Genes of past, present and future: does legacy pollution contribute to antibiotic resistance in industrialised estuaries?

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The legacy of past pollution exists in many estuaries of industrialised cities. Persistent pollutants, historically discharged into waterways, have become incorporated into sediment layers as a record of past, unregulated release. Preliminary reports have shown that pollution legacies have the potential of affecting antimicrobial resistance (AR) in exposed bacteria. The sediment zones become reactors with the biochemical stressors to stimulate the production and dissemination of AR genes. By co-selection processes the genes could simultaneously select for genes for antibiotic resistance.

Aim: Novel approach to examine the historical significance the pollution-related effects on multiple-antimicrobial resistance in bacteria

Why the Clyde estuary?

Objectives:

Objective 1: Sampling Locations, Range of sediment conditions, (freshwater to seawater ends, grain-size, relationship to past industrial impact)

Objective 2: Sediment characterisation (particle size & distribution, organic matter [OM], conductivity [EC], pH, moisture content [MC], PAH, heavy metals)

Objective 3: Radiometric assessment as dating tool (in progress)

Objective 4: Quantitatively track the presence of AR bacteria within each stratum with multiplex qPCR assays (in progress)

Focus on Erskine location (ESK)

References


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Amoebae are known to harbour bacteria in the environment. Characterising the bacteria inside amoebae will help us understand this relationship in the emergence of antimicrobial resistance

Amoebae are growing in areas of medium to high organic content. Contaminants may also be affecting their growth and consequently impacting on microbial relationships

Conclusion

1. Detailed analysis of the effects of legacy pollution on emergence of AMR in the environment
2. Comprehensive map of AMR in the Clyde Estuary correlated with geochemical evaluation
3. Understanding and knowledge of how amoebae can also influence AMR in bacteria in the environment and how they can be influenced by legacy pollution
4. Minimise risk to human and animal health (bacterial and amoebic disease)