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Review of Ph.D. thesis***Taxonomy and ecology of Neotropical Cassidinae (Coleoptera: Chrysomelidae)*****by Lukas Sekerka**

The presented Ph.D. thesis was done in University of South Bohemia in České Budějovice Faculty of Science under supervision of Doc. RNDr. Oldřich Nedvěd Csc. This thesis consists of comprehensive review along with series of nine published papers which present the results of studies on the systematics and biology of Neotropical Cassidinae and current state of knowledge of all tribes of this family occurring in the Neotropics.

The presented in thesis information is an result of author's long term research on Neotropical Cassidinae in various countries in Central and South America and study of extensive type material deposited in numerous institutions. The author's research could be carried out with financial support of the Faculty of Science, University of South Bohemia; Grant Agency of the University of South Bohemia (081/2010/P); the Smithsonian Tropical Research Institute (Short Term Fellowship); the Natural History Museum in London (Special Funds to M.V.L. Barclay); the Ministry of Culture of the Czech Republic (DKRVO 2013/12, 2014/13, 2015/14, 2016/14, National Museum, 00023272); and the Synthesys Programme of the European Union (DE-TAF-3898, DK-TAF-2164, FR-TAF-4937, GB-TAF-3616, SE-TAF-3623).

In the review of Ph.D. thesis Lukas Sekerka summed up the current state of knowledge on Neotropical Cassidinae. Presented information come from published papers as well as from numerous unpublished observations which were made by author himself. The review is composed of three introductory Chapters (*Introduction, Tribal classification within the group, Immature stages and their importance for tribal classification*) followed by Chapter *Overview of Neotropical tribes of Cassidinae* where are gathered information about diversity, biology, larvae, diagnostic characters which are accompanied by additional comments for each of 19 established Neotropical tribes (in *Foreword* and *Summary of Ph.D. thesis*, by mistake was mentioned 18 tribes). The review is ended by Chapter *Conclusion* followed by Chapters *References* and *Plates*.

Lukas Sekerka perfectly knows the literature on the subject of research. In the *Introduction* Chapter, he discussed the systematic position and monophyly of Cassidinae. Based on literature data and personal study the problem of division of cassidinae beetles into two subfamilies (Cassidinae and Hispinae) is discussed and author concludes that the division of this group of beetles into two subfamilies is unfounded and former two subfamilies are polyphyletic. He agree with previous hypotheses that cassidinae and hispine beetles should form a single monophyletic subfamily. He also discussed the problem of the sister group for Cassidinae and difficulties associated with the placement of the clade Cassidinae on the phylogenetic tree of Chrysomelidae. The most valuable part of the Chapter *Introduction* is critical analysis of the characters used by other authors to the classification of cassidine beetles like position of mouth part, approximate antennal insertions, tarsi with only four visible tarsomeres etc.

The next two chapters partly based on literature data and partly on personal observations and the results of personal researches. Chapter – *Tribal classification within the group* presents review and current classification within Cassidinae whereas in Chapter *Immature stages and their importance for*

tribal classification the Author in addition to data from the literature on host plants gave his proposed classification of the basic types of larvae known in Cassidinae and discussed proposed division of tribes of Cassidinae in the two main groups using the combination of larval and adult morphological characters.

Fourth Chapter *Overview of Neotropical tribes of Cassidinae* is very important because contains many unpublished data collected by the author and his proposals of taxonomic decisions and, without a doubt, it is the most valuable part of the reviewed thesis. As the author presented, the degree of knowledge of the biology of Cassidinae as well as their host plants is still at a very low level (for less than 10% of the species we known host plant association and for less than 5% we have published information on life history or immature stages), thus any additional information in this area are extremely valuable.

The results of Lukas Sekerka researches were also published in a series of nine original articles. The series consist of:

(1) paper with synonymization of two species – *Plagiometriona forcipata* and *P. emarcida* – based on combined morphological, biological and genetic studies, (2) paper devoted to two new species of *Plagiometriona* from Bolivia with their biological data, (3) third paper contains description of new species of *Cephaloleia* with its larva and biological data, (4) fourth paper is a revision of the genus *Cladispa* and reassignment of the genus to the tribe Spilophorini with description of larva and biological data, and molecular classification of several hispinae genera (5) fifth is a review of Immatidiini genera with a lot of nomenclatorial and taxonomic changes, (6) sixth paper contains redescription of *Heteronychocassis acuticollis*, (7) review of Fabrician types of Cassidinae deposited in the Natural History Museum (with proposed nomenclatorial and taxonomic changes) are in seventh presented paper, (8) when in eighth is a review of subgenera of *Charidotella* Weise with description of a new subgenus and species from Brazil, (9) last, ninth paper, contains a review of the Neotropical leaf beetle subgenus *Dorynota* s. str. Chevrolat.

All these papers are of a very good quality and were published in important entomological and taxonomical journals indexed by ISI. Particular emphasis is given the fact that some of this work combine the morphological, biological and genetic studies. This allows to verify the taxonomic and systematic hypotheses at the highest level.

