**External Examiner’s Report**

Student: Sive Finlay

Degree: Masters by Research

School: Natural Sciences

Dissertation: Morphological diversity in tenrecs (Afrosoricida, Tenrecidae): comparing tenrec skull diversity to their closest relatives

After reading Ms. Sive Finlay’s dissertation, I recommend that **the degree should be awarded subject to minor corrections being made to the thesis**. I expand this recommendation below.

The dissertation evaluates morphological diversity in tenrecs, a clade that is considered an example of exceptional ecological radiation and convergent evolution. The dissertation makes the important point that past conclusions regarding tenrecs’ exceptional ecomorphological diversity have been qualitative and not subjected to rigorous quantitative testing. To this end, the dissertation used geometric morphometrics to compare skull and mandible shape diversity between tenrecs and their nearest relatives, the golden moles.

Sive’s work has produced an interesting dissertation that involved an impressive amount of data collection. It is also exceptionally well written. Complicated concepts are clearly explained and the writing is concise without being barren and engaging without being distracting. I wish more research was written this well (including my own). Achieving this level of clarity indicates that not only is Sive is a good writer, but that she has developed a solid understanding of the concepts and methods she has used, with an appreciation of the relationship to wider fields of knowledge

Beyond the writing, the dissertation asks a clear, topical and testable research question. It makes a contribution to our knowledge of the tenrec radiation, and, more widely, to our understanding of morphological radiation, and the importance of quantitatively testing qualitative patterns. Also, the datasets Sive has produced are extensive; it was great to see that she has made them publicly available, where possible, as they have the potential to make a further contribution to the wider field.

Although the dissertation is excellent in its aims, writing, and in the thoroughness of its methods, it is let down a bit by the interpretation and discussion of the results. I think minor corrections need to be resolved before the thesis can be accepted. Most importantly, I am not convinced that Sive’s main conclusion that tenrecs are not more morphologically diverse than golden moles is consistent with her data. Most tests actually showed tenrecs to be more diverse than golden moles. When 31 tenrec species were included, 2/4 traits showed more morphological diversity in tenrecs using t-tests and 4/4 when permutation tests were used. Excluding most *Microgale* species resulted in 3/4 significant t-tests and 4/4 significant permutation tests. Sive expresses scepticism regarding the lateral skull and mandible results but why these should be discounted was not fully justified, in my mind. Certainly, while the evidence are mixed, there seems to be more evidence suggesting that tenrecs are more morphologically diverse, especially when the over-representation of *Microgale* is accounted for. I think Sive needs to reconsider her conclusion that overall there is no evidence for exceptional morphological diversity in tenrecs. The opposite conclusion seems to be the case, especially given the permutation results, which to me are more convincing than the parametric tests.

I also found the Discussion to be a bit thin and would like to see a consideration of how the phylogenetic branching pattern within the tenrec and golden mole clade could have affected disparity comparisons between the two sister clades (e.g. under Brownian motion), though I doubt there is a sufficiently well resolved phylogeny to test this directly (and, regardless, there may not be a sufficient sample size of golden moles available for a meaningful test). Also, while Sive accounted for differences in sample size using a randomization test, she did not discuss the implications of lower and, I assume, non-random, sampling (completeness) of the golden mole clade.

I expect these changes should be quite straightforward and will result in an impressive thesis of which Sive can be very proud. It will be a very strong body of work.

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