Reconstruction of the evolutionary history of the venom gene Stonustoxin in *Sebastes*

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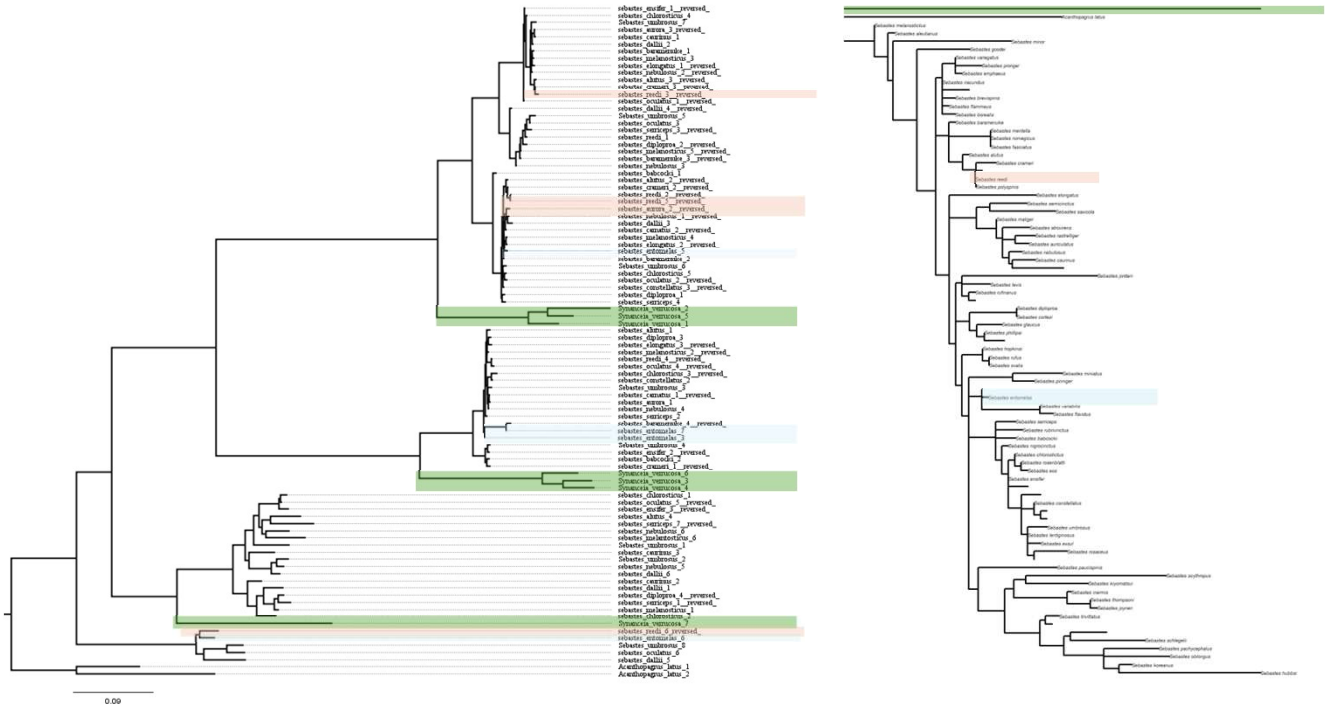
Abstract

Rockfish, or *Sebastes,* is a highly diverse genus of fish primarily located in the Eastern Pacific and is important for fisheries and coastal ecosystems. Research suggests that organisms with venom production have accelerated evolutionary rates compared to other lineages without a venom system (Yang, Siqi, et al., 2025). *Sebastes* is closely related to venomous species including *Pterois sp.*, and there is a lack of data on the evolution of venom in the genes *Sebastes* (Lee, Sung-Gwon, et al.,2025). This research uses the *Sebastes* genome collection from NCBI to extract orthologous stonustoxins, a group of venom genes that includes venom from lionfish (*Pterois*) and stonefish (*Synanceia*). We built phylogenies to understand the evolutionary history of the gene; we looked for selection signatures, and we overlaid ecological characteristics to detect associations. Studying the evolution of venom in fish is useful for understanding adaptive potential for species interactions as well as diversification of a speciose genus of fishes.

Methods

- Mitochondrial DNA COI to establish species relationship
- Stonustoxin alignment among several species of Rockfish Sebastes
- Extract putative Stonustoxin region in all *Sebastes* from NCBI
- Align putative Stonustoxin across *Sebastes spp.*

Results



Next steps

Finish extracting the *Sebastes* genus. Select species to extract putative Stonustoxin and conduct trna analysis to determine if the protein is expressing in those species.

References

Lee, Sung-Gwon, et al. "Complete mitogenomes of venomous fish paracentropogon rubripinnis and inimicus japonicus elucidate phylogenetic relationships in scorpaeniformes." *Scientific Reports*, vol. 15, no. 1, 5 Aug. 2025, https://doi.org/10.1038/s41598-025-05085-y.

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Acknowledgments

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