

Morphometric evaluation of the *Listroderes costirostris* Schoenherr complex (Coleoptera, Curculionidae)

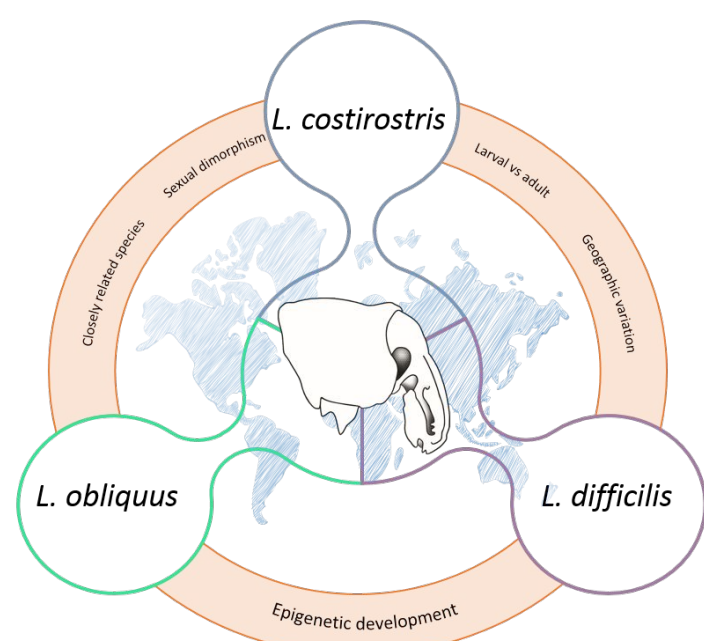
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INTRODUCTION

The South American pest weevil species complex *Listroderes costirostris* Schoenherr ("vegetable weevils") comprises three species: *Listroderes costirostris*, *Listroderes difficilis*, and *Listroderes obliquus* (Morrone, 2002). The correct identification of these species is crucial for management and pest control, but it is difficult due to their morphological similarity.

This project aims to apply geometric morphometrics to the study of the variation within the *Listroderes costirostris* complex. The ultimate goal is to evaluate if the specimens of the three aforementioned species correspond to a single polymorphic species or to three entities resulting from a speciation process.

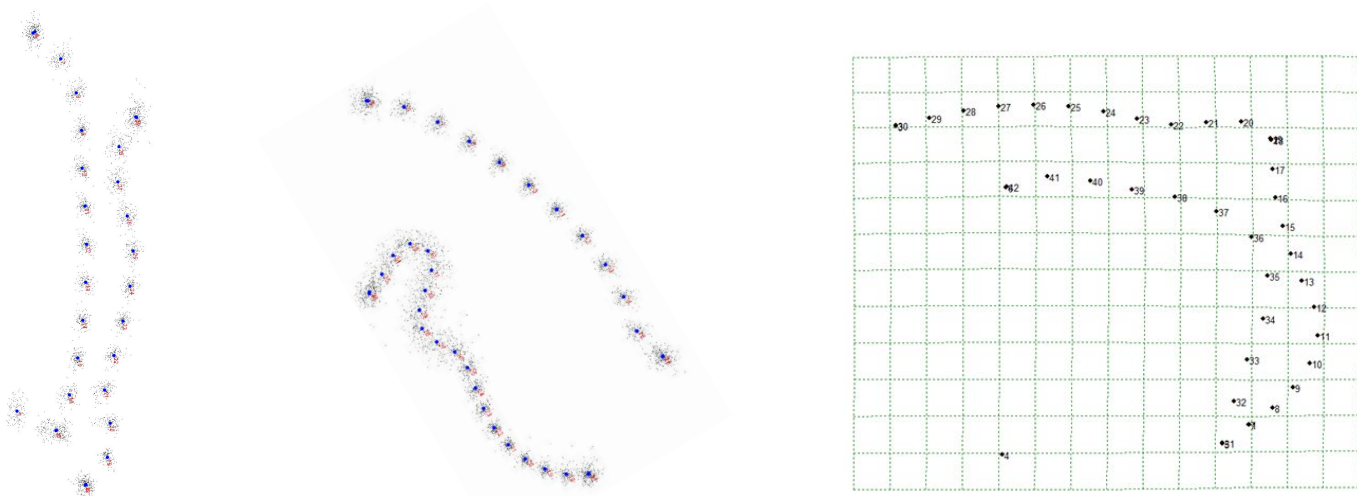


MATERIAL & METHODS

A total of 135 female specimens (45 per species) were analyzed. The material belongs to the following from Argentina museums: Museo de la Plata (MLP), Fundación Miguel Lillo (FIML), and Museo Argentino de Ciencias Naturales Bernardino Rivadavia (MACN).



