

Abstract

Is Cryptic Biodiversity a Common Phenomenon among Atlantic Oceanic Squids?[†]

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† Presented at the 1st International Electronic Conference on Biological Diversity, Ecology and Evolution, 15–31 March 2021; Available online: <https://bdee2021.sciforum.net/>.

Abstract: Historically, marine oceanic open environments have been considered without barriers to dispersal, and the subsequent speciation of lineages from distant areas. As a consequence, many marine pelagic marine invertebrates are considered as monotypic cosmopolitan taxa, sometimes even including divergent geographic morphotypes. However, this view has been consistently challenged in the last decades by the discovery of many cryptic species complexes among pelagic

marine “cosmopolitan” invertebrates. Despite their vast ecological importance, oceanic squids of the order Oegopsida Orbigny, 1845 and the superfamily Bathyteuthoidea Vecchione, Young and Sweeney, 2004 are seldomly molecularly tested for cryptic biodiversity covering wide areas. Here, we barcoded specimens belonging to 12 oceanic squid species sampled during several Atlantic oceanic cruises covering Atlantic waters from Brazil to Iceland, and the Mediterranean Sea. For assessing the presence of cryptic lineages, we studied the uncorrected p-distances at the intra- and interclade level and performed molecular species delimitation methods, such as the Poisson Tree Processes and the Generalized Mixed Yule Coalescent approach. Within Atlantic waters, we found cryptic biodiversity in five species: *Abraliopsis morisii* (Verany, 1839), *Ancistrocheirus lessueuri* (Orbigny 1842), *Chtenopteryx sicula* (Verany 1851), *Galiteuthis armata* Joubin, 1898 and *Helicocranchia pfefferi* Massy 1907. Atlantic individuals of *Pterygioteuthis gemmata* Chun, 1908 represent a divergent lineage of those from New Zealand. The divergence values among cryptic lineages of individuals of the same nominal species range from 2.2 to 17%, likely representing different stages of divergence since each putative speciation phenomena. In total, 50% of the tested species revealed cryptic lineages, which indicates that oceanic squid biodiversity is underestimated and it is necessary to develop more studies to assess the diversity of these animals at a global scale.

Citation: Fernández-Álvarez, F.A.; Villanueva, R.; Allcock, L. Is Cryptic Biodiversity a Common Phenomenon among Atlantic Oceanic Squids?[†], *Proceedings* **2021**, *68*, x. <https://doi.org/10.3390/xxxxx>

Published: date

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