

# Real-Time identification of Micro-organisms by Quantum Dots and Flow Cytometry.

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## Background

Determining the microbial diversity in extreme environments is one of the outstanding tasks for microbiology. Techniques that complement the microbial culture approach are necessary for a better understanding of microbial diversity and its role in ecosystem maintenance. Semiconductor quantum dots have the potential to become a new class of fluorescent probe for biological applications. We have overcome many of the methodological problems that limit the exploration of microbial community structure and function in applying recent advances in quantum dot technology to microbial ecology. The technology we have developed will have wider applications, particularly in diagnostic microbiology and for biosecurity surveillance.

## Outcomes

- Rapid real-time method for bacterial identification, particularly in water
- Multiplexed detection of microbial pathogens and assessment of biomass diversity

## Progress to date:

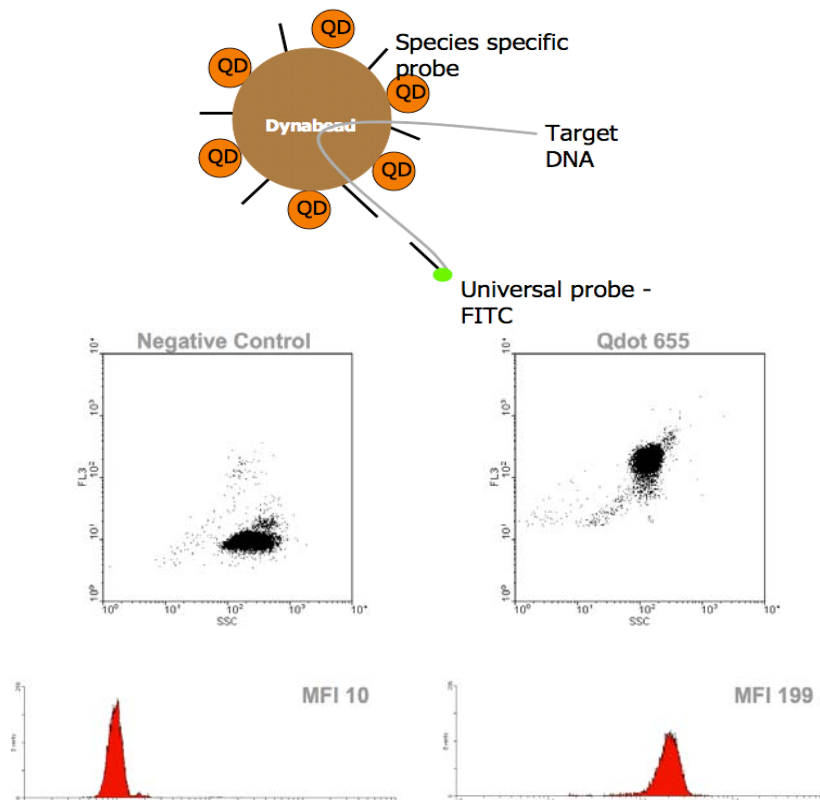
- Devised ways of coupling quantum dots (QD's) to oligonucleotide probes to identify bacteria in biomass
- Demonstrated that QD's are at least 70-fold brighter than organic fluorophores.
- Preliminary studies have shown that the FACS Aria instrument with its purple laser is ideally suited to the detection of signals from quantum dots hybridised to specific oligonucleotides and antibodies conjugated to DynaBeads. We have achieved a substantial increase in sensitivity compared to previous generation instruments.

## Funding is sought to:

- Increase sensitivity further and establish lowest detection limits
- Further develop multiplexing for simultaneous identification of micro-organisms
- Methods development for antibody capture and sorting of specific micro-organisms

## Quantum Dot Strategy for target DNA detection

- Species-specific probe and QDs conjugated to surface of the Dynabead®
- Species-specific probe hybridizes to target DNA
- A universal reporter probe modified with FITC binds to target DNA
- Complex detected using dual colour flow cytometry



## Contact:

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