

Integrative taxonomic-ecological perspective of parasites infecting krill, chaetognaths and their nektonic predators in the Gulf of California, Mexico

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The zooplankton as key intermediate hosts of trophically transmitted parasites is not generally included or even recognized in zooplankton ecological studies. We did an integrative taxonomic–ecological study of helminth parasites of 11 omnivorous euphausiid species (numerically dominated by *Nyctiphanes simplex*, *Nematoscelis difficilis*, and *Euphausia lamelligera*), 15 species of carnivorous chaetognaths species (numerically dominated by *Flaccisagitta enflata* and *Zonosagitta bedoti*) and several of their main nektonic predator species [jumbo squid (1 spp.), teleost fish (9 spp.), sharks (6 spp.), and blue whales (feces)] in the Gulf of California. Euphausiids and Chaetognaths had quite distinct parasite species assemblages (identified morphologically and genetically) that transmit to higher trophic levels using different transmission pathways. Only numerically dominant species had helminth parasites. Euphausiids were infected with four Cestoda (98.8%), one Acantocephala (0.6%), two Trematoda (0.4%), and one Nematoda (0.2%) species. All them had a relatively large parasite-host size ratio with intensity typically 1 (rarely 2) associated with the relatively large biomass and carbon weight of the krill hosts. Chaetognaths were mostly infected with a diverse Trematoda species assemblage (92%) and one species of cestod (5%) and nematod (3%). Trematodes were found in intensity up to 8 and typically have small parasite-host size ratio, likely associated with low carbon weight of the chaetognath host. All blue whales (88 feces) were infected mostly with unidentified helminth eggs, and adults of Acantocephala that paradoxically does not match with parasitic diversity of their euphausiid preys. Sharks were infected with adult phases of cestodes that infect krill *N. simplex* and chaetognaths *F. sagitta*.

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