It is especially valuable that the author in his research came and studied most of the available type and non-type materials from the New World. This demonstrates a reliable approach to the research.

Many papers presented by Lukas Sekerka were published in co-authority with several authors from various countries. This demonstrate the important teamwork skills, ability to plan and coordinate joint work both in the field and in the laboratory.

Conclusion

Extensive studied material and challenging themes, from which the candidate really did well indicates that he is already fully formed scientist worthy of a doctoral degree.

The thesis is written very clearly, logically, in a good English style. The reference list is completed and accurate; literature is properly quoted in the main text. Figures are well designed and clearly labelled.

In sum, my impression of presented Ph.D. thesis is very positive thus in my opinion, the presented thesis fulfils all requirements for gaining the Ph.D. degree in biological sciences; therefore it is recommended.

Questions

How to solve the problem with finding of the sister group for the family Cassidinae. Do the Candidate has a research idea, which could lead to a solution of this problem? Is possible to use in such studies morphological characters of immature stages?

Is knowledge of host plants useful in phylogenetic reconstruction and classification of the subfamily Cassidinae?

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Opponent's Review. Thesis title: Taxonomy and ecology of Neotropical Cassidinae (Coleoptera: Chrysomelidae) by Lukáš Sekerka

Thesis of Lukáš Sekerka consists of two parts: review and published papers. First part (82 pp.) is a detailed introduction, providing overview of the classification and biology of the tribes of Neotropical Cassidinae. After a short general intro, overview of a tribal classification is provided, summarizing recent approaches on classification of the group (incl. combination of the subfamilies Cassidinae s. str. and Hispinae in the classical sense). Body forms of immature stages are briefly summarized, with focus on first instar larvae, linking the different larval types (eruciform, onisciform or mining) with biology of the beetles.

This is followed by detailed account of all 19 tribes of Cassidinae, distributed in the Neotropical Realm. For each tribe, information is provided on general diversity of the group, biology and host plants, diagnostic characters of adults and also larvae (when available), eventual fossil records, known links with Old World taxa, and various remarks on current taxonomy of the group. All is illustrated on 12 plates, demonstrating habitus of selected adults and immature stages as mentioned through the text. Short Conclusions point out some future questions to be studied in classification and biology of the group.

Second part contains nine selected papers, published in IF journals, documenting various aspects of taxonomy, phylogeny and biology of Neotropical Cassidinae. This has almost 200 pp.

Structure of the **review** is quite clear. I would only appreciate more explicit formulations of questions of the thesis in the text. Already p. 2 of the text contains detailed discussion about the orientation of mouthparts in adults of various groups within Cassidinae, but without link to the general questions. So, as a non-specialist in Chrysomelidae, I am slightly confused why just this question is discussed after a few general intro lines.

The information in the review clearly demonstrates that Lukáš is able to combine extensive field work with subsequent processing of the samples. He has good general knowledge about existing problems in the classification of the group, and is able to place his results into more general framework. Also, he is able to put information on biology of the species (host plants associations, details on feeding strategies of different groups, behaviour of larvae etc.) and morphology of immature stages into evolutionary context.

The text is written in clear and concise English, with minimum of typos and confusing formulations (but e.g. check 3 vs. 4 spp. mentioned on bottom of p. 10). I appreciate also the formulation in the Foreword, making the reprinted new names unavailable in the sense of ICZN, preventing the possible confusions to treat them as valid and creating here the junior homonyms of already published names.

Also, I would recommend shorter number of selected papers to be included in the **second part**, as the thesis has almost 300 pp. (B6 format) in total. This is not an easy reading! I am more used to theses containing 3–4 carefully selected papers, clearly linked with a general question defined in the introduction.

Here, the papers illustrate different skills of Lukáš: he is able to perform standard taxonomical studies, focused on a close group of species (usually within a single genus) [e.g. Chapters I, II, VI, IX], providing a revision of a genus-group taxon and linking it with phylogeny and distribution of the group [e.g. Chapters IV, VIII, IX] up to a review of tribal classification [Chapter V]. Also, he is clearly able to apply complicated rules of ICZN and link taxonomy and nomenclature, when applied to classical species-group taxa named by Fabricius in late 18th century, but affecting the stability of several common species up to recently [Chapter VII]. Some papers cross the descriptive form to synthesize biological information with morphology of adults and immature stages [e.g. Chapters I and III].

I have the following **question**: HOLT et al. (2013, *Science* 339) updated the traditional zoogeographical realms and proposed a division of the traditional Neotropical Realm into newly defined Panamanian Realm (for Latin America and northern part of South Am.) and restricted Neotropical Realm (only for central and southern part of South America). However, this is based on distribution of vertebrate taxa. Make such a division sense for you, when applied to know distribution of taxa within Cassidinae?

In my opinion, the thesis of Lukáš Sekerka fulfilled the requested requirements and the candidate should be awarded with the title Ph.D.

Praha, March 2, 2017

Jan Růžička

