**Tracing sea lamprey (*Petromyzon marinus,* L.) in the aquatic food webs: two distinct diets put in evidence by fatty acids trophic markers**

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**ABSTRACT**

Sea lamprey *Petromyzon marinus* (L.) is an anadromous species in which the larvae are microphagous feeders. After metamorphosis, the pelagic juveniles migrate downstream to the sea, where they begin the parasitic stage of their life cycle, feeding primarily on the blood of marine fish. At the end of this oceanic phase the adults cease feeding and enter rivers to migrate upstream, where they spawn and die. The low number of specimens caught in the ocean is one of the reasons for the scarce information on sea lamprey feeding ecology during the marine phase of their life cycle. In this study, fatty acid (FA) signatures and FA trophic markers were used to trace sea lamprey’s trophic preferences. Sea lamprey adults were captured in the Mondego estuary in March and larvae were collected in freshwater in September. Accelerated Solvent Extraction was used to obtain muscle’s total lipids and FAME were analyzed on a Bruker GC/MS system. Most of the studies of fish tissue FA analysis use Massa Spectra data and linear retention indices, which are inefficient due to the very similar mass spectra of the isomers. We used a multidimensional system that leads to an increase separation between compounds. The FA trophic markers revealed the importance of bacteria as sources of *iso* and *anteiso* FA and the strong trophic representation of benthic phytoplankton in larvae muscle FA profile. In adults, the results point out for a carnivorous diet associated with a marine food web with a planktonic base, as highlighted by the presence of fatty acid signatures characteristics of calanoid copepods.

Keywords: Anadromous migration, fatty acids, trophic markers, Petromyzontidae