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Molecular methods resolve the bacterial composition of natural marine biofilms on galvanically coupled stainless steel cathodes

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Navy vessels consist of various metal alloys and biofilm accumulation at the metal surface is thought to play a role in influencing metal deterioration. To develop better strategies to monitor and control metallic biofilms, it is necessary to resolve the bacterial composition within the biofilm. This study aimed to determine if differences in electrochemical current could influence the composition of dominant bacteria in a metallic biofilm, and if so, determine the level of resolution using metagenomic amplicon sequencing. Current was generated by creating galvanic couples between cathodes made from stainless steel and anodes made from carbon steel, aluminum, or copper nickel and exposing them in the Delaware Bay. Stainless steel cathodes (SSCs) coupled to aluminum or carbon steel generated a higher mean current (0.39 mA) than that coupled to copper nickel (0.17 mA). Following three months of exposure, the bacterial composition of biofilms collected from the SSCs was determined and compared. Dominant bacterial taxa from the two higher current SSCs were different from that of the low current SSC as determined by DGGE and verified by Illumina DNA-seq analysis. These results demonstrate that electrochemical current could influence the composition of dominant bacteria in metallic biofilms and that amplicon sequencing is sufficient to complement current methods used to study metallic biofilms in marine environments.

Biography

Athenia Oldham has completed her PhD from The University of Oklahoma Health Sciences Center in 2010 and Post-doctoral studies from the University of Oklahoma in 2015. She is an Assistant Professor of Biology at UT Permian Basin, a hispanic serving institution. She has published papers in EMBO, Frontiers in *Microbiology, and the Journal of Applied Microbiology and Biotechnology* among others.

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