

Review article

## Detection of bacterial pathogens in environmental samples using DNA microarrays

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### Abstract

Polymerase chain reaction (PCR) is an important tool for pathogen detection, but historically, it has not been possible to accurately identify PCR products without sequencing, Southern blots, or dot-blot. Microarrays can be coupled with PCR where they serve as a set of parallel dot-blot to enhance product detection and identification. Microarrays are composed of many discretely located probes on a solid substrate such as glass. Each probe is composed of a sequence that is complimentary to a pathogen-specific gene sequence. PCR is used to amplify one or more genes and the products are then hybridized to the array to identify species-specific polymorphism within one or more genes. We illustrate this type of array using 16S rDNA probes suitable for distinguishing between several salmonid pathogens. We also describe the use of microarrays for direct detection of either RNA or DNA without the aid of PCR, although the sensitivity of these systems currently limits their application for pathogen detection. Finally, microarrays can also be used to “fingerprint” bacterial isolates and they can be used to identify diagnostic markers suitable for developing new PCR-based detection assays. We illustrate this type of array for subtyping an important food-borne pathogen, *Listeria monocytogenes*.

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