Real-time image processing for label-free enrichment of Actinobacteria cultivated in picolitre droplets.

ILRS Authors

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Projects

 Automated analysis of dynamic properties in biological systems from image data
Details

Abstract

The majority of today's antimicrobial therapeutics is derived from secondary metabolites produced by Actinobacteria. While it is generally assumed that less than 1% of Actinobacteria species from soil habitats have been cultivated so far, classic screening approaches fail to supply new substances, often due to limited throughput and frequent rediscovery of already known strains. To overcome these restrictions, we implement high-throughput cultivation of soil-derived Actinobacteria in microfluidic pL-droplets by generating more than 600,000 pure cultures per hour from a spore suspension that can subsequently be incubated for days to weeks. Moreover, we introduce triggered imaging with real-time image-based droplet classification as a novel universal method for pL-droplet sorting. Growth-dependent droplet sorting at frequencies above 100 Hz is performed for label-free enrichment and extraction of microcultures. The combination of both cultivation of Actinobacteria in pL-droplets and real-time detection of growing Actinobacteria has great potential in screening for yet unknown species as well as their undiscovered natural products.

Identifier