

Synthesis of DPD and new analogues, the precursor of AI-2, the bacterial signalling molecule for inter-species communication.

The bacterial signal molecule called autoinducer-2 (AI-2) is well known for its ability to mediate inter-species communication regulating important bacterial group behaviours such as biofilm formation, virulence, and antibiotic production.

In this project our aim is to synthesize the precursor of AI-2, 4,5-dihydroxy-2,3-pentanedione (DPD). The lack of an easy and inexpensive method for synthesizing this compound has been a major drawback in the advance of these novel research areas aiming to understand the molecular mechanisms of bacterial communication.

The new strategy will allow the preparation of labelled DPD and new analogues by introducing and varying the substituents in different positions of the molecule. The labelled DPD constitutes an important reagent for the ongoing elucidation of the biochemical fate of this molecule at the cellular level. The new derivatives will hopefully provide potent agonists and antagonists of AI-2 and will also contribute for a better understanding of the influence of the new groups added, the nature of these groups, their stereochemistry on the response of bacteria, and which properties are important for the recognition of the molecule by the different receptors.

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