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Orientation: Sustainable Use of Marine Resources

Specialization Area: Management and Use of Resources

Research Area: 2.1 Research into resources based on knowledge of ecosystems



PhD project: Ecology of cephalopod paralarvae in a seasonal upwelling system



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Summary: Cephalopod paralarvae are the less known stages of cephalopods, due to their low abundance in the zooplankton and their morphological similarities that greatly difficult their identification to species levels. These uncertainties, prevent to understand how environmental conditions affect the spatiotemporal abundance of the different species and adult recruitment. Besides, their unusual way of feeding - by absorbing the liquified content of their prey - also has prevented knowing their trophic links in the wild. This thesis applied molecular techniques to unravel the ecology of the different cephalopod paralarvae species present in the Ría de Vigo. The most remarking findings to these aims were:

I) Unexpected cephalopod paralarvae diversity within the Ría de Vigo, with up to 12 different species: *Octopus vulgaris*, *Loligo vulgaris*, *Alloteuthis media*, *Alloteuthis subulata*, *Sepiola pfefferi*, *Sepiola tridens*, *Rondeletiola minor*, *Sepiola atlantica*, *Sepietta neglecta*, *Sepiola ligulata*, *Todaropsis eblanae* and an undescribed sepiolid species belonging to the family Heteroteuthidinae.

II) Hatching increment length and head width measures could be useful to discriminate between *L. vulgaris* and *Alloteuthis sp.* individuals. Tentacle length could be useful to discriminate between *A. media* and *A. subulata*. The three most abundant sepiolid paralarvae species differed in size, being *S. pfefferi* the largest, and *R. minor* the smallest. However, discriminant analyses did not succeed discriminating among them with 100% effectivity.

III) The existence of three loliginid species and seven sepiolid species with different molecular diversity patterns, is supported by a phylogenetic tree with high bootstrap. Contrasting molecular diversity indexes and haplotype networks were found within the same genus.

IV) Next Generation Sequencing analyses identified prey in the digestive gland of 96.87 and 81.25% of octopus and squids respectively. 122 MOTUs were found, of those 39 to species level.

V) There were less paralarvae captured during the day, excluding *Loligo vulgaris*. *Octopus paralarvae* were mainly found during the night in shallowest layers, sepiolid captures were also higher during the night and near the bottom, and loliginid were mainly captured in intermediate waters.

