

Mesophotic zone as refuge: acclimation and in-depth physiological response of yellow gorgonians in the Mediterranean Sea

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Abstract

The intensification of warming-induced mass-mortalities in invertebrate populations is a critical phenomenon that affects many regions worldwide, including temperate ones. Mesophotic zones (from 30 to 150 meters depth) have been hypothesized to provide refuge from climate change to gorgonian populations, a promise for re-seeding damaged or destroyed shallow populations. Using a proteomic approach, we investigated the responses and acclimatization ability of the yellow gorgonian *Eunicella cavolini* along an environmental gradient following reciprocal transplantations between shallow (20m) and mesophotic (70m) zones. Our results suggested that yellow gorgonians from mesophotic waters exhibit a more plastic response when transplanted into shallow waters, compared to shallow gorgonians when placed at 70m. Colonies transplanted from mesophotic to shallow waters presented a down-regulation of immune response compared to colonies that stayed at 70m. Despite immunodepression, transplanted colonies displayed no signs of necrosis or apoptosis, underscoring the potential acclimation capacity of mesophotic populations. Under future climate change scenarios, *Eunicella cavolini* populations could thus exhibit physiological plasticity in the face of environmental stress, suggesting that no physiological barrier may limit natural colonization from mesophotic populations. This analysis provides new insights into the cellular and molecular responses of gorgonians to environmental changes.

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