# The phenomenon of a biased modern record: living and dead molluscs on living and dead hard substrates in the northern Red Sea

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Different subtidal hard substrates (reef flats, reef slopes, coral carpets, coral patches, rock bottoms) with varying coral associations were studied with respect to shelled molluscs: At 68 sample localities ranging from shallow subtidal to 40m water depth a total area of 340.5 m² was investigated and 2846 individuals were counted.

Most of the hard substrate molluscs were alive (77.7%) and the overall density of living molluscs (1.62 indiv. / 0.25m²) is much higher than that of the dead fauna (0.47 indiv. / 0.25m²). Striking differences regarding the dominant taxa are evident: living molluscs are strongly dominated by taxa with distinct relations to living corals, mainly *Pedum* (24.79%), *Coralliophila* (15.29%) and *Tridacna* (11.62%), and the encrusting gastropod *Dendropoma* (17.50%). In contrast, dead molluscs are strongly dominated by encrusting bivalves, mainly Chamoidea (50.08%) and Spondylidae (14.02%). There is no statistically significant correlation between the total of living and dead molluscs and their overall similarity is only 6%. Similarity between living and dead molluscs is above 50% at 12 sample locations only and at 17 sample locations considerable correlations between living and dead molluscs were recognized. These correlations are mainly based on similarities between living and dead Chamoidea.

Regarding the distribution patterns, 5 distinct groups can be differentiated for living molluscs; at least 4 of them can be related to specific hard-substrate types. Reef flats are dominated and characterized by *Dendropoma*. Coral carpets and reef slopes with *Porites* associations are dominated by coral associated bivalves and gastropods and best characterized by *Coralliophila* and *Barbatia foliata*. Hard bottoms with high amounts of bare rocky surface („rock grounds") are dominated and characterized by Chamoidea and *Cerithium* spp. *Millepora – Acropora* reef slopes are dominated by gastropods and bivalves associated with living corals and best characterized by *Drupella* and Pteriidae. The last group consists mainly of carpets with faviid associations, but includes also sample locations with other coral associations and bottom types. This group is dominated by bivalves with varying life habits: *Pedum*, *Tridacna*, *Barbatia setigera*, Chamoidea and *Ctenoides*; their co-occurrence consequently best characterizes this sample group. The content of dead individuals is for all 5 groups dominated by Chamoidea, Spondylidae and *Cerithium* spp. in varying dominances. Correspondingly, dead molluscs do not show a consistent distribution pattern which can be related to specific hard substrate types.

Rock grounds are the only sample group, where all sample locations show considerable correlations between living and dead molluscs; in this group, both the living and dead fauna is dominated by Chamoidea and *Cerithium* spp.

The results of this study emphasize the special conditions of faunal composition and preservation in coral dominated areas: living corals provide different habitats, which are colonized by distinct faunal associations. After death, taxa closely associated with the living substrate will either be overgrown (most bivalves) or will probably be found in surrounding sediments (gastropods). The fauna encrusting / colonizing dead hard substrates remains much longer at the surface and is therefore prone to time-averaging, whereas the time-resolution of faunas overgrown by the living substrate should be much better.

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