Dear Editor,

I am writing on behalf of my co-authors to submit our manuscript titled “The Evolutionary History of Siphonophore Tentilla” to be considered for publication in *Integrative & Organismal Biology*. All authors approve of the manuscript and its submission to *Integrative & Organismal Biology*. The manuscript is original work and has not been simultaneously submitted to any other journal. This work builds on the data, phylogeny, and analyses we are publishing in *PNAS* (in press), expanding on the organismal detail and implications to siphonophore natural history.

Siphonophores (Cnidaria:Hydrozoa) are planktonic colonial predators occupying a central role in open-ocean food webs. They capture prey using nematocysts loaded onto specialized tentacle side branches called tentilla. These structures are exclusively used for prey capture and exhibit a rich diversity of shapes and sizes across species. Many species bear tentilla with a dynamic discharge behavior capable of rapidly wrapping the prey in nematocysts as they fire. Siphonophore tentilla are the most complex prey-capture apparatus among cnidarians, and yet their evolutionary history has remained largely unexplored.

This manuscript addresses five core questions on the evolution of siphonophore tentilla: (1) What is the evolutionary history of morphological novelties, (2) are tentilla composed of phenotypically integrated modules, (3) is there convergent evolution among distantly related taxa with similar diets, (4) what should we expect understudied species to eat based on their tentilla morphology, and (5) how does morphology translate to discharge performance.

We find that most morphological novelties arise following the appearance of dynamically-discharged cnidobands, leading to further dietary diversification in this clade. In addition, we find that tentilla and nematocyst characters evolved in four distinct and phenotypically integrated modules. Our results show clear signals of convergent evolution among distantly related fish prey specialists, and among small crustacean specialists. These insights are key to understanding the processes that gave rise to the morphological diversity of tentilla we observe among extant siphonophores, and to predict their roles in open-ocean food webs. Our conclusions are supported by phylogenetic comparative analyses of new and previously published data collected by myself as a graduate student. Specimen collection required SCUBA diving and the deployment of remotely operated vehicles hundreds of kilometers from shore.

The implications of our findings go beyond zoological curiosity. The sustainability of marine ecosystems, commercial fisheries, and the biological carbon pump depends on the structure of oceanic food webs. Thus, it is critical to understand how shifting the pool of organismal traits in the community will affect its architecture. Studying the ecology of siphonophores is extremely difficult due to the inaccessibility of their habitat and the hardships of collecting them alive. Our work provides a robust framework to predict the trophic ecology of manifold understudied species based on their functional morphology and phylogenetic distribution.

We believe that this manuscript is appropriate for publication in *Integrative & Organismal Biology*, as it advances our knowledge of the natural history of an understudied group of animals from a rigorous phylogenetic perspective.

Thank you for your consideration of our manuscript.

Yours sincerely,

Alejandro Damian-Serrano