

## How and why bacteria produce the abundant, climate-active gas, isoprene

### SUPERVISOR

Dr Terry McGenity, Dr Mike Hough, Dr Boyd McKew, University of Essex, Dr Jonathan Todd, University East Anglia

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**Scientific background:** Isoprene is a reactive five-carbon biological volatile organic compound (BVOC) that is abundantly released into the atmosphere. It affects climate in diverse and often detrimental ways, such as extending the lifetime of the greenhouse gas, methane. Many plants produce isoprene, which protects them against thermal and oxidative stress, and in some cases serves as a signalling molecule.

Some Bacteria produce isoprene, for example most *Bacillus* species and some marine Bacteria from different phyla. The key enzyme in the formation of isoprene, isoprene synthase, has been identified only in plants, and no enzyme with a similar sequence has been found in Bacteria.

Therefore, this project provides the platform for making important discoveries that will improve our understanding of isoprene production in organisms of great environmental and biotechnological importance.

### Objectives

1. determine the role of isoprene production in Bacteria
2. identify and characterize the key enzyme(s) responsible for bacterial isoprene synthesis
3. determine the extent to which Bacteria contribute to global production of isoprene

### Approaches

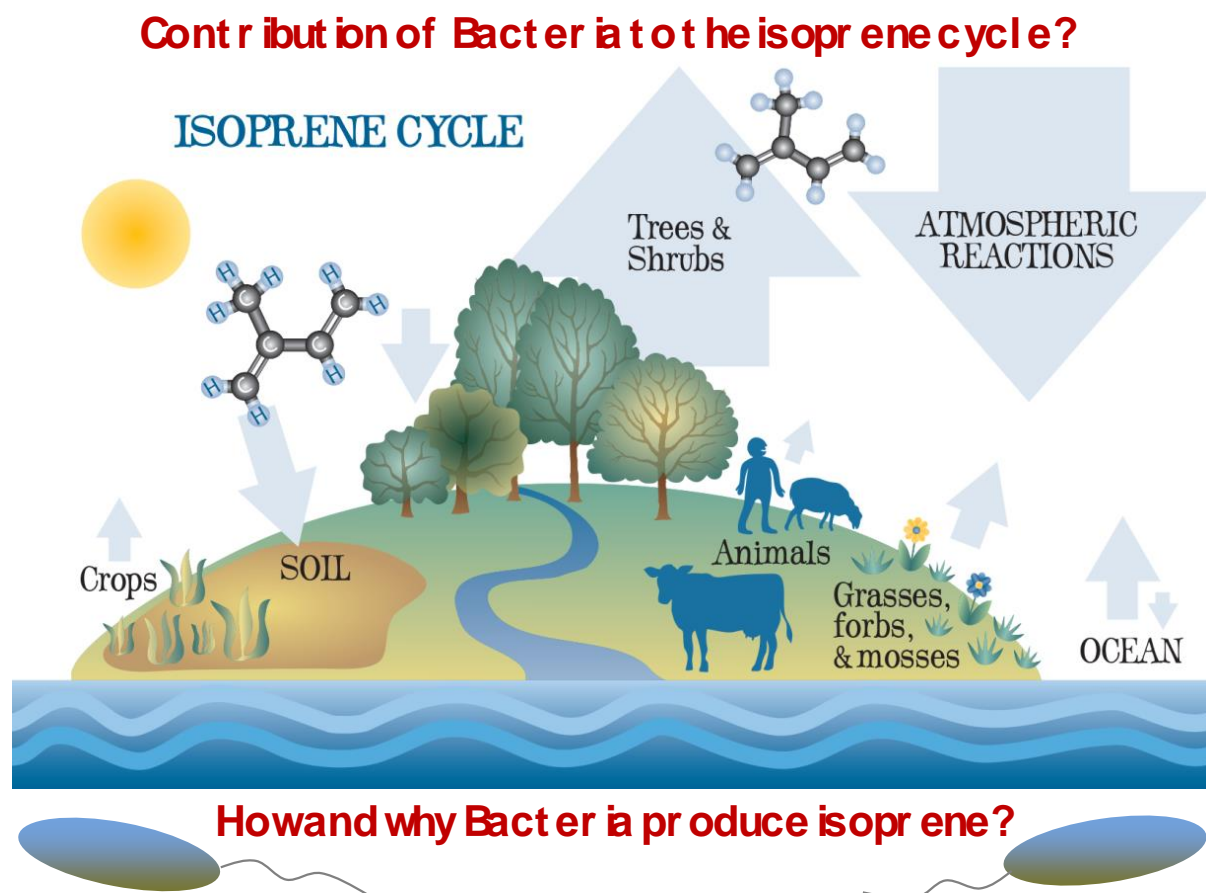
The PhD student will gain experience in:

- A. isolating and characterizing isoprene-producing microbes from different environments
- B. designing experiments to identify the environmental factors that lead to enhanced/reduced isoprene production
- C. identifying proteins that are up-regulated when isoprene is being abundantly produced (using proteomics)
- D. identifying and confirming the function of the gene(s) coding for bacterial isoprene synthase(s) and determining their global distribution (using a combination of molecular genetics and bioinformatics)

## Person Specification and Training

This is an exciting opportunity for a highly motivated student with a background in Microbiology or other relevant disciplines. The PhD will be based primarily at the University of Essex, with opportunities to work in the University of East Anglia (UEA). Specifically, the student will receive training in the above, diverse and state-of-the-art methods by the project team (e.g. A&B – Terry McGenity (Essex); C – Boyd McKew, Mike Hough (Essex); D – Jonathan Todd (UEA)).

The student will be expected to influence the direction of the project depending on their interests and preceding results. We support and encourage training in advanced and transferrable skills in preparation for a successful career.



This project has been shortlisted for funding by the EnvEast NERC Doctoral Training Partnership, comprising the Universities of East Anglia, Essex and Kent, with twenty other research partners. Undertaking a PhD with the EnvEast DTP will involve attendance at mandatory training events throughout the course of the PhD.

Shortlisted applicants will be invited to interview on 13/14 February 2018.

**Funding**

Successful candidates who meet RCUK's eligibility criteria will be awarded a NERC studentship - in 2016/17, the stipend was £14,296. In most cases, UK and EU nationals who have been resident in the UK for 3 years are eligible for a full award. For non-UK EU-resident applicants NERC funding can be used to cover fees, RTSG and training costs, but not any part of the stipend. Individual institutes may, however, elect to provide a stipend from their own resources.

For further information, please visit [www.enveast.ac.uk/apply](http://www.enveast.ac.uk/apply).

**Closing date for this application is midnight 8 January 2018. Please apply online via <https://www.essex.ac.uk/pgapply/enter.aspx>**