

专论与综述

活性污泥微生物菌群研究方法进展

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摘要 活性污泥是活性污泥法处理污水系统的功能主体。人类对活性污泥微生物菌群的认识随着其研究方法的发展而逐步深入。传统培养方法只能检测到活性污泥中1%~15%的微生物。随着一系列基于免培养的分子生物学技术的出现, 活性污泥中菌群的复杂性和多样性以惊人的速度被人们认识, 大量依靠传统检测方法未能发现却在活性污泥中起关键作用的微生物逐渐被发现。许多模拟活性污泥菌群生存环境条件的现代培养技术开始发展, 且已成功培养了一部分传统培养方法不能培养的细菌类群, 这为研究基于免培养方法发现的大量新的微生物菌群的生理特性和作用机制提供了可能, 也无疑将把人们对活性污泥菌群的认识推向一个新的层次。主要介绍活性污泥微生物菌群研究的一系列方法, 从传统培养方法到基于免培养的现代分子生物学技术, 再到现代培养技术, 着重论述了现代分子生物学技术及其在活性污泥微生物菌群研究中的进展。

关键词

[activated sludge](#) - [bacterial community](#) - [16S rRNA](#) - [PCR-DGGE](#) - [PCR-SSCP](#) - [FISH](#) - [FCM](#)

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Development in research methods of activated sludge bacterial community

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Abstract Activated sludge is the key functional element of biological wastewater treatment plants which employ an activated sludge process. This review enhances our knowledge about activated sludge microbial community and the development of its research method. Traditional cultivation-based studies could detect only 1% to 15% of microorganisms in activated sludge, therefore causing heavily biased shifts in community composition. With the emergence of a variety of cultivation-independent molecular methods, mainly based on 16S rRNA sequences, from the 1980s to the present, the biodiversity and complexity of activated sludge microbial communities were revealed at astonishing speed, and correspondingly numerous key microorganisms in activated sludge which were not detected by traditional cultivation methods, were disclosed by culture-independent techniques. Recently, many modern cultivation procedures, based on simulation of the environmental conditions that the samples existed in, were developed and have successfully cultured some previously uncultivable microorganisms, offering the possibility of further exploring the physical characteristics and functional mechanisms of these newly recognized microorganisms. These advances undoubtedly promote our knowledge about activated sludge microbial communities to a higher level. This review introduces a series of methods about activated sludge microbial community research, including traditional cultivation-based methods, microbial biomarkers, molecular biological technology and modern culture approaches, especially focusing on a summarization of molecular biol

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ological technology, such as PCR-DGGE, FISH, FCM, and its application for research on the activated sludge bacterial community.

Key words

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