

## **Diel vertical migration and cross-shore distribution of barnacle and bivalve larvae in the central Chile inner-shelf**

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### **Abstract**

The vertical and horizontal distribution of larval stages of the most common intertidal barnacle and mussel species were characterized in near-shore waters of central Chile. Paired day/night cruises were conducted on four spring-summer dates between December 2007 and November 2008, under contrasting wind, wave height, and near-shore stratification conditions. Regardless of variability in oceanographic conditions, the highest abundances of barnacle and mussel larvae were found within 1500 m from shore. Non-uniform vertical distributions were observed for chthamalids, balanids and mussel larvae, but patterns of diel variability differed among them. Chthamalid and balanid nauplii, as well as balanid cyprids were more abundant in the upper 20 m of the water column, while the density of chthamalid cyprids was highest near the bottom. Mussel larvae were only found within 20 m of the surface. The Mean Depth Distribution (MDD) of all nauplii (balanid and chthamalid) and chthamalid cyprids was deeper during day than night, suggesting typical diel vertical migration (DVM), but this difference was statistically significant only for nauplii. Mussels did not show diel differences in vertical distribution. The amplitude of DVM, measured as the difference between daytime and nighttime MDD, decreased with increasing wave height in chthamalid and balanid nauplii, but not with along-shore wind stress. Chthamalid nauplii, and to a lesser extent, balanid nauplii were found below the pycnocline during the day and above at night, suggesting that DVM involves daily crossing of this density barrier. In contrast, cyprids of all barnacle species were distributed across the pycnocline with no clear pattern. The results suggest that barnacle and bivalve larvae may exhibit a variety of behavioral responses to position themselves in the water column despite typically turbulent near-shore waters, and that such behavior varies between species and through ontogeny within species. Moreover, some stages of barnacle larvae perform DVM, but the amplitude decreased with increasing wave height – which may be either a plastic response to environmental cues or merely turbulent mixing impeding the ability of larvae to perform vertical migration..