva of the "Corydalidae"-type with the pygopods have the separate triangulate "Sialidae"-type labrum and mandibles with several teeth (occurred in Megaloptera). On the other hand, this larva is also with the narrow elongate head and narrow pronotum, which is narrower than both mesonotum and metanotum (which is more characteristic for Coleoptera). Aquatic larvae of "Corydalidae"-type as "*Permosialis*" and also of "Sialidae"-type are known from the Middle Triassic of Voltzia Sandstone. In the Upper Triassic of Coburger Sandstein (Middle Keuper, Upper Carnian) was also collected the "Sialidae"-type larva, which could belong to Coleoptera. In all localities mentioned above, Megaloptera are very rare or absent while Coleoptera are rather numerous. The known Jurassic and Cretaceous megalopteran larvae were characterized by a complex of structural features less specialized than those considered in the Permian and Triassic ones. Therefore, it seems to be more plausible to assume attribution of these larvae to Coleoptera rather than Megaloptera. The superfamily Schizophoroidea as probable relatives of Myxophaga and Adephaga seems to be the most probable taxon to include them. Materials of this presentation will be published in a further paper of the authors (Prokin et al., in prep.).

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First immature description of *Hylotribus* Jekel, 1860 (Coleoptera: Anthribidae) from Chile, with comments of genus distribution and phylogeny

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The genus *Hylotribus* Jekel, 1860 comprises 15 species, eight from Chile, one from Peru and six recently described from Brazil (Queiroz & Mermudes 2014). The knowledge of the immature stages is incipient, only one larva was found and it is here described. According to the papers of Elgueta et al. (2006) and Elgueta & Marvaldi (2006), the species of *Hylotribus* from Chile are found in the canopy of *Nothofagus* and were collected by fogging. In this work, the larva of *Hylotribus lineola* (Philippi & Philippi, 1864) is described, adding information about the morphology of immature stages of the family that can be subsequently used in phylogenetic studies. The larva was associated with an adult and it was collected in fungus.

In Chile and Argentina, the temperate flora from Andes is composed by forests of *Nothofagus* and *Araucaria*, meanwhile in Brazil the temperate flora is only found in high altitude regions of Atlantic Rainforest, characterized by the single species of pine that occurs in Brazil, *Araucaria angustifolia*. Despite the lack of information of the associated plant with the species of *Hylotribus* from Brazil, those species occur in sympatry with *Araucaria angustifolia* which may suggest that *Hylotribus* is associated with the temperate areas of South America. For the single species of *Hylotribus* that is found in Peru, *Hylotribus aspis* (Erichson, 1847), Queiroz, Elgueta and Mermudes (unpublished data) propose that it is from a different genus, *Piesocorynus* Dejean, and it will be transferred there and synonymized. These data reinforce the association between the Chilean and Brazilian species with a temperate flora which may have occupied the South region of South America.

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Evaluation of head capsule width in larvae of *Platycerus caprea* (De Geer) and *P. caraboides* (Linnaeus) (Coleoptera: Lucanidae)

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Platycerus caprea (De Geer, 1774) and *P. caraboides* (Linnaeus, 1758) occur throughout Europe, West Asia, and North Africa; they are widespread in Italy from Alps to Apennines, while no data are available for Sicily and Sardinia (and Corsica). Larvae of both species feed on decaying logs of hardwood in deciduous forests. *P. caprea* usually lives in the lowlands and in the mountains (Holuša et al. 2006), while *P. caraboides* in the hills and mountains at low and medium altitudes (Franciscolo 1997). *Platycerus* larvae show typical lucanid larva features (Lawrence 1981).

In order to investigate morphometric characters useful for specific discrimination between the larvae of these two species, head capsule width in different instars was evaluated. A total of 85 specimens were collected in several localities in northern Italy from August 2013 to April 2015. In detail, 44 *P. caprea* larvae (1st instar: 0 specimens; 2nd instar: 7; 3rd instar: 37) were collected in decaying wood of *Fagus sylvatica*, *Quercus* spp., and in other trees; 43 *P. caraboides* larvae (1st instar: 2 specimens; 2nd instar: 5; 3rd instar: 36) were collected almost exclusively in decaying wood of *Castanea sativa*. In the present study the width of the head capsule was compared between both species for the available instars. The measurement was made on both living and dead larvae, by using a gauge. Normal distribution of data was tested, according to Zar (2010), by using Kolmogorov-Smirnov and Shapiro-Wilk tests, and one-way ANOVA test was used for the same larval instar to infer the differences in head capsule width between these two species.

