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Dr Andrew Lovering

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About

I am a recently appointed lecturer and my research interests involve utilising structural biology (and related techniques) to investigate protein function – many of these projects involve the unusual predatory bacterium *Bdellovibrio*; see “Research” below and be enthused!

I have been awarded EMBO Young Investigator status for 2014-2017; prospective PhD students can look at the associated benefits of this on the EMBO website.

EMBO Young Investigator

(http://www.embo.org/news/press-releases/press-releases-2013/23-researchers-join-network-of-embo-young-investigators)

Biography

I grew up in Wales (Barry to be precise) and studied for both my undergraduate degree (Biochemistry) and PhD (structural biology of therapeutic enzymes) at the University of Birmingham, before beginning a 6 and a half year stint in Canada in the laboratory of Natalie Strynadka at the University of British Columbia, Vancouver. These postdoctoral years involved the study of how bacteria build their cell walls, and the associated targeting of these processes by antibiotics (funded by two fellowships from MSFHR & CIHR). I thus began a bit of a love affair with bacteria, bacterial disease, mechanisms of infection & disease control. Now, Vancouver may be the world’s most liveable city, but it’s not Birmingham. So, in 2010 I came back to the UK to start my own group looking into how we can utilise a “living antibiotic”, the bacterium *Bdellovibrio bacteriovorus*, to tackle bacterial pathogens.

In 2012 I was presented with an ICAAC Young Microbiologist of the Year Award, administered by the American Society for Microbiology (http://asm.org/index.php/awards/21-awards-a-grants/current-laureates/103-andrew-lee-lovering-2012-icaac-young-investigator-award-laureate).

As mentioned above, I have also been awarded a prestigious EMBO Young Investigator award, to run between 2014 and 2017.

Teaching

I teach on several undergraduate and postgraduate modules, including Bio311 (antibiotic resistance component) and Bio305 (cell wall biosynthesis and staphylococcal & streptococcal disease topics).

Postgraduate supervision

For a list of possible PhD projects offered by Dr Lovering:

www.findaphd.com/search/customlink.asp?inst=birm-Biol&supersurname=Lovering (http://www.findaphd.com/search/customlink.asp?inst=birm-Biol&supersurname=Lovering)

Research

Research Theme within School of Biosciences: Molecular Microbiology

X-Ray crystallography and structure: function relationships of bacterial proteins

My laboratory uses X-ray crystallography to study the molecular basis of protein function. We are interested in a variety of bacterial systems - especially those with the potential for antibiotic development. One of these systems involves analysis of the remarkable predatory bacterium Bdellovibrio bacteriovorus (in collaboration with Professor Liz Sockett at Nottingham). Predatory bacteria feed off and eventually kill other bacteria, and thus research into this process has potential therapeutic possibilities. Bdellovibrio is the model predatory organism, and possesses an unusual lifestyle where it enters its prey through the outer membrane and resides in the periplasm. The host cell changes shape (forming a structure termed the "bdelloplast") and the Bdellovibrio cell grows and replicates using material obtained from prey breakdown. Progeny then exit the dead host to start the cycle anew. Host-independent forms of Bdellovibrio may be grown separate from prey in rich media.

We are using X-ray crystallography to study Bdellovibrio proteins with the aim of understanding:

- the precise function of proteins involved in predation events

- how Bdellovibrio responds to the challenges of intraperiplasmic growth
- what specifically regulates the alteration to a host-independent (non-predatory) lifestyle

Many of these proteins are unique to Bdellovibrio, and are thus termed part of the "predatosome". Of course, there is much more to study, not forgetting prey recognition events, membrane entry, bdelloplast formation, host material hydrolysis, predation on biofilms, and signalling/regulation of all of the above!

Reviews on this topic are included in the references below and short summaries can be found at **http://en.wikipedia.org/wiki/Bdellovibrio and by downloading the PDF (http://en.wikipedia.org/wiki/Bdellovibrio) www.sgm.ac.uk/pubs/micro_today/pdf/110805.pdf (http://www.sgm.ac.uk/pubs/micro_today/pdf/110805.pdf)** .

The laboratory has a number of other collaborations and projects ongoing, both within and external to Birmingham.

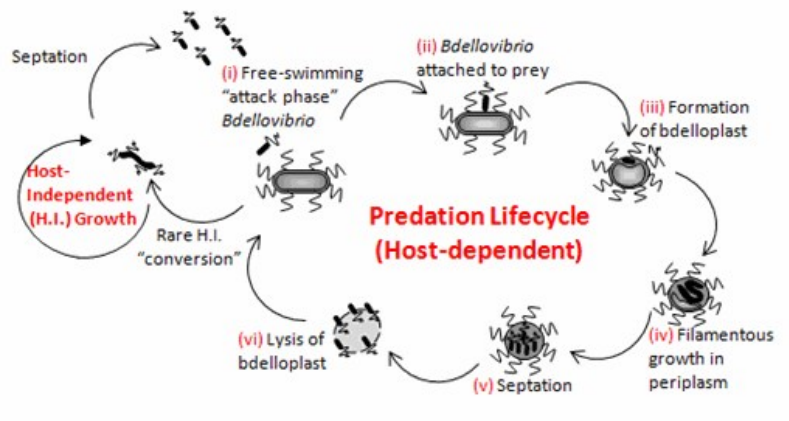

Figure 1: Bdellovibrio predation lifecycle

Other activities

The lion's share of my free time is taken up by my young family; outside this I favour sleep. Outside that, I like reading the Observer (disclaimer: other newspapers are available), watching sport