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Microencapsulation and Subsequent In-Situ Incubation of Marine Bacteria for the Discovery of Novel Natural Products

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ABSTRACT

Despite difficulty in successfully culturing the vast majority of microbes present within the natural world, microbes continue to be a significant source of natural products. Consequently, various methods, including, but not limited to, modification of media composition and growth characteristics, single cell isolation, and *in-situ* incubation, have been employed over the years in an attempt to improve microbial recovery from environmental samples. To improve microbial recovery, the effect of microencapsulation followed by *in-situ* incubation on the abundance, viability and diversity of bacteria recovered from marine sediment samples was examined. Marine bacteria dislodged from sediments samples were concentrated by centrifugation and either resuspended (control) or encapsulated and then incubated within modified dialysis cassettes for a week in their natural environment. The effect of encapsulation and *in situ* incubation on the recovery of marine sediment bacteria was determined by assessing abundance, viability and diversity before and after incubation. While the abundance, viability and diversity were not significantly different between resuspended and encapsulated samples before incubation, significant differences were observed between the samples following *in situ* incubation. The abundance of colonies observed for the resuspended samples was significantly greater than that of the encapsulated samples, while the viability and diversity of encapsulated samples was significantly greater than the resuspended samples. The results of this study suggest microencapsulation followed by *in-situ* incubation results in recovery of a different composition of bacteria compared to traditional cultivation, thus improving the diversity of bacteria recovered from marine sediment. Conversely, the greater abundance of growth observed from resuspended samples is likely due to the overgrowth of more common, faster growing species rather than rare species as both overall viability and diversity of resuspended samples were significantly lower than encapsulated samples. While future studies should aim to perform a comprehensive assessment of bacterial diversity obtained using this new technique, this pilot study indicates the benefits of microencapsulation followed by *in-situ* incubation compared to previous culture methods.