

Amphipod assemblages along shallow water natural pH gradients: data from artificial substrata (Island of Ischia, Italy)

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ABSTRACT Amphipods, studied along natural pH gradients, showed to be severely selected only below a tolerance threshold (i.e., pH 6.6), with important changes in assemblage structure.

KEY WORDS Amphipoda; ocean acidification; natural pH gradient; artificial substratum; Mediterranean Sea.

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Ocean acidification is one of the most serious threats facing marine life. It is likely to cause a decrease in biodiversity which may lead to shifts in ecosystem structure (e.g. Sunday et al., 2017). Amphipods, due to their structural and functional role, have become important in assessing biodiversity (Scipione, 2013a), and have long been known as sensitive environmental indicators (Conlan, 1994). The present study was framed within a wider research programme, aimed at investigating the effect of low pH/ $p\text{CO}_2$ on benthic assemblages, and in particular at evaluating amphipod robustness or sensitiveness to future acidification scenarios.

It was conducted at the Castello Aragonese, an area off the Island of Ischia (Gulf of Naples, Italy) characterized by natural pH gradients due to CO_2 volcanic vents. In this 'natural laboratory', amphipods were sampled by means of artificial collectors settled for one month at approx. 2 m depth. The present study is related to a comparison between collectors placed at two locations, in the water column and on the rocky reef, in May 2010 and June 2011, respectively. At both transects, three

stations along the pH gradients at the north and south sides of the Castello were established: St. 1 ambient (mean pH 8.1), St. 2 low pH (7.7; 7.8) and St. 3 extreme low pH (7.3; 6.9), totalling 42 samples (Ricevuto et al., 2014). Species richness, abundance and Shannon-Wiener diversity index were calculated for each sample. Data were analysed by means of nMDS and cluster analysis, and differences between location, side and pH were studied through SIMPER and PERMANOVA analyses.

Overall, 11,540 individuals (water column: 1,495; rocky reef: 10,045), belonging to 43 species (30; 37) were identified. Assemblage parameters showed significant differences between the two locations, with higher values on the rocky reef, except for St. S3. In the water column diversity increased significantly in the South at low and extreme low pH, while on the rocky reef it was significantly lower at St. S3 (Fig. 1a). The structure of assemblages: - showed clear disjunctions along the pH gradients in both the water column (ambient vs. acidified sites) and the rocky reef (ambient, low pH vs. extreme low pH) (Fig. 1b); - significantly differed between pH zones, with significant inter-