

Response Letter to Editor and Reviewers

Estimating body volumes and surface areas of animals from cross-sections

Dear Editor and Reviewers,

Thank you for your comments. These comments are valuable and helpful for improving my article. I have revised the article taking into account all the comments. Below I clarify the changes I made to the manuscript.

Editor

The revised manuscript and additional examples make your analyses and comparisons easier to follow and of broader relevance. I would like to see this work published, but some minor but crucial points remain to be addressed:

You mention in the abstract and introduction that body mass and surface area is impossible to obtain in all extinct species. This is not entirely true – likely in most vertebrates but surface area can be calculated for extinct animal species with closed shells through CT (e.g., brachiopods, bivalves). Please rephrase.

Thank you for your suggestion. I have revised the abstract and the introduction (lines 10 and 40).

Tyrannosaurus tail reconstruction

As highlighted by reviewer 2, the cross-sections of the tail completely neglect the presence of the substantial leg retractor muscle which leads to an underestimation of the tail mass and a more anteriorly located CM when compared to other studies (see suggestion provided by reviewer 2). Please use this suggestion or at least explicitly discuss this issue.

Thank you for your comment. I have revised the *T. rex* model and reconstructed the tail cross-sections following a previous study. Two research articles on this topic are cited in the revised manuscript (lines 467, 489), and I have mentioned why the tail muscles should be taken into consideration (lines 216-218). The estimated CM of the revised model is consistent with the results published in previous studies (please see the article for citations; line 284). For more details, please see my response to Reviewer 2.

Add DOI to supporting materials on GitHub repository

As links on GitHub could change, please make sure an archive of your tutorial/supporting data on GitHub with digital object identifier is made and the DOI explicitly mentioned in the manuscript. This is crucial to be able to reproduce your study on the long-term. This can be done through Zenodo as far as I am aware: <https://docs.github.com/en/repositories/archiving-a-github-repository/referencing-and-citing-content>

Thank you for your suggestion. I have created a DOI for the GitHub repository using Zenodo. The link is in line 243 of the revised manuscript.

Formatting

There are some additional formatting or typographical/language issues (compare suggestions of reviewer 2)

Thank you for helping with the formatting. I have revised the manuscript taking into account of all your and Reviewer 2's comments. There is one thing that I need to explain, about "Benedon Paratodus" in the Acknowledgements section. Yes, this is a pseudonym. This person supported my work but wants to stay anonymous by using this name. I have explicitly stated this in the manuscript.

Reviewer 1

Basic reporting

I am satisfied that the revised manuscript has adequately addressed my concerns from the original submission. I am happy to support acceptance of this revision.

Thank you for your positive evaluation.

Experimental design reporting

I am satisfied that the revised manuscript has adequately addressed my concerns from the original submission. I am happy to support acceptance of this revision.

Thank you.

Validity of the findings

I am satisfied that the revised manuscript has adequately addressed my concerns from the original submission. I am happy to support acceptance of this revision.

Thank you for your positive comments.

Reviewer 2

Basic reporting

This revised version of the original submission has responded to all of my previous comments, questions and suggestions.

The writing is clear and my requests for the addition of the definite article 'the' in many places in the text have been met.

The requested clarifications of the figures have also been done as requested.

The literature citations are all fine and bit more comprehensive than before.

Thank you for your evaluation and comments.

Experimental design

The experimental design meets all the PeerJ requirements listed.

Thank you.

Validity of the findings

The results are consistent with the proposed methods and the 3D models provided as a test cases. All the PeerJ conditions for valid results and conclusions are met.

Thanks for the positive comments.

Additional comments

I only have one significant correction to make:

The cross-sections of the tail of *Tyrannosaurus* presented in Figure 6 completely neglect the presence of the substantial leg retractor muscle that lies along the proximo-ventral two-thirds of the tail - the caudifemoralis longus. This muscle is present in all limbed diapsids (eg. lizards, crocodilians, non-avian dinosaurs) Neglect of this muscle in the model results in an underestimation of the tail mass and a more anteriorly located CM when compared to other studies. See the attached JPEG image of what the base of the tail should look like with the proper musculature.

Thank you for your comment and JPEG file, which improve my knowledge on dinosaurs. I found two research articles relevant to this theme and cited them in the revised manuscript: Persons and Currie (2011), and Snively et al (2019). Snively et al (2019) reconstructed the tail cross-section of FMNH PR 2081 according to an adult alligator. I investigated the caudal vertebrae of AMNH 5027 from the 3D model again. It turned out that the transverse processes of its caudal vertebrae are proportionally shorter than those of FMNH PR 2081. This seems to suggest a slimmer tail in AMNH 5027. Thus I reconstructed tail muscles following the criteria proposed by Persons and Currie (2011). Also, their criteria fit better with the JPEG file you sent me. The plane containing the CM of the revised model is located at the anterior edge of the pelvic girdle. This result is consistent with those from previous studies. Albeit the slimmer tail, the position of the estimated CM of AMNH 5027 is similar to that of FMNH PR 2081 reconstructed by Snively et al (2019). This is possibly because the ribcage of 5027 is thinner than that of 2081.

About the terminology: I checked the literature. It seems that both “m. caudifemoralis” and “m. caudofemoralis” are valid spellings. I used the latter following Persons and Currie (2011) and Snively et al (2019).

There are also a handful of wording corrections to make as well. I have indicated this in the annotated review PDF which is attached.

Thank you for your suggestions. I have revised the manuscript.