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**Microbiology Community Changes During the Start-up and Operation of a  
Photosynthetic Bacteria-Membrane Bioreactor for Wastewater Treatment**

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**Abstract**

A pilot-scale photosynthetic bacteria-membrane bioreactor was applied to treat wastewater and culture photosynthetic bacteria (PSB) cells, and microbial communities at different stages were analyzed to reveal the underlying roles of efficient long-time operation of this reactor. After 40 days start-up, the reactor was successfully operated for 180 days. The results showed that the PSB-membrane bioreactor operated stably, with high COD and NH<sub>3</sub>-N removal efficiency of 95%. The PSB biomass could maintain a high cell concentration with a 10% harvest each day. Analysis of the microbial community showed that bacterial communities changed dramatically at different stages. The dominant bacteria were *Ectothiorhodospira* in the beginning to *Caenispirillum* and *Pannonibacter* during the stable operation. The Shannon index from 1.876 dropped to 1.477 after 6 months. The diversity of PSB

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