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珠江水体中细菌碱性磷酸酶基因 $phoD$ 的多样性 Diversity of bacterial APase $phoD$ gene in the Pearl River water

关键词: [碱性磷酸酶](#) [\$phoD\$ 基因](#) [多样性](#) [富营养化](#) [珠江](#)

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摘要: 碱性磷酸酶(APase)是最主要的有机磷水解酶,在无机磷匮乏的情况下,APase释放的无机磷供藻类利用,致使藻类大量繁殖,因此,对APase基因多样性的研究有利于揭示对水体富营养化有重要影响的微生物类群.基于此,本文以珠江水体为研究对象,构建了珠江广州段穗石、坦尾和南沙3个点细菌的 $phoD$ 基因克隆文库.限制性酶切片段多态性(RFLP)分析结果表明,上述3个点的 $phoD$ 基因分别含有15、17、13个操作分类单元(Operational Taxa Unit, OTU),穗石点的多样性(Shannon指数和Simpson指数)均高于其他两个点; $phoD$ 基因序列系统发育分析表明,珠江水体中 $phoD$ 基因主要来源于*Plesiocystis*、*Limnohabitans*、*Pirellula*等属的细菌,而*Limnohabitans*属的 $phoD$ 基因在文库中含量最高,占文库的44%~50%.研究表明,珠江水体中细菌的 $phoD$ 基因具有较高的多样性,这些基因编码的碱性磷酸酶可能在珠江水体的富营养化过程中有重要的作用.

Abstract: Alkaline phosphatase (APase) is an important hydrolase to many bacteria. In water ecosystems, it releases inorganic phosphorus from organophosphorus by hydrolyzing activity. The released inorganic phosphorus was usually assimilated by algae or microalgae, which led to the cyanobacteria blooming in these ecosystems. Investigation of the diversity of bacterial APase gene in freshwater water is helpful for revealing the microbial groups that have important impacts on eutrophication. In this paper, we took water samples from the Pearl River as research subject, and constructed three $phoD$ gene clone libraries based on Suishi, Tanwei and Nansha sampling sites of Guangzhou section. The restriction enzyme fragment polymorphism (RFLP) analysis suggested that the numbers of Operational Taxa Unit (OTU) in the three $phoD$ gene clone libraries were 15, 17 and 13, respectively. The diversity (Shannon index and Simpson index) of $phoD$ gene in Suishi site was higher than the other two sites. The nucleotide sequence phylogenetic analysis showed that the $phoD$ in the Pearl River water were closely related to the genus of *Plesiocystis*, *Limnohabitans*, *Pirellula*, etc. The $phoD$ gene from *Limnohabitans* was the most predominant in clone libraries, and accounted for 44%~50%. This work indicated the $phoD$ gene had high diversity in the Pearl River water, and the APase had an important role on the eutrophication in the Pearl River.

Key words: [alkaline phosphatase](#) [\$phoD\$ gene](#) [diversity](#) [eutrophication](#) [Pearl River](#)

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