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Multiomics analysis of seaweed holobiont dynamics reveals the influence of copper

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Video Byte

Keywords: holobiont, surface metabolome, surface microbiota, copper stress, temperature, chemical interactions, metabarcoding, metabolomics, metabolome, Microbiome, microbiota, algae, macroalgae, Taonia atomaria, Phaeophyta, multiomics, Mediterranean, epibacterial community, trace metals, pollution

Posted Date: October 13th, 2021

DOI: https://doi.org/10.21203/rs.3.rs-967539/v1

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Abstract

Macroalgae and their surface microbes closely interact in integrated assemblages called holobionts. However, the interactions within these holobionts and the effects of environmental factors, especially in the context of coastal pollution, remain unclear. To clarify this issue, a recent multiomics study investigated the spatiotemporal dynamics of the holobiont of Taonia atomaria, a Mediterranean seaweed at sites with different levels of trace metal pollution. At all geographical sites, the surface bacterial communities were highly specific to the seaweed. The density and diversity of bacteria living on the seaweed at each site generally increased with the progression of time toward summer, but the proportions of core taxa and specific algal-enriched taxa decreased, suggesting the arrival of new colonizing bacteria. Notably, besides temperature, the copper concentration in the seawater was a key environmental factor shaping holobiont dynamics. Metabolomics revealed that carotenoid expression increased with the copper concentration, suggesting that copper exposure caused oxidative stress, which might have affected the surface bacteria composition. Although further clarification is needed, this study highlights the dynamic nature of the holobiont of T. atomaria and reveals copper stress as an important driver of the interactions between this seaweed and its surface bacteria.