**The influence of illumination on interstitial ciliates community**

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**Abstract.** Intertidal zones are critical habitats that support diverse microbenthic communities [1]. Microbial communities play a crucial role in nutrient cycling, ecosystem functioning and overall ecosystem health [2]. The influence of illumination on interstitial ciliates community is not yet fully understood, despite its potential importance. Therefore, this study aimed to investigate the influence of illumination on interstitial ciliates community, focusing on the changes of species composition, diversity and abundance under different light conditions, as well as the effects of physical and chemical factors on their numbers. We hypothesize that highlighting reduces ciliates species richness over time, and that changes in benthic populations may affect the entire marine ecosystem. To test this, we sampled a small patch of sand (1 m2) at the low and middle littoral in the Gryaznaya Bay (the Kandalaksha Gulf, the White Sea), miming three different kinds of light (minimal darkening, half dark, full dark). In addition, environmental factors such as temperature, salinity and nutrient levels were measured to determine their potential impact on microbenthic communities. After analysis, illumination had a significant influence on the ciliates community, with significant changes observed in species composition, diversity, and abundance between the three different illumination treatments. The number of ciliates in the high light group was the highest, and the species diversity was higher than that in the low light group. In addition, physicochemical factors also affect the abundance of interstitial ciliates. We found that illumination and oxydation had a significant positive correlation with ciliate abundance and diversity, suggesting that ciliates prefer well-illuminated and oxygenated sediments. We also found that sediment pH, silt content, and salinity had a significant impact on ciliate distribution, with ciliate abundance decreasing with increasing sediment pH and silt content, and increasing with salinity. Additionally, we found that nutrient availability, as indicated by the concentration of ammonium, nitrites, nitrates, and phosphates in interstitial water, had a significant impact on ciliate abundance and diversity, with higher nutrient concentrations leading to increased ciliate abundance and diversity. The availability of nutrients also affects the distribution and abundance of benthic microorganisms, with some species being more abundant in nutrient-rich environments. This study can not only evaluate the change of Marine ecosystem from the direction of ecological environment, but also predict the future climate change, which is of great significance for the direction of future environmental governance.

**References**

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