Dear Editor,

Please find attached the manuscript entitled “Butterfly seed predators mediate shifts in selection on flowering phenology in their host plant” to be considered for publication in Ecology, under the category Articles.

Spatial variation in selection is fundamentally important for maintaining genetic variation within populations, for local adaptation and genetic differentiation of populations, and for speciation. Identifying and quantifying the effects of different selective agents, as well as how the relative importance of different agents varies with the environmental context is therefore key to a more mechanistic understanding of natural selection and evolution. Yet, these relationships have rarely been quantified for large sets of natural populations. In this study, we examine how selection on timing of reproduction in a perennial herb is mediated by the interaction with a butterfly seed predator and how this interaction is related to the abundance of a second (ant) host of the butterfly. The results clearly show that selection shifts from favoring earlier flowering within a season in plant populations where the antagonist is absent, to favoring later flowering when it is present. Our results are important and novel in demonstrating how among-population variation in the direction of natural selection can be explained by interactions with an antagonistic selective agent, and simultaneously showing that the incidence of this antagonist is related to the community context, in terms of the abundance of its second host. Our results highlight that in order to link variation in selection to the environment, we need to assess both the effects of species interactions on fitness, and the effects of the environmental context on the outcome of the interaction.

Although previous studies by one of the authors have examined the role of antagonistic interactions for among-population variation in selection on timing of reproduction, as well as the effects of environmental context (Arvanitis et al., 2010, Ehrlén et al. 2015, König et al. 2015), the current study is novel, compared to this work as well as to the work of others, in several important respects. First, it deals with a study system – *Phengaris* (*Maculinea*) butterflies and its two hosts, plants and *Myrmica* ants, used sequentially - that is extremely well studied but that has never been thoroughly examined in the current context (none of the authors have published about this study system previously). Second, the study is important and novel because it clearly shows that among-population variation in not only the intensity but also the direction of selection on timing of reproduction in a plant can be explained by the presence and preferences of an antagonistic interactor, and linked to the community context

The attached work has not been published or accepted for publication elsewhere, and is not under consideration for publication in any other journal or book. Its submission for publication has been approved by both authors, and all persons entitled to authorship have been so named.

We thank you in advance for your consideration of our manuscript.

Yours sincerely,

Alicia Valdés (corresponding author)

*References:*

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