Morpho-geometric analysis: three structures were photographed and considered for independent analysis, namely, head in frontal view (HF), head in lateral view (HL), and pronotum in lateral view (PL). Landmarks and semi-landmarks were established using TPSdig (Cruz *et al.*, 2023).



A Procrustes analysis was performed to obtain the coordinates and distances as shape variables. A principal components analysis (PCA), a canonical components analysis (CVA), and a discriminant analysis between groups (AFD), 1000 permutations each and a significance of $p \leq .05$, were performed in both MorphoJ and Geomorph 4.2 programs (Gemmell *et al.*, 2018; Cruz *et al.*, 2023).

Statistical analysis

PCA

Variation in shape

Coordinates

135 specimens

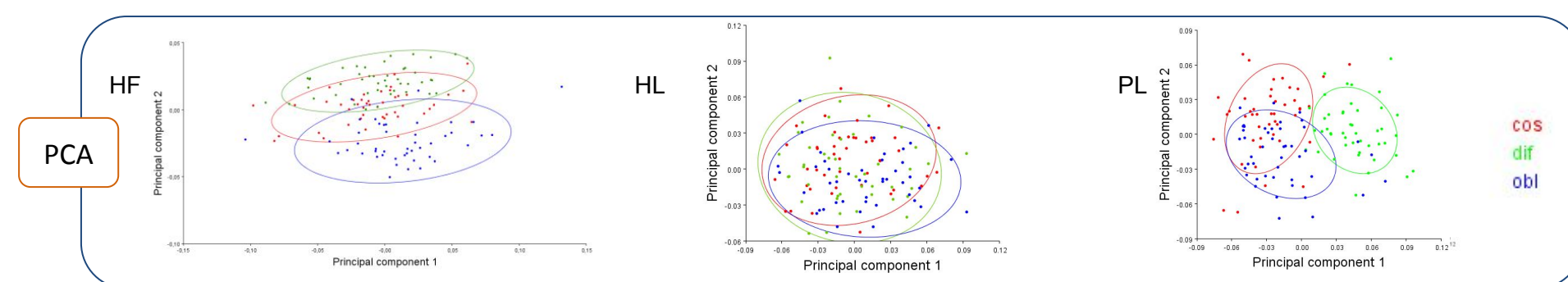
CVA

How significant the differences between species are

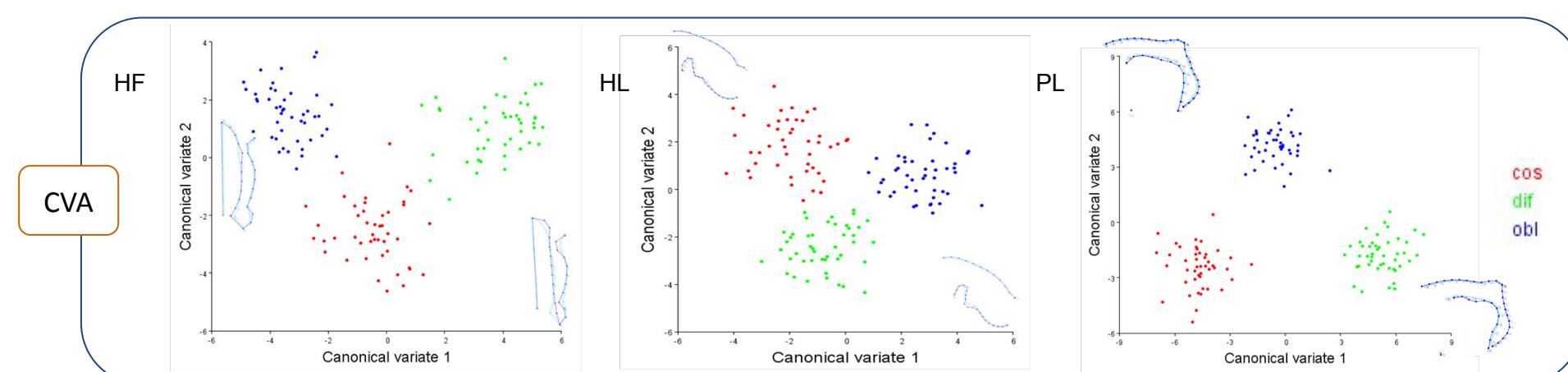
AFD

Discriminant analysis

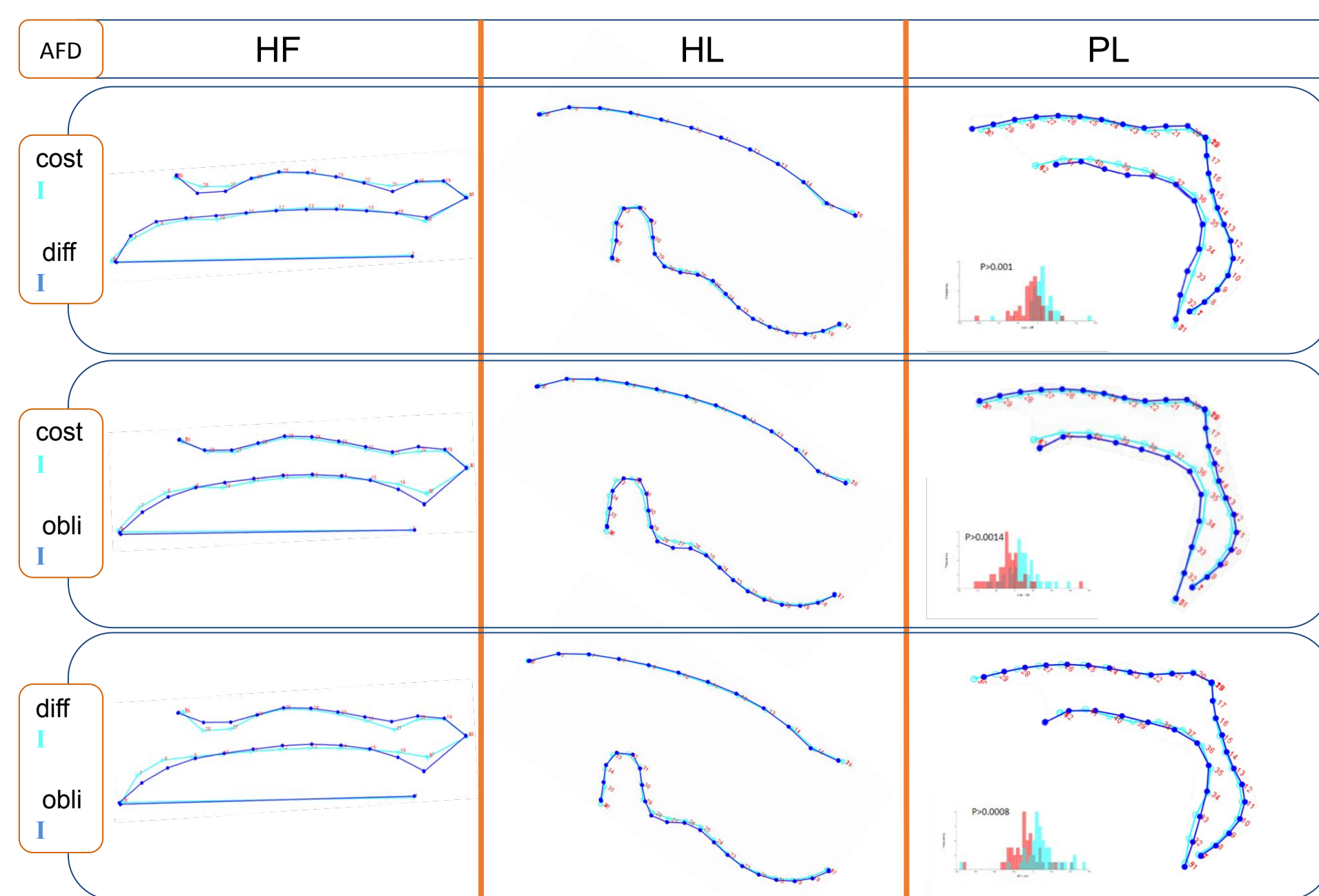
RESULTS



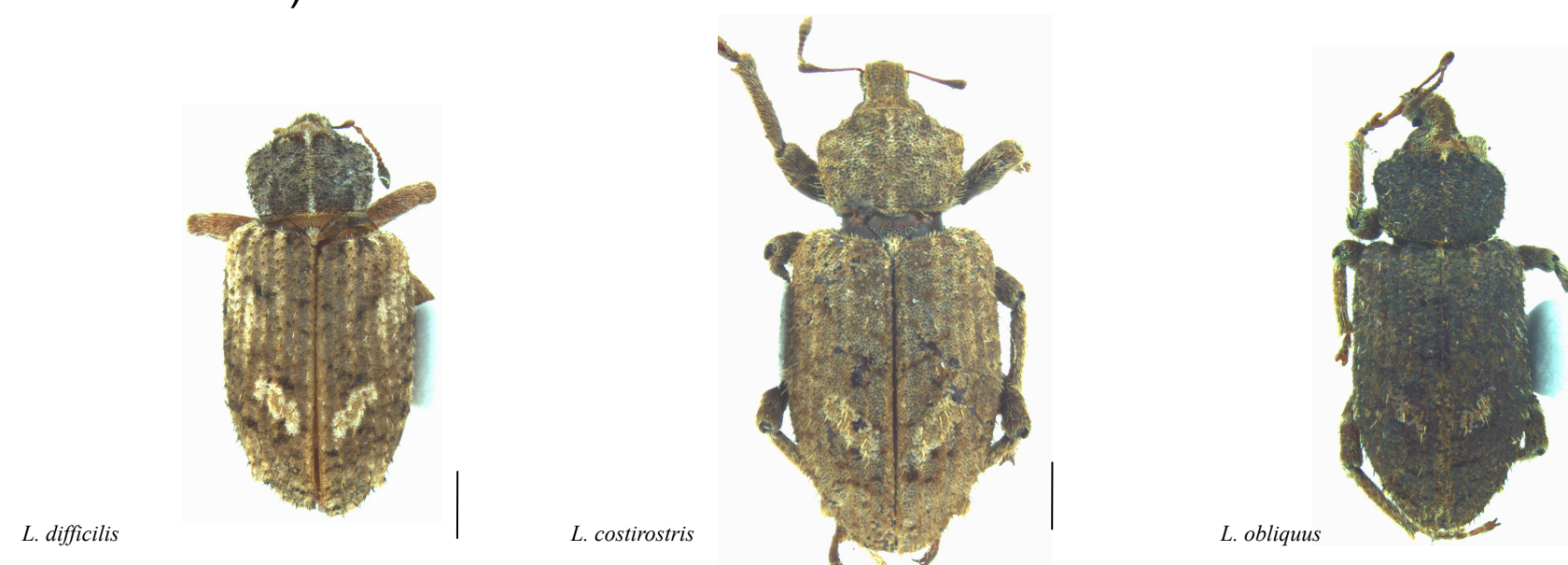
Specimens from the three species do not form defined groups for all the structures; however, in HF and PL there is a subtle differentiation in groups.



The CVA shows defined groups of individuals with similar shapes for all structures, significantly separating the aforementioned species. However, PL shows better defined groups.



Pairwise comparisons show little observable differences in the shape of each structure, with exception of a few particular landmarks (e.g. HF= 15-21; PL= 31-34 and 38-40).



CONCLUSION

The morphometric variation analyzed with this technique allows us to differentiate the three species of the *L. costirostris* complex. All the three structures turn out to be useful, with the pronotum in lateral view being the most relevant.

Nevertheless, it would be useful to analyze whether this morphometric variation correlates with genetic variation in order to conclude the status of these species.

REFERENCES

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