FOR ADVERTISING

Project Title: Development of natural algal virus platforms for scalable industrial biotechnology.

DTP Research Theme: Living World

Main Supervisor Dr Mike Allen (Plymouth Marine Laboratory)
Co-Supervisor: Dr Marian Yallop (School of Biological Sciences, Bristol University)
Co-Supervisor: Dr Tracey Beacham (Plymouth Marine Laboratory)
Co-Supervisor: Dr Andrew Spicer (Algenuity)

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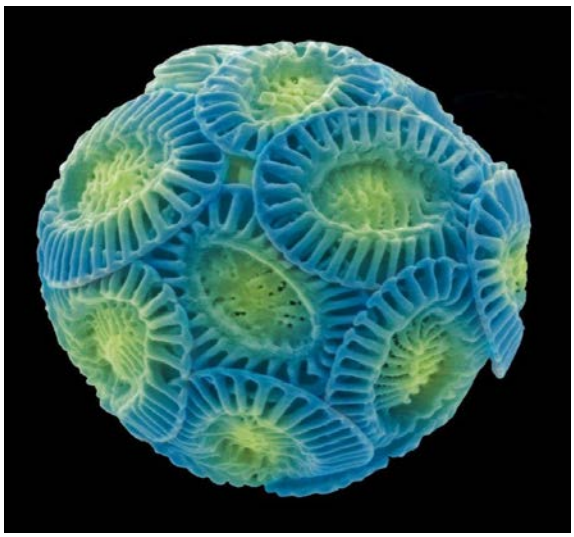
Host Institution: Plymouth Marine Laboratory



Microalgae such as *Emiliania huxleyi* (imaged above) and *Chlorella sp*. are established industrial platforms. Their infection by viruses provides the opportunity to induce/enhance the production of novel metabolites.

Background

NERC funded research has previously supported the isolation and characterisation of novel viruses from the natural environment that are capable of inducing the production of unique metabolites during infection of their microalgal hosts. The Chloroviruses and Coccolithoviruses (infecting *Chlorella* and *Emiliania huxleyi*, respectively) for example, induce the production of hyaluronan and ceramide-like sphingolipids, respectively, as part of their natural infection strategies. With a current market size of $13.4billion and $240million for hyaluronan and ceramide, the translation of ecological observations into the development of novel microalgal production platforms provides great opportunity.

Project Aims and Methods

This project will seek to adapt two established microalgal platforms (*Chlorella sp.* and *Emiliania huxleyi*) for the production of hyaluronan and ceramide, via viral induction. The project aims to exploit existing viral strains and characterise new isolates (none of which have been used in a commercial setting previously), with the emphasis on translating the physiological and biochemical changes that occur during viral infection into industrially relevant outputs. A multi-faceted approached will involve laboratory work combining molecular, bioinformatic, microbiology, virology and physiology studies, with the ultimate aim of scale up and optimization of the algal-virus system as a biomass production platform utilising state of the art photobioreactors. The student will spend at least 3 months based at Algenuity (Bedfordshire) to experience a dynamic, cutting edge industrial environment.

Candidate

The project would suit a student with a passion for environmental virology and a desire to translate fundamental academic research into commercially relevant solutions. A very good undergraduate degree in a biological science, a desire to learn new skills and the ability to interact with diverse stakeholders is essential.

Case Award

This is an industrial CASE award. The student will spend a minimum of 3 months (over the course of the 3.5 year studentship) at the CASE partner, Algenuity (Bedfordshire), though the balance can be adjusted to suit project progression and the interests of the candidate. Dr Spicer (Algenuity) and Dr Yallop (Bristol) are regular visitors to PML, due to ongoing collaborative project and research interests (such as the Innovate UK funded PALM-UK, NERC Nanomaterials and the GW4 supported AVARICE projects). Contact and project progress will be monitored and maintained with weekly group meetings at PML, and between the whole team via monthly Skype meetings.

Training

The student will receive training in environmental virology and molecular biology from Allen (PML), with support in algal physiology and culturing with Yallop (Bristol). The successful candidate will emerge with a strong background in microbiological, biochemical and physiological laboratory skills and a highly marketable transferable skill set including: numeracy, written and spoken presentation skills and an ability to work in a multidisciplinary team. The breadth of training provided on this PhD could lead to a career in academia or the industrial sector.

References / Background reading

Nissimov, Pagarete , Ma, Cody, Dunigan, Kimmance & Allen. Coccolithoviruses: A Review of Cross-Kingdom Genomic Thievery and Metabolic Thuggery. *Viruses*, 2017; 9 (3), 52.

Weynberg , Allen & Wilson. Marine Prasinoviruses and Their Tiny Plankton Hosts: A Review. *Viruses*, 2017; 9 (3), 43.

Nissimov, Jones, Napier, Munn, Kimmance & Allen. Functional inferences of environmental coccolithovirus biodiversity. *Virologica Sinica*, 2013; 28 (5), 291-302.

Pagarete , Le Corguillé, Tiwari, Ogata, de Vargas, Wilson & Allen. Unveiling the transcriptional features associated with coccolithovirus infection of natural *Emiliania huxleyi* blooms. *FEMS Microbiol Ecol*, 2011; 78 (3), 555-64.

Wilson, Schroeder, Allen *et al* Complete genome sequence and lytic phase transcription profile of a Coccolithovirus. *Science*, 2005; 309 (5737), 1090-2.

Lee & Spicer. Hyaluronan: a multifunctional, megaDalton, stealth molecule. *Current Opinion in Cell Biol*ogy, 2000; 12 (5) 581-586.

Links

PML:	http://www.pml.ac.uk/People/Science_Staff/Dr_Mike_Allen
	http://www.pml.ac.uk/Working_with_us/Studentships
Bristol University:	http://www.bristol.ac.uk/biology/people/marian-l-yallop/index.html%20
	http://www.bristol.ac.uk/biology/courses/postgraduate/
Algenuity Website	https://www.algenuity.com/
NERC GW4+ DTP Website:	http://nercgw4plus.ac.uk/

Application deadline: Midnight GMT, Sunday 25 June 2017

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