

Summary:

The immature stages of holometabolous insects are traditionally less studied than the adults. Albeit this neglect could be explained by the still unsatisfactory knowledge of adults, it is clear, that we lose a considerable amount of information on bionomy, ecology and also phylogeny of insects due to this constant ignorance.

The thesis focuses on the immature stages of the very popular and widely known group of Scarab beetles (Coleoptera: Scarabaeidae), more precisely on the “pleurostict” or phytophagous scarab beetle clade, e.g. on larvae of various chafers, rhinoceros beetles or flower beetles. The work consists of three papers already published in international journals, one manuscript prepared for submission and a general introductory chapter focusing on the problematic aspects of scarab beetles phylogeny and the study of the immature stages of scarabs.

As mentioned above, the Scarab beetles represent a widely know group of insects. Despite being so popular, the group is everything else but well studied (probably with the exception of alpha-taxonomical level), which is best demonstrated by the absence of a broadly accepted phylogenetical hypothesis of the whole group. In the first two papers included into the thesis we focused on the phylogenetic relationships within the group Cetoniinae (with the three traditionally recognized groups: Cetoniini, Trichiini and Valgini) based on morphological characters of larvae and adults. Both papers were based on almost similar set of characters and taxa, however the matrix of the second paper was much extended in number of taxa and characters included in the analysis. The results of both analyses corroborate the monophyly of Cetoniinae (sensu lato), however they don't correspond with the traditional concepts of the within group classification. Perhaps the biggest deviation from the classical scheme is the recovery of the paraphyletic Trichiini. The former Trichiini subtribes *Osmodermatina* and *Incaina* have been consistently recovered at the base of the Cetoniini clade, whereas the subtribes *Trichiina* and *Cryptodontina* along with Valgini formed the second clade of the three. The subtribe *Cryptodontina* was moreover recognized as sister group to the Valgini. Based on the proposed phylogenetic hypothesis of Cetoniinae we consider decayed wood to be ancestral food source for larvae with the subsequent shifts to plethora of decomposing organic matter like dung, humus or rich soil. Also the fourth paper included into the thesis focuses on the phylogenetic relationships of pleurostict scarabs. It discusses the position of

the Euchirinae, an enigmatic group of scarab beetles, classified either as a member of Melolonthinae or as a separate subfamily of Scarabaeidae. The results of our analyses support more or less the second option; however the problem cannot be solved without a comprehensive and exhausting analysis of the whole phytophagous scarab clade.

When evaluating the relative information value of larval and adult morphological characters we found, that analyses based on larval data have provided results about two times more consistent with the combined larvae + adult analyses, than analyses based only on adult morphological data. Both larval and adult datasets often yielded contradictory results.

Beside the above mentioned phylogenetical studies, the thesis contains original descriptions or re-descriptions of the immature stages of the following taxa: *Coleocorynus opacicauda* Arrow, 1926 and *C. desfontainei* Antoine, 1999 (paper II); *Dicronocephalus wallichii bouringi* Pouillaude 1914 (paper III); *Cheirotonus formosanus* Pouillaude 1914, *Propomacrus bimucronatus* (Pallas, 1781) and *P. cypriacus* Alexis et Markis, 2002 (paper IV). It also contains comments on ecology and bionomy of the described taxa. The most interesting ecological finding is perhaps the description of the “nesting” behavior of *Dicronocephalus wallichii bouringi* Pouillaude 1914 and *D. adamsi* (Pascoe 1863). The females of these species prepare clutch of torn leaves below the surface of soil, in which they lay a single egg. Similar behaviour is common in several groups like Bolboceratidae, Lethrinae, Geotrupinae, Aphodinae or Scarabaeinae, but with the sole exception the rhinoceros beetle *Strategus antaeus* (Drury 1773) was not observed in the phytophagous scarab clade.