**Cover letter for the manuscript** “**Linking modularity and conspicuous asymmetry in the insect head and mandibles” by S. Ginot, S. Sommerfeld & A. Blanke.**

Dear Editors,

We are pleased to submit our new manuscript to *Evolution*. This study investigates an idea that has, to our knowledge, rarely been suggested in the literature, namely that the presence of morphological conspicuous asymmetries in bilaterian animals relate to modularity between the left and right sides. Indeed, conspicuously asymmetric structures can be viewed as a special case of phenotypic diversification, whereby each side of a bilaterally homologous structure displays a different target phenotype. Meanwhile, a frequent proposition is that modularity between an organism’s substructures favors evolutionary diversification by allowing these substructures to vary to some extent independently from each other. It may therefore be expected that 1) left-right modularity allows conspicuous asymmetry to arise, and 2) modularity between neighboring symmetric and asymmetric structures is necessary to avoid negative disruption of the symmetrical body plan.

We test these expectations explicitly using the grasshopper head and mandibles as a model, and doing so we produce one of the first 3D geometric morphometric study of asymmetry and modularity patterns in the head of an insect. The grasshopper head is a very interesting model to tackle the problem for several reasons. First, the insect head constitute a so-called *tagma*, meaning a highly integrated anatomical unit, constituted by specialized segment physically and to some extent developmentally correlated with each other. Furthermore, the head supports sensory organs, for which symmetry should be advantageous. On the other hand, the grasshopper head, like that of many other biting-chewing insects, also supports a pair of mandibles which are conspicuously asymmetric, forming and “key-and-lock” morphology which allows them to cross and occlude. Both mandibles must therefore have divergent but highly constrained phenotypes to ensure proper feeding. Given these facts, our findings, which confirm the significance of variational modularity between the left and right mandibles, and between the mandibles and the rest of the head, constitute some of the first solid empirical evidence that modularity is an important factor in the development of conspicuously asymmetric phenotypes. More generally, this particular case also brings additional support to the importance of modularity in phenotypic diversification.

We strongly believe that our study is a good fit for *Evolution*, as it brings up the novel idea of connecting conspicuous asymmetry with modularity, as well as unique empirical data to start tackling this idea. Additionally, our data allowed us to control the impact of various ways to superimpose data on integration and modularity results, which we hope can participate in solving ongoing methodological debates, by bringing in more empirical data.

In the past years, *Evolution* has been consistently publishing spearheading studies related to modularity and asymmetry, especially using geometric morphometrics, some of which have greatly inspired and helped our research. It is our opinion that it would constitute a great platform for our study to reach both a large audience as well as specialists of the field. We therefore hope you will find our study to be a suitable candidate for publication in *Evolution*.

On behalf of my co-authors, with best regards,

Samuel Ginot