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Domesticating Bacterioplankton: New Methods Produce a Surfeit of Cultured Oligotrophs

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Recently introduced high throughput culturing (HTC) procedures have led to a dramatic increase in the number of important bacterioplankton groups that are being cultivated and studied in a laboratory setting. This approach is based on Button's method for isolating cells by extinction culturing in natural seawater. Approximately 2500 cultures of pelagic marine have been isolated by this approach. Up to 14% of cells from coastal seawater were cultured using this method, a number that is 1400 to 140-fold higher than obtained by traditional microbiological culturing techniques. Among the cultured organisms are many unique cell lineages that have been named as new phyla, families, and genera. Ninety percent of the cells recovered by the HTC project do not replicate in Petri dishes of agar media. A majority of the isolates obtained are obligate oligotrophs that display logistic growth curves in seawater. These strains are being used to study microbial metabolic processes at natural substrate concentrations and cell densities, which are typically about three orders of magnitude less than in common laboratory media. Twenty-seven genomes from HTC isolates are now sequenced or in ques for sequencing. It is apparent that some abundant bacterioplankton groups do not replicate in the current generation of HTC media, and will require further innovation before isolation can be achieved.