This research provided interesting data on the morphometric distribution of head capsule width in some larval populations; moreover, this character could be used for specific identification of the two species. Statistical analysis demonstrates that data are normally distributed, and one-way ANOVA test suggest that the head capsule width in *P. caprea* third instar larvae is smaller than in *P. caraboides*. The same can be inferred for second instar larvae. This is in contrast to the data by Hůrka (1975) who, basing on a smaller number of specimens, reported that the head capsule width in *P. caprea* is larger than in *P. caraboides*, for both second and third instar. It could be possible that populations in distinct areas are different in head capsule width, so this "aleatory" character could be considered in species discrimination only for populations with known morphometric data for the area. Currently the most usefulable characters in species discrimination are located on their antenna, stridulatory apparatus on legs, anal pad, and raster. Further studies should be conducted to evaluate the morphometric distribution of head capsule width also in other populations.

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Larval development of *Eucoeliodes mirabilis* (Coleoptera: Curculionidae: Ceutorhynchinae) with description of its larva

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Weevil larvae (Coleoptera: Curculionoidea) usually lead an endophytic life, however, some weevil groups live ectophytically (Oberprieler et al. 2014). Endophytic/endophagous larvae, either living in soil or inside plant tissues, are legless and largely sedentary, while ectophytic and ectophagous larvae live exposed on aerial parts of plants and are adapted to moving on plant surfaces by means of ambulatory ampullae, pedal lobes or creeping soles (Oberprieler et al. 2014). In Central Europe, ectophagous and ectophytic larvae occur in the tribes Bagoini, Cionini, Hyperini, Phytobiini and rarely Ceutorhynchini, feeding on leaves or flowers (Scherf 1964, Dieckmann 1972, Oberprieler et al. 2014). Ceutorhynchini live mainly endophytically (Prena et al. 2014), and until today, one known exception has been *Ranunculiphilus faeculentus* (Gyllenhal, 1837), with ectophytic larva feeding on terminal bud (Wanat 2011).

We bring new data on ectophagous and ectophytic larval development of another weevil of the tribe Ceutorhynchini, *Eucoeliodes mirabilis* (A. & G. B. Villa, 1835), on the basis of field and laboratory observations in southern Moravia (Czech Republic). *E. mirabilis* belongs to rare weevils of Central Europe associated with *Euonymus europaeus*. Larvae were observed feeding ectophytically at the lower surface of the leaves. Larval feeding marks are first superficial, later producing "windows" and holes. The larvae are protected by a mucus shield and a dark substance reminding excrements (= "fecal shield"). Larval morphology of *E. mirabilis* (mainly structure of cuticule and its chaetotaxy) is adapted to this life style. Pupation was observed in a few specimens during rearing experiments. The larvae pupated on the surface of the sand which covered bottom of the rearing dish. It is strange that the pupae were free, without any additional protection, e. g. cocoon or earthen cell. Whether this "unprotected pupation" occurs in larvae under natural conditions, must be a subject of further study. Ectophytic life of larvae is relatively rare in case of Palaearctic weevils, and is restricted to species of a few tribes. More typical is for some other phytophagous Coleoptera, such as some groups of Chrysomelidae (LESCHEN & BEUTEL 2014), but these new data shows that it could be more used also in weevils.

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Pupal morphology of the subfamily Brontinae Erichson (Cucujoidea: Silvanidae)

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The subfamily Brontinae Erichson includes two tribes, Brontini Erichson and Telephanini LeConte. The adult of former can be distinguished from the adult of latter by the posteriorly opened procoxal cavities, the wide intercoxal process of pro- and mesocoxae, and the not lobed 3rd tarsomere (THOMAS & NEARNS 2008). The former inhabits subcortical environment, whereas the latter inhabits plant debris, although both taxa are thought to be fungivorous and possess mycangium on each basal mandible in adults (THOMAS 2002). However their ecological information is poorly known. Pupal morphology of only one species of Brontini (*Dendrophagus crenatus* (Paykull): WHITE (1872)) and only two species of Telephanini (*Cryptamorpha brevicornis* (White): HUDSON (1924) and *Psammoecus scitus* Yoshida & Hirowatari: YOSHIDA & HIROWATARI (2015)) have been described, and the detailed morphology was not described in the descriptions of early era.

