

**Application of DNA Microarray to Environmental Microbiology  
(Quantitative Detection of Environmental Genes in Biological Samples  
by Using DNA Microarrays)**

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To quantify target genes in biological samples using DNA microarrays, a reference DNA was employed to normalize variations in spot size and hybridization. This method was tested using nitrate reductase (*nirS*), naphthalene dioxygenase (*nahA*), and *E. coli* O157 O-antigen biosynthesis genes as model genes, and lambda DNA as the reference DNA. Good linearity between log (signal ratio) and log (DNA concentration ratio) was observed at DNA concentrations above the methods detection limit, which was approximately 10 pg. This approach for designing quantitative microarrays and the inferred equation from this study provide a simple and convenient way to estimate the target gene concentration from the hybridization signal ratio.