

Effects of *Chiton granosus* (Frembly, 1827) and other molluscan grazers on algal succession in wave exposed mid-intertidal rocky shores of central Chile

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Abstract

Molluscan grazers can have important effects on the abundance, colonization rates, and successional pathways of algal assemblages and the entire intertidal community. In general, early successional algae are more readily consumed than corticated algae and kelps, which usually get established later in the community succession. To generalize, however, the effect of different grazers on algal assemblages must be examined on different coasts and under different scenarios. This information could help us understand the mechanisms of ecosystem processes and situations in which general models do not apply. Along the coast of Chile, humans harvest large keyhole limpets, which seem to be the only invertebrate grazers capable of controlling the dominant corticated alga *Mazzaella laminarioides*, a canopy-forming species that can cover extensive areas of the mid intertidal zone. In this scenario, where large limpets are harvested, the overall effects of the diverse molluscan assemblage of limpets, chitons and snails on algal succession and on corticated algae in particular are not clear. We conducted a 26-month-long experiment to evaluate the effects of molluscan grazers on mid-intertidal algal succession and to isolate the effects of *Chiton granosus*, the most conspicuous member of the assemblage at these tidal elevations. At sites heavily impacted by humans the molluscan grazer assemblage had strong negative effects on colonization and abundance of green algae such as ulvoids and *Blidingia minima*. In doing so, the grazer assemblage had a strong negative indirect effect on the establishments of chironomid fly larvae, which were only observed on green algal mats and rarely on bare rock. No significant effects were detected on epilithic microalgae, and effects on sessile invertebrates were highly variable over space and time. *C. granosus* also had significant negative effects on green algae but did not account for the total grazing pressure exerted by the guild. Limited foraging excursions (ca. 35 cm) from refuges and moderate site (crevice) fidelity in this species may contribute to the patchiness in green algal distribution observed in the field. Nearly 13 months after rock surface were experimentally cleared, *M. laminarioides* appeared in all experimental plots, but increased over three times faster in enclosures containing *C. granosus* than in exclosures plots or controls, suggesting that moderate levels of herbivory could actually facilitate the establishment of this alga in the succession and that the green algal cover found in the absence of grazers may delay its establishment.