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**The evolution of animal diversity: a comparative approach**

# Abstract Book



Department of Life Sciences and Systems Biology - University of Torino

## **HINDWING AND BODY VARIATIONS IN DUNG BEETLES: SIZE MIRRORS FUNCTIONAL CONSTRAINTS WHILE SHAPE MIRRORS PHYLOGENY**

As a rule, in dung beetles the flight ability is well-developed, eliciting the search for a partner and food sources. In those insects, only hindwings are used to fly, thus they are of great importance, and deserve to be carefully evaluated. The hindwing of twenty-seven species of Onthophagina and Oniticellina was recently studied, and two distinct morphological patterns of shape variation were recognized. Since each group included only the members of one of the two subtribes, it was confirmed the goodness of this anatomical trait in taxa recognition at higher rank. To evaluate its applicability at lower taxonomic level, in the present research thirty-four Afrotropical *Onthophagus* species (Scarabaeidae, Onthophagini) were examined using the geometric morphometric methods on the hindwing and pronotum. These anatomical traits are strictly related given that the hindwings develop from thoracic segments (i.e., tergal and pleural structures). The overall shape variation was highlighted using Principal Component Analysis (PCA) and Canonical Variate Analysis (CVA), showing two distinct, well separate patterns for both anatomical traits. The analysis of size variation, expressed by the CS values, gave significant, well differentiated patterns for both the structures. The results were congruent, for the same species were included together in each group in all the analyses. The hindwing size was then compared to the body size (i.e., CS values of pronotum), evidencing a linear correlation for these dimensions. According to the present findings, it has been highlighted that: 1) the studied species can be divided in two distinct groups by the size and shape of both anatomical traits; 2) the hindwing size increases at the increasing of body size, thus it should be hypothesized that functional constraints related to flight mechanism can have affected their evolutionary trends; 3) within each identified group, the shape and size variations of hindwing and pronotum displayed phylogenetic signals. Thus, the hindwing traits can be efficacely used in taxa recognition also at lower rank.

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[angela.roggero@unito.it](mailto:angela.roggero@unito.it)