Enrichment and isolation of piezotolerant hydrocarbon degraders from the deep waters of the Eastern Mediterranean Sea

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Deep sea microbial degradation of hydrocarbons has been thoroughly studied in the Gulf of Mexico after the Deepwater Horizon (DWH) accident in 2010 [[1]]. However, the vast majority of research has been conducted with decompressed microbial communities which were incubated either at atmospheric pressure (P) or re-pressurized in the lab [[2,3]]. Disruption of *in situ* P alters the community diversity and thus affects the overall metabolic capability including hydrocarbon degradation rates [[4, 5]]. In this study, un-decompressed and decompressed microbial communities were collected from the deep waters of the Eastern Mediterranean Sea (EMS) and were enriched in hydrocarbon degraders, in the presence of oil and dispersed oil at *in situ* P and temperature, in order to address the effect of decompression and dispersant on oil removal rates and microbial structure. Bacterial strains were isolated from each treatment and were subjected in synergistic experiments under atmospheric and high pressure to assess any possible increase in degradation rates. Since oil and gas exploration activities in the EMS are intensifying and moving towards deeper and more challenging waters, the results from this study aim to elucidate the importance of pressure when experimenting with deep water communities and provide insight on important strains that might be used in bioaugmentation protocols for bioremediation in the EMS.

References

1. Atlas RM, Hazen TC (2011). *Environ Sci Technol* **45**, 6709–6715.
2. Dubinsky EA, Conrad ME, Chakraborty R, et al (2013). *Environ Sci Technol*, **47**,10860–7.
3. Marietou A, Chastain R, Beulig F, et al (2018). *Front Microbiol,* **9**, 808–819.
4. Nguyen UT, Lincoln SA, Valladares Juárez AG, et al (2018). *PLoS One*, **13**, e0199784.
5. Perez Calderon LJ, Gontikaki E, Potts LD, et al (2019). *MicrobiologyOpen*, **8**, e768.