

Reviewer's statement on the Ph.D. thesis by Kateřina Jůzová: „Strepsiptera and their host specialization“ submitted for defense at the Charles University in Prague, Faculty of Science, in November 2016

The Ph.D. thesis by Kateřina Jůzová is a collection of four papers dealing with the phylogeny, taxonomy and nomenclature of the strepsipteran family Stylopidae, particularly the genera *Stylops* and *Rosenia* which are parasites of bees. All four papers have been published in internationally respected peer-reviewed scientific journals: paper I, dealing with the molecular phylogeny of *Stylops* in the *Zoological Journal of the Linnean Society* which is one of the leading journals in field (impact factor 2.3, Q1 in Zoology according to the Journal of Citation Reports 2015 edition); paper II, bringing *Stylops* nomenclature formally up-to-date based on the results of the paper I in *Acta Entomologica Musei Nationalis Pragae* (IF 0.6, Q3 in Entomology); and papers III and IV describing/redescribing previously insufficiently known stylopid taxa based on morphological and molecular characters in *ZooKeys* (IF 0.9, Q3 in Zoology). Kateřina Jůzová is the first author of the paper I, and a co-author of the other three papers. All four papers are written and illustrated very well and contain important and novel scientific data which have substantially improved the knowledge of the taxonomy and host specialization in stylopid Strepsiptera. The individual papers partly combine molecular phylogenetic methods and traditional morphological descriptions using optical and scanning electron microscopy, which are applied on a relatively numerous material collected from different regions of the world and supplied with accurately identified host data. It clearly comes out of the thesis that such an integrative approach is very appropriate and needed to solve out the systematics of this complicated group.

The four papers are introduced in the thesis by 20 pages of introduction presenting briefly the aims of the study, a review of literature on host-parasite interactions from a very general, evolutionary perspective, as well as a very brief outline of the Strepsiptera systematics and biology, and brief descriptions of the content of all four papers included into the thesis. From a formal view, I consider this introduction as sufficient for a Ph.D. thesis of this type. However, I find its structure slightly imperfect for the following reasons:

- starting with „aims and methods“ on the first page preceding any general introduction is a bit strange: this text does not help much a reader who opens the PhD thesis for the first time to understand what the hell is *Stylops* and Strepsiptera and why it has been worth to consecrate more than four years of student's life to deal with its systematics. Moreover, this text is more a short description of individual papers included in the thesis than a list of aims and methods, and such a description is repeated again, although in different words on pages 18–20, and again on pages 31–32.
- the general review on the evolutionary biology of parasites is an interesting reading, introducing many theoretical concepts. However, in the context of the thesis, this text stands quite alone (i.e. purposeless) as the information included is practically almost not used for a discussion on the actual results of the thesis.

- as the thesis is focused on the systematics of just one of the strepsipteran families, Stylopidae, and particularly one genus, *Stylops*, I would expect to find somewhere in the introduction a chapter on the systematics and biology of this particular family and genus, written in a more detailed and synoptical way than the short text under the heading „Classification“ on page 16.
- the English of the thesis is generally good and correct but there are some awkward expressions in the introduction which are difficult to understand (e.g. the whole second paragraph on p. 12 „Because species concept...“) or don't make sense (e.g. „many species had to be synonymized as conspecific species“ on p. 19: a correct way would be to say that „many species names had to be synonymized“ as you cannot synonymize species but only their names and you can have „conspecific individuals/populations“ but not „conspecific species“).

My main concern as a reviewer of this thesis is the following: as individual authors' contributions to the published papers are not specified anywhere in the thesis, could you make clear for every paper during the defence what was Katka's own contribution and which parts of the work were done by other co-authors, please? Also, the paper I which is the core of the PhD thesis, is clearly based on the results from Katka's master thesis. Could you explain what was added to this research during the PhD study, please?

My further questions for the discussion during the thesis defence are:

- on p. 12 of the Introduction you conclude that „the idea of gradual specialization with coevolution followed by cospeciation or coextinction has little support in current studies“. Are there any other evolutionary mechanisms that could explain the species diversity of parasitic organisms and have a better „support in current studies“?
- in the whole thesis and published papers, you discuss the phylogeny and speciation of *Stylops* only from the point of view of host specialization. However, geography has been shown as very important for explaining speciation patterns in many parasitic groups too (including phytophagous insects which are parasites as well). Do you have any evidence for vicariance events in your *Stylops* phylogeny?
- I agree with you that *Stylops* and *Andrena* are a very good model system to study coevolution. I can see several reasons for this: both taxa are well-defined (probably monophyletic), species-rich, apparently with quite specific host-parasite interactions and, as Strepsiptera are endoparasitic, you usually collect both the parasite and the host at the same time and into a same vial. Why have not you tried to sequence (at least for COI) also the *Andrena* host specimens which you surely have at your disposal, to compensate for the lack of the host phylogeny? This would make your results even more scientifically interesting and valuable as you could test the congruence of both parasite and host trees.
- Besides the knowledge of the host specificity, type specimens are important to fix the names correctly in *Stylops* (as in any other animal group subject to ICZN). Have you made any effort to locate and/or document the types available? What is the situation?

Conclusion: The PhD thesis by Kateřina Jůzová formally fulfills the requirements for PhD theses submitted at the Institute of Zoology, Faculty of Science, Charles University in Prague. It is a pleasure for me to recommend this thesis for a defence.

In Brno, 17 November 2016



Mgr. Igor Malenovský, Ph.D.

Department of Botany and Zoology

Faculty of Sciences

Masaryk University, Brno