

## **REVIEW – 22/01/2024**

« *The contribution of Mediterranean connectivity to morphological variability in Iron Age sheep of the Eastern Mediterranean* »

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### **Preprint strengths:**

- The issue of the impact of maritime trade on the spread of livestock and the evolution of domestic sheep breeds is very interesting and innovative from the point of view of geometric morphometrics methods.
- Chronological period poorly documented for these lines of research
- Fluid writing, easy to read

### **Preprint weaknesses:**

- Problems with the structure of the article
- Insufficient justification for statistical tests
- Socio-cultural heterogeneity of the sites selected and, in fact, of astragali corpus
- The discussion section lacks important data, such as the impact of the taxonomic identification of the astragali, or the links between the heterogeneity of the socio-cultural contexts of the corpus and the results obtained in GMM, even though an effort has been made to highlight this.

## **GENERAL COMMENTS:**

### **Title**

No comments.

### **Abstract**

No comments.

### **Introduction, Materials & Methods:**

The article presents a structural problem in the "study sites", "material" and "methods" sections. Many sentences describing the corpus and the method are in the introductory part. You could move the methodological sections written in paragraphs 5 and 6 of the introductions to the method section to present GMM and justify its use. Similarly, the sites presentation should be moved to the material section, where table 1 referring to sampling should be referred to in the text (data currently missing).

I suggest the following structure:

1. Present the corpus, adding information on the temporal resolution of the data + the origin of the assemblages (paragraph 2 of the material and method section).
2. Present the GMM method + statistical tests and justify it.

Regarding the methodological presentation, in my mind it lacks many justifications for the choice of statistical tests used and bibliographical references. I didn't find any references on GMM. These need to be added.

A methodological presentation of the various statistical tests that are used in the results section to discuss the data are missing: centroid size, ANOVA, permutation tests, allometry tests, visualisation of unrooted morphological proximity trees.

Similarly, the method used to produce the average conformation patterns per site and their visualisations is not explained.

The sites are not presented in the same terms. In introduction view, I recommend that you provide additional information describing the topographical characteristics of the environment in order to justify your choice of your samples when you write « we chose samples that derive from sites in a similar topographic setting ».

I would also advise you to add information on the main findings of the archaeozoological studies to give an overview of animal economy identified.

Furthermore, if it is possible, I advise you to add as co-authors of the publication your colleagues who participated in the acquisition of the morphometric data on which your results are based.

#### **Discussion:**

Overall, interpretations need to be nuanced due to corpus heterogeneity (bones from totally different contexts). Even though these arguments are set out in the third paragraph, I suggest that you detail your hypotheses on morphotypical ovine diversity, taking these limitations into account.

I would also advise you to write some details of the interpretative problems associated with taxonomic identification that might suggest the variability of the data within sites. Although it is doubtful that the outliers from the LTD site were wild animals, this hypothesis cannot be refuted due to the anatomical identifications.

Figure 5: explain in the text.

#### **DETAILS COMMENTS:**

##### **Introduction:**

« to minimize possible functional morphological differences » = **justify**

« Our results, which represent the first study of animal mobility in the southern Levant using geometric morphometric methods, should be somewhat **liberally interpreted** due to the primacy of this study »: **I think the term 'liberally interpreted' is completely inappropriate. On the contrary, as the data set is heterogeneous and limited, and as no comparative study has yet been carried out on the influence of maritime mobility on the introduction of new sheep varieties thanks to GMM, we need to be extremely cautious about the results.**

### **Methods:**

« osteologically mature at time of death » = **to be justified due to the age identification problems based on talus ossification.**

« *Ovis* sp. » = **explain why the identification remained at the gender level and why this may be problematic in relation to the hypotheses formulated in the article.**

**Better justify the use of CVA.**

**Can you include the results of the PCA in the additional data?**

### **Results:**

Overall, in this section, you should remove the comparisons with other studies and describe the results objectively.

#### **Digitization error**

Can you also indicate the result obtained on landmarks alone (without taking sliding into account).

#### **Centroid size**

« The smaller size of the Dor specimens also resonates well with the results from other Levantine coastal sites in the Iron Age ([Chahoud et al., 2023](#)). The specimens from Cyprus are especially small. We do not know how universal this pattern may be on the island during the Iron Age, and this observation requires further investigation » = **for discussion**

« The effect of the interaction between group and size on shape is not significant » = **indicate the p-value.**

You should make the results of the allometric tests more obvious. I recommend adding this information to the subtitle « centroid size » and **“allometric pattern”**.

#### **Ordination:**

In view of the CVA results, I doubt the need to add the tree calculated from the Mahalanobis distances from the CVA. I advise you to add this graph and this information to the "supplementary" section.

« The group-based CVA ordination of the first ten principal components explains almost all the variability in that dataset » **pay attention to the formula. The first two axes of the CVA performed on the first 10 dimensions of the PCA explain 98% of the variability.**

#### **Disparity:**

Be careful with the formulation: here the data are calculated on the basis of Procrustes distances using which method (PCA)?

« The similarity between the results of two different analyses—direct measurements of disparity on landmark data and on eigen-ordinated coordinates—support the statistical results »: **add the raw data.**

Figure 3: I advise you to divide up this figure for greater clarity and visibility. You could, for example, present the boxplots and then present the conformation data in a second figure. In addition, I would suggest that you remove the individual numbers from the CVA biplot and, if possible, use colour plates to bring the groups together.

Figure 4B is not explained in the text: either explain it and therefore add the method that enabled it to be carried out in the method section, or remove it. In my own view, this description is very important in order to show the differences in shape that exist between the 'average' sheep astragalus at each of the sites.

## REFERENCES

All the references mentioned are appropriate and accurate.

However, GMM references are missing. You have to add some references concerning the origin of the method like (Rohlf and Marcus, 1993, Bookstein, 1991...)

If you want, you can add too the PhD thesis of Manon Vuillien next to the reference of Colominas et al., 2019 and Haruda et al., 2019 : <https://www.theses.fr/2020COAZ2020>

She works on the morphological variability of Late Neolithic and Iron Age sheep in Provence combining GMM and more traditional approaches in archaeozoology.