

Reviewer Report

Title: The genomic basis for colonizing the freezing Southern Ocean revealed by Antarctic toothfish and Patagonia robalo genomes

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Reviewer Comments to Author:

In this study, Chen and colleagues did genome sequencing of two notothenioids to understand genetic basis of Antarctic notothenioids adaptation to the Southern Ocean. I do think that the methodology of the study is sound and findings here are solid. The genomic resources are valuable for further studying genetic basis of the notothenioids adaptive radiation as the authors state. Before recommendation for its final publishing in GigaScience, I have the following concerns that authors might consider. 1) The authors might consider to incorporate the earlier sequenced notothenioid genome. I see that the authors have included the Antarctic bullhead notothen genome in their comparison analyses but do not make fair comparison among the three notothenioid genomes. For example, the authors speculated that TE might contribute to genome size increasing in derived notothenioids by comparison between Antarctic toothfish and Patagonia robalo. What about TEs in the Antarctic bullhead notothen genome? What about LINEs in Antarctic bullhead notothen genome? A thorough comparison among the three notothenioid genomes might give us more information about the topic the authors are trying to beat. 2) As findings in their earlier works, the authors find that gene duplication plays an important role in adaptation to the freezing Southern Ocean in notothenioids. I am wondering how many gene families experienced duplication have been identified by both this study and their 2008 PNAS study. 3) The authors used an RNA-seq method for their study of transcriptomic adaptation to the freezing environment. However, I do not see any details how they collected the tissues, as we all know that such analysis is very sensitive to the sampling strategy.

Methods

Are the methods appropriate to the aims of the study, are they well described, and are necessary controls included? Choose an item.

Conclusions

Are the conclusions adequately supported by the data shown? Choose an item.

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