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Investigation of Trace Metal Accumulation on MiPs and Their Impact on Aquatic Organisms in Red River Delta

Scientific research question

The pollution caused by microplastics (MiPs) in aquatic environments has become a pressing global issue, with millions of tons of plastic waste entering the oceans each year, posing significant threats to marine organisms. Recent studies have primarily concentrated on the presence of MiPs and the pollutants, particularly metals, that they can adsorb in aquatic ecosystems and biological communities. This study, conducted in the Red River Delta, aims to investigate the ecological toxicity of MiPs in this aquatic environment, specifically focusing on the influence of adsorbed metal types on the surface of MiPs. The objective is to identify the role of MiPs as vectors facilitating the transfer of metal contaminants into aquatic organisms. Additionally, the study seeks to elucidate the toxic effects of these metal-contaminated MiPs on aquatic species by examining changes in the activity of specific enzymes, including glutathione-S-transferase (GST), catalase (CAT), acetylcholinesterase (AChE), and lysozyme (LYS). By doing so, the research aims to highlight the importance of using biomarkers for monitoring and early warning of aquatic pollution, particularly related to metal accumulation on MiPs, in the Red River Delta ecosystem.

Experimental approach

- **Sample Collection and Analysis:** Water and sediment samples will be collected from various locations within the Red River Delta to evaluate the presence of microplastics (MiPs) and the extent of metal accumulation on these particles.
- **Exposure Experiments:** Aquatic organisms will be exposed to metal contaminated MiPs under controlled laboratory conditions, with contamination levels designed to reflect the actual pollution observed in field samples from the Red River Delta.
- **Biological Response Assessment:** The health impacts on exposed organisms will be evaluated by measuring changes in the activity of key enzymes, such as glutathione-S-transferase (GST), catalase (CAT), acetylcholinesterase (AChE), and lysozyme (LYS), as biomarkers of toxicological effects.

Possible prospective task of the intern

- Assist in isolating MiPs from environmental samples using density separation and filtration techniques.
- Aid in conducting laboratory exposure experiments with aquatic organisms.
- Participate in preparing samples for metal analysis and performing assays to measure metal accumulation.
- Assist in analyzing enzyme activity to assess the physiological effects of metal exposure.
- Contribute to data organization, interpretation, and reporting.

Contact

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