In this study, we revealed the pupal morphology of three genera of Brontini (*Macrohyliota* sp., *Megahyliota* sp., and *Uleiota arboreus* (Reitter)) and telephanine *Cryptamorpha desjardinsi* (Guérin-Menéville). We also observed their behavior and obtained some new ecological information of them. We provide descriptions of these pupae and morphological differences among them. In addition, we discuss their possible synapomorphies and evolutionary implications based on behavior observations and their morphology.

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POSTER PRESENTATIONS

Postabdomen morphogenesis in the stage of prepupa in carabids: the first results

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Larval abdominal segmentation in carabids, like in most Coleoptera, is well-known to nearly fully follow germ bud segmentation (KEMNER 1918, MATSUDA 1976, TIKHOMIROVA 1991, KOBAYASHI et al. 2013). In contrast, the pupal abdomen is similar in structure to the abdomen of the imago and carries differentiated genitalia (KIRCHNER 1927, JEANNEL 1941, STURANI 1962, DI GIULIO et al. 2007). It is obvious that the most important stage of morphogenesis related both to the formation of an external genital apparatus and to the differentiation of the abdomen into a pre- and a post-abdomen coincides with the latest period of larval development, i.e. a prepupal stadium which remains inside the pupal chamber. These transformations occur concealed under the larval cuticle, being very poorly studied in the beetles in general (KERSCHNER 1913, SINGH-PRUTHI 1924a,b) and completely unknown in carabids. In addition, much of the available information is based on studies of untypical morphogeneses affected by juvenile hormone analogues and such like (Tikhomirova 1991, Konopová & Jindra 2008, Lee et al. 2013), thus rendering their interpretation problematic.

Larvae and pupae of *Poecilus* (s. str.) *versicolor* (Sturm, 1824) and *P.* (s. str.) *reflexicollis* Gebler, 1830, obtained in the laboratory between 1.06.2015 and 27.08.2015 at 22–24°C and LD 16:8, served us as study material. Stages of prepupal morphogenesis were evaluated based on the shape and position of pigmented eye spots: these latter separated from the eye tubercle and shifted proximad to reach the prothorax border, at which stage a molt ensued. Since the duration of a prepupal stadium differed in both species, it was the position of the pigment spot that comparisons between the stages of morphogenesis were based upon.

In the beginning of prepupal morphogenesis, when the pigment spots were located in the postocular furrow area, segments IX and X retained a size and a structure typical of the larva, but the ventral area of segment IX showed genital system anlage.

The middle stage of morphogenesis, when the pigment spots were located between the postocular and occipital furrows, was characterized by the appearance of external genitalia on sternite IX, while the ducts of the genital system grew differentiated and considerably elongated. The proportions of the urogomphi and segments IX and X remained almost unchanged.

In the final stage of prepupal morphogenesis, when the pigment spots were placed proximal to the occipital furrow, both urogomphi and segment X became considerably shortened, and the genitalia differentiated to show clear distinctions between the sexes.

Further on, in the pupal stage, the urogomphi went on shortening, segment X was diminished in size and invaginated inside segment IX, whereas, in contrast, both VII and VIII expanded to attain a structure typical of an imago.

The above observations allow for a few conclusions to be drawn: (1) in the course of metamorphosis, segment X is gradually reduced to take no part in the formation of a genital system, this observation contradicting those of Jeannel (1941) and Snodgrass (1957); (2) external genitalia are derived from sternite IX alone, their relations to pleurites or tergites IX (Verhoeff 1918, Bils 1976, Deuve 1993) being refuted; (3) there is no evidence whatever for the external genitalia being derived from extremities (Singh-Pruthi 1924a, Dupuis 1950, Metcalfe 1932, Matsuda 1976, Bils 1976); (4) our data confirm the hypothesis that the male aedeagus in Carabidae is a new formation (Sharp & Muir 1912, Matsuda, 1976).

There is no question that the above information is provisional and requires verification using other species, first of all those which represent basal subgroups of the family.

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External morphology of *Platycerus caprea* (De Geer) and *P. caraboides* (Linnaeus) larvae (Coleoptera, Lucanidae): discrimination concordance and discordance

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Platycerus caprea and *P. caraboides* (Coleoptera, Lucanidae) larvae are similar, but the discrimination of the species is possible analyzing *in primis* some characters of the antenna, pars stridens, raster, and anal pad. While the first two features can be useful in the identification of the species, it is noticed that other peculiarities are often discrepant. Thus, further studies on external morphology of *P. caprea* and *P. caraboides* larvae are necessary. Statements are supported by original photos of Italian specimens, taken with a stereomicroscope.