Iglesias C., G. Goyenola, M. Meerhoff & N. Mazzeo. Effects of macrophytes and predation risk on the diel distribution of cladocerans in a subtropical lake (Lake Blanca, Uruguay). ORAL. En: Shallow Lakes, Dalfsen, Holanda, 2005.

Resumen:

Macrophytes play a key role in fish-zooplankton interactions in shallow temperate lakes. The presence of planktivorous fish may alter the distribution of zooplankton. Studies in this respects have shown that pelagic zooplankton move into macrophyte beds seeking refuge against fish predation during daytime diel horizontal migration (DHM). Also the presence and extent of DHM is known to be conditioned not only by the type and density of macrophytes, but also by the density and distribution of predators. Lazzaro (1997) pointed out the difficulty to apply this theoretical framework to tropical and subtropical lakes, mainly due to the differences in the fish community. The objective of this work is to determine the spatial use of cladocerans in a subtropical shallow lake and the effects promoted by the spatial distribution of predators (planktivorous fish and Chaoborus larvae). Lake Blanca (34°54´ S, 54°50´ W) is a shallow eutrophic system (total area,40.5 ha; Zmax, 1.5-3.6 m) without piscivorous fish, is located in the main tourist area of Uruguay and is used for water supply. We sampled the lake from winter 2003 to autumn 2004, taking samples at 5 points per habitat: open water (OW), submerged plants Egeria densa and Ceratophyllum demersum (SP), and emergent plants, mainly Schoenoplectus californicus (EP), at midday and midnight. We took integrated zooplankton samples using a core sampler. The fish community was sampled using electro fishing and minnow traps. Differences in day-night densities were tested with ANOVA's, and the relationship between predators, physico-chemical characteristics and zooplankton with Mantel's tests. The zooplankton community comprised 16 taxa of rotifers, 3 of copepods and 5 of cladocerans. The highest abundance occurred in autumn (ca. 2400 ind. l^{-1}), while the other seasons were quite similar (ca. 1000 ind. l^{-1}). The mesofiltrators dominated in winter while microfiltrators dominated the rest of the year. The cladocerans *Bosmina longirostris* Müller, *Moina micrura* Kurz, *Diaphanosoma birgei* Korineck, *Alona* spp. and *Chydorus* spp. were found all year round, with higher abundance in winter and autumn. The relative composition varied between seasons: *B. longirostris* dominated in autumn and winter, *Chydorus* spp in spring and summer, especially in SP and EP. *Diaphanosoma birgei* was present the whole year and dominated in the OW (with *M. micrura*) in spring, practically disappearing in summer. We found evidence of inverse DHM for *D. birgei* and *B. longirostris*. Both species showed higher abundance in OW and EP during the day and low or near zero in SP. By night, the abundance in OW and EP decreased significantly and rose 50-fold in SP. *Diaphanosoma birgei* showed a stronger pattern than *B. longirostris*, which is consistent with observations that large cladocerans are more susceptible to predation and, therefore, undergo DHM. The fish community comprised only two species, the planktivorous *Jenynsia multidentata* and *Cnesterodon decemmaculatus. J. multidentata*, the dominant species, was found strongly associated with EP. The invertebrate predator *Chaoborus* spp was also found, mainly in OW and EP and at night. Although the physico-chemical characteristics differed among habitats, they were not related to the spatial distribution of zooplankton (Mantel's test). However, a predator-induced DHM is supported by a significant relationship with the predator matrix ($r=0.153$, $p<0.05$). We conclude that the combined effect of fish and invertebrate predation risks is determining the DHM patterns of *B. longirostris* and *D. birgei.*

Literature*:* Lazzaro, X. (1997) Do the trophic cascade hypothesis and classical biomanipulation approaches apply to tropical lakes and reservoirs? Verh. Internat. Verein. Limnol. 26: 719-730