



Methods – Experimental evolution part:

Host populations (those with higher resistance to parasitoids and those with higher competitive ability) for evolutionary experiments were selected within 16, and 12 generations, respectively. Do you have previous experience or published resources that these are enough generations to significantly maintain resistance and competitive ability? Furthermore, in all resistance experiments you used „low“ (1 wasp in a vial with host flies) and „high“ (2 wasps in a vial with host flies) pressure design. Do two wasps in a vial make really that high pressure to the host in contrast using one parasitoid female? How many eggs can parasitoid female lay during its life-span? What is the difference between „high pressure“ (2 wasps in a vial, p. 13) and „medium pressure“ (2 wasps in a vial, p. 16)?

Results and discussion:

I really appreciate designing experiments to testing multiple phenotypes and indentifying the specific trade-offs in combined conditions. It definitely better mirrors the natural conditions where tested hosts and their parasitoids coexist. It is just a pity that experiments with *Leptopilina* sp. did not bring any results to allow you to compare the effects of each of the two parasitoids. Is there any explanation why *Leptopilina* sp. failed in your experiments? I know from your thesis that you considered *Leptopilina* sp. less effective, but I personally do not believe that as in the first run of your experiments *Leptopilina* sp. emergences were comparable to *Asobara* sp. Do you plan to repeat these experiments again to identify the reasons of *Leptopilina* sp. failure in more detail? Do you have in your cultres some other species of *Leptopilina* that you can try?

It would really be interesting to quantify fenotypic and genotypic changes on genomic level. I know that it is above the scope of this thesis, but as closely related species already has annotated genome, it could be „quite“ easy to indentify the specific genes which play major role in resistance for example and level of their expression. Are there any studies saying how many generations of *Drosophila* are needed to fix the adaptation to some environment conditions (again e.g. resistance) in the genome?

Additional questions:

1. Do you know if parasitoids species are proovigenic or synovigenic? If synovigenic, were adult females fed prior/during experiment?
2. Proovigenic species are usually decreasing their ability to lay eggs as they are getting older. Therefore, if your parasitoids are proovigenic, I would recommend to use very freshly (up to 24 hours) fertilized females. In your experiments, the age of all wasps were unknown. Do



Review of the Master's thesis

Trade-offs in parasitoid resistance and competitive ability in *Drosophila*

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Supervisor: Jan Hrček, PhD

Studying eco-evolutionary dynamics in evolutionary adaptation of species is an important approach to better understand species genotype and phenotype evolution under both biotic and abiotic conditions. However, such studies are still scarce, even if they can provide better insight into understanding the species role and its evolutionary dynamics in changing environment with different selective pressures. These phenomena are even more neglected in community ecology where variable trade-offs may directly influence species interactions, and their evolution. Hymenopteran parasitoids are megadiverse group of insects and their interactions with hosts definitely represent one of the key processes in the nature. Using this model group, therefore, can help to understand eco-evolutionary processes in community ecology globally.

The reviewed thesis uses for the first time two *Drosophila* species (*D. birchii* and *D. sulfurigaster*) and their two parasitoids (a braconid *Asobara* sp. and a figitid *Leptopilina* sp.) to study two different conditions, i.e., intraspecific larval competitive ability and parasitoid resistance. More specifically, the authors aim was to answer questions such as whether there is trade-off in performance between two different conditions, and whether some phenotypes of host species may be more optimal for conditions with multiple selective pressures.

All used species originate from a natural tropical area in Australia, they all have been established in a large number of lines in the Jan Hrček's laboratory, which makes the whole system even more interesting and unique, and (I presume) they are heavily used in all their experiments.

However, only a little is mentioned about the parasitoid biology in the thesis. Except the author stated that they are koinobiont endoparasitoids, I did not find the information whether females are proovigenic (females have complete oogenesis prior to, or shortly after, emergence) or synovigenic (females eclose only with a fraction of their total egg complement as mature eggs and the rest of eggs are developing later on, usually dependent on availability of diet for adult parasitoid females). Similarly, I do not know what is the life-span of each species. Were parasitoid females fertilized? All these characteristics can play a significant role in all made experiments and must be taken into account in discussion of your results.



you have any idea how to improve your experimental design in order to use only freshly fertilized females?

Last (taxonomy-oriented) question:

As your parasitoids serve as very important model and are often used taxa in your group, do you plan to formally describe the two species?

In conclusion, I must state that the present thesis is very well written, brings many new results that are definitely worth publishing. Even if I had some comments and questions to the methods mostly, I considered the thesis as very valuable contribution to study of eco-evolutionary dynamics of hosts and their hymenopteran parasitoids. After successful presentation of the results of this Master thesis, I strongly recommend accepting this thesis with a grade excellent (1) as a necessary step to award Jeni Sidwell with the Master's degree title at The University of South Bohemia in České Budějovice. I suggest

In Stuttgart 19th May 2022

Petr Janšta, Ph.D.