

## Bacterial cross-talk with small molecules

Bacteria, the unicellular prokaryotic microorganisms are the first form of life to appear on earth that may be traced way back about 4 billion years ago. Bacteria exist in typically two life forms i.e planktonic or free-swimming microbial phase and association with a surface in a structure known as a biofilm. The significance of secretion and perception of small signalling molecules or secondary metabolites by the bacteria and their role in coordinating behaviour and survival has started getting appreciation since the last decade. In our present study, similar role of small signalling molecules were unearthed in intra-species bacterial communication among *Pseudomonas* sp.

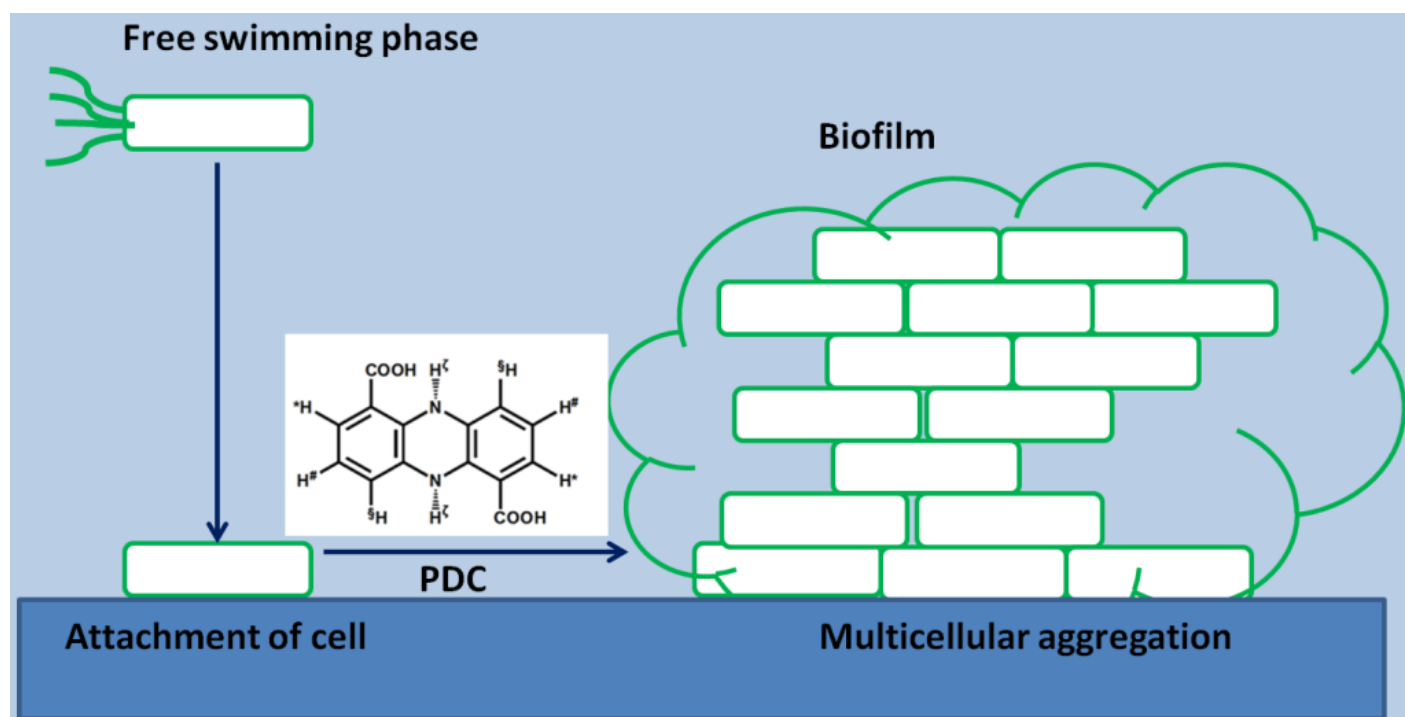


Fig. 1. This figure shows Phenazine 1,6 di-carboxylic acid (PDC) produced by one *Pseudomonas* strain helps another *Pseudomonas* strain to make prominent biofilm.

Three strains of *Pseudomonas* sp. were isolated from water samples collected from three different sites at Ganges Delta in India and all the isolated *Pseudomonas* strains were found to be capable of utilising crude oil as carbon source. Interestingly among them, two strains (named as KPW.1-S1 & HRW.1-S3) were found to produce proficient biofilm on glass surface while the third (DSW.1-S4) was biofilm defective in nature. Additionally, the two biofilm forming strains of *Pseudomonas* sp. showed production of derivatives of small molecules of Phenazine group of organic compounds when grown on various carbon sources. Surprisingly, the biofilm defective third strain failed to

produce any similar small molecule and administration of these Phenazine compounds helped the biofilm-defective strain to produce biofilm in a dose dependent manner. The thickness of the biofilm and biomass units were significantly increased in presence of the compound Phenazine 1,6-di-carboxylic acid (PDC). To the best of our knowledge, HRW.1-S3 is the first reported *Pseudomonas* strain which is able to produce PDC. Therefore, the present study showed how a small molecule produced by one strain of *Pseudomonas* cross-communicates with another strain and thereby contributes towards multicellular behaviour in the recipient bacterial strain (Fig1).

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## **Publication**

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