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## Prokaryotic Horizontal Gene Transfer in Freshwater Lakes: Implications of Dynamic Biogeochemical Zonation

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### ABSTRACT

The highly adaptive nature of prokaryotic communities in the face of changing environmental conditions reflects in part their ability to share advantageous genetic information through horizontal gene transfer (HGT). Natural freshwater lacustrine (lake) systems are a vital and finite resource, and the influence of HGT on their quality (e.g. enabling the spread of antibiotic resistance and xenobiotic catabolism genes) is likely significant. Laboratory and *in situ* studies indicate that the dynamic physical, chemical, and biological conditions that structure freshwater systems can influence HGT within freshwater prokaryotic communities. Thus, understanding how biogeochemical parameters impact HGT in freshwater lakes is an emerging knowledge gap with potential implications for ecosystem and human health on a global scale. In this review, we provide a general synopsis of what is known about HGT in freshwater prokaryotic communities, followed by an integrated summary of current knowledge identifying how biogeochemical factors may influence prokaryotic HGT in freshwater lacustrine systems.

### KEYWORDS

Gene Transfer; Freshwater; Water Quality; Prokaryotic; Biogeochemistry

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