陈亚楠,王亚炜,魏源送,郑祥,王光宇.不同功能地表水体中病原微生物指示物的标准比较[J].环境科学学报,2015,35(2):337-351

不同功能地表水体中病原微生物指示物的标准比较

Evolution and standard comparison of indicator microorganisms for different surface waters

关键词：地表水 指示微生物 水质标准

基金项目：中国科学院生态环境研究中心"一三五"项目(No.YSW2013B02);"十二五"国家科技支撑计划课题(No.2012BAJ19B02);教育部"新世纪优秀人才支持计划资助"(No.NCET-12-0531);国家自然科学基金项目(No.51478460)

作 者 单位

陈亚楠 1. 中国人民大学环境学院, 北京 100872;2. 中国科学院生态环境研究中心, 北京 100085

王亚炜 中国科学院生态环境研究中心, 北京 100085

魏源送 中国科学院生态环境研究中心, 北京 100085

郑 祥 中国人民大学环境学院, 北京 100872

王光宇 美国加州环境保护署圣塔莫尼卡湾治理委员会, 洛杉矶 CA 90045

摘要：地表水病原微生物污染对人类健康构成了巨大的潜在威胁,地表水体的病原微生物污染及其控制日益得到人们的重视.因此,本文从地表水环境功能和人类健康的角度出发,通过大量调研国内外不同功能的地表水环境质量标准,总结了当前常用病原微生物指示物的特点与指示效果;综述和比较了美国、欧盟、世界卫生组织和中国水环境标准中有关病原微生物控制指标的演变历程;最后对地表水体中病原微生物指示物的研究进行了展望.总体而言,当前常用指示微生物涵盖细菌、病毒和原生动物,但应针对不同目的选取不同类型的指示微生物;美国、欧盟和世界卫生组织的病原微生物控制指标已陆续转向大肠杆菌与肠球菌,而我国仅经历了从总大肠菌群到粪大肠菌群的转变.培养法与分子生物学方法是当前主要的病原微生物检测手段,前者广为应用,后者更为方便、快捷,但无法与相应标准对接.

Abstract：Pathogenic pollution of surface water may pose great threat to human health, and has been paid more and more attention recently. Therefore, the purpose of this study was to summarize the state-art of indicator microorganisms and the control standards for pathogen in surface water through literature review according to function of surface water and human health. Firstly, this study briefly introduced the evolution of microbiological standards for surface water adopted by different countries and organizations, such as USA, EU, WHO and China. And then the characteristics and performance of indicator microorganisms commonly used were summarized, together with the analysis methods of indicator microorganisms. Finally, the trends of indicator microorganisms in surface water were proposed. In a word, indicator microorganisms often used were bacteria, viruses and protozoa, which should be selected for different purposes. Indicator microorganisms of pathogen in recreational water adopted by USA, EU and WHO had been turned to *E.coli* and *enterococcus*, while the only change was from *total coliform* to *fecal coliform* in China. Culture and molecular biological methods are the main analysis methods of pathogen in surface water, and the molecular biological method is more convenient and quicker than the widely used culture method. However, its difficulty in docking with the corresponding standards limits its wide application.

Key words：surface water indictor microorganisms standards of water quality

主办单位：中国科学院生态环境研究中心

单位地址：北京市海淀区双清路18号 邮编：100085

服务热线：010-62941073 传真：010-62941073 Email：hjkxxb@rcees.ac.cn