



Review of Bachelor thesis Three-dimensional flight trajectories in three European butterfly species written by Luca Rauscher

The thesis consists of a short literature review about flight parameters and three observed species of butterflies and of an experimental part that should reveal differences between flight parameters according to their morphology and habitat use. These aims are clearly defined and the methods used can effectively test the hypotheses.

The introduction is not excellent. Either I do not understand the explanations of the student regarding flight parameters or the student does not understand physics. It would be much better if more relations explained were depicted in a 2D scheme like Figure 1. Definition of gliding vs. flapping phase are problematic. There can be often flapping to maintain constant direction and speed. It is not gliding. Definitions of parameters in chapter 1.2.2. and Table 1 are unclear or contradictory. For example, student defines Velocity but then uses term forward flight speed in definition of Advance ratio. Does velocity and forward speed differ? How does wing beat frequency differ from the flapping speed? For Curvature, is it the number of turnings per time or distance? Wing width on Figure 5 is not exactly determined, everybody can measure it somewhat differently. There is mentioned an importance of wing load in the thesis several times, but it seems that body mass was not measured. Why?

Results show well performed statistical analyses, but no real parameter values! Chapter 3.1 includes no text. Graphs and tables are informative but the main results – means $\pm$ SD of individual parameters for individual species are totally missing. Must be shown during defence.

Chapter Limitations is a strong part of the thesis, it shows potential and real problems of this and future studies. Discussion is also well organised and wisely compare expectations and real measurements. It also correctly uses literature sources for comparison and explanation. But the list of references has many inconsistencies and missing information (even journal names). Number of literature sources is sufficient.

Some small recommendations for better text: do not always repeat full generic name of the organisms – make abbreviations; do not use huge number of decimals for coordinates. What is the distance of measured 48.9937936N, 4.4365289E and a point 48.9937935N, 4.4365288E?

The two *Pieris* species are closely related but probably not sister. Can student find some other species that is sister to one of the observed?

Student learned how to perform complicated experiments and how to analyse complex data obtained. She can define aims and then discuss the results. However, she must pay more attention to the description of methods



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and to presentation of results. I recommend evaluation of the thesis by grades 2 to 3.

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