Biotechnological potential of methanotrophic Bacteria for production of fish/animal feeds.

DoS Dr Rich Boden

The School of Biological Sciences at Plymouth University is inviting applications for a three year fully funded PhD studentship. The studentship is expected to commence on the 1st October 2015, 1st January or 1st April 2016.

Project Description

Methanotrophic Bacteria oxidise methane as their sole carbon source, producing biomass (proteins, lipids, carbohydrates etc) and carbon dioxide, with around 50-60% of methane-carbon ending up as biomass (Methylococcus capsulatus, Boden & Murrell, 2011; Foster & Davis, 1966). The potential for use of methanotrophic Bacteria to produce single-cell protein (SCP) has been long recognised and is in commercial use by Norferm Danmark A/S, in the form of the ‘BioProtein’ product. It is widely recognised that the production of SCP in this way is limited by a number of factors, not least the relatively poor carbon conversion efficiency.

The Boden Lab have isolated a number of methanotrophic Bacteria in which higher carbon conversion efficiencies combined with an ability to produce or sequester key micronutrients lead to the potential of producing a novel route to not just SCP but to a more complete feed. Through co-culture with facultative autotrophs, we are able to ‘cross-feed’ methanotrophs with useful metabolic intermediates, further improving yield and removing toxic waste products.

The aims of the project are:

1) To optimise growth of methanotrophs for SCP production, with benchmarking against M. capsulatus.

2) To examine the accumulation of micronutrients and to optimise their uptake and retention in bioaccessible forms.

3) To assess the nutritional biochemistry of preparations of the optimised culture and to further optimise against dietary needs of a range of livestock.

[NB: live feeding trials are not part of the project]

The successful candidate will gain valuable skills in microbial physiology and biochemistry; scaling of cultures for biotechnology; analytical chemistry; nutritional biochemistry and radiorespirometry. The successful candidate will be required to sign a non-disclosure agreement (NDA) and to observe a high degree of record-keeping such that any intellectual property can be protected.
The Boden Lab comprises (autumn 2015) 1 Postdoctoral Research Associate (KTP), 1 Senior Postdoctoral Research Fellow and 5 postgraduate research students plus interns and taught masters (MSc) students each year. Our interests span principally sulfur and metal metabolism in the Bacteria and the Archaea along with methanogens and methanotrophs as tools for biotechnology.

**Eligibility**

Minimum qualifications are an MSc and/or a BSc at 2.1 level or above. EU and Overseas applicants should have a minimum English requirement of IELTS 6.5 or above. The candidate would have a background in biochemistry and/or microbiology and experience of the latter at the bench, ideally with ‘difficult’ microorganisms such as thermophiles. Prior work with methanotrophs is not essential but it would be desirable, as would some knowledge of fundamental fish and animal nutritional biochemistry.

The studentship is supported for 3 years and includes full Home/EU tuition fees plus a stipend of £14,057 per annum. The studentship will only fully fund those applicants who are eligible for Home/EU fees with relevant qualifications. Applicants normally required to cover overseas fees will have to cover the difference between the Home/EU and the overseas tuition fee rates (approximately £10,800 per annum).

If you wish to discuss this project further informally, please contact Dr Rich Boden (email: rich.boden@plymouth.ac.uk) However, applications must be made in accordance with the details shown below.

You can apply via the online application form which can be found at: https://www.plymouth.ac.uk/study/postgraduate and click ‘Apply’.

Please mark it FAO Catherine McCoulough and clearly state that you are applying for a PhD studentship within the School of Biological Sciences and clearly state which project you are applying for.

**General information about applying for a research degree at Plymouth University.**

For more information on the admissions process contact Catherine McCoulough (catherine.mccoulough@plymouth.ac.uk).

**The closing date for applications is 17:00 on 15 September 2015.** Shortlisted candidates will be invited for interview. We regret that we may not be able to respond to all applications.