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Detection of blue light receptor genes from metagenomic DNA using a microarray approach

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Blue light photoreceptors containing LOV domains, which were first characterized in plants, have been reported from more than 90 bacterial genomes. It can be expected that presence of LOV domain containing protein in the metagenome which includes more than 99% of unexplored microbial world can be overwhelming.

In order to screen a large number of environmental DNA libraries, a DNA microarray technique has been applied. For this approach oligonucleotide-based DNA microarrays containing 149 different probes have been constructed using the sequence information from the conserved region of the LOV core (ca. 55 nucleotides in length) based on the sequence alignment of LOV domains from genomic and metagenomic databases. The LOV microarray has been tested successfully to identify the plasmid/cosmid clones and genomes having the similarity to the spotted probe. The detection limit of LOV microarray has been determined with plasmids, cosmids and complete genomes with different backgrounds. Currently, different metagenomic libraries and complex metagenomic DNA are being screened using LOV microarray. Presence of LOV domain has been detected in Elbe river metagenomic DNA, drinking water biofilm library and thermophilic soil metagenomic library using this approach.