

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-description 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 quarry, Osnabruck Formation, Moscovian). Recently *Cavalarya caudata* Aristov & Rasnitsyn, 2015 was described as a holometabolan larva from Tsherkarda (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, indeed, 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 materials – campodeiform with long walking legs (PIN 1700/2204, 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 (dispersal 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 holometabolans 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 “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.).

^{*}**Note.** The genus *Permosialis* was proposed for the adults of Hypoperlida (MARTYNOV 1928) from Permian (Tikhie Gory, Roadian) and later transferred to Miomoptera by RIEK (1976).

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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 genera immature is incipient, only one larva was found and it is here described. Accordingly 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 a larvae of *Hylotribus lineola* (Philippi & Philippi, 1864), adding information about the morphology of immature stages of the family, that can be posteriorly be 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 bushes 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 is from a different genus, *Piesocorynus* Dejean, and it will be transferred and synonymized. These data reinforce the association between the Chilean and Brazilian species with a temperate flora which that may have occupied the South region of South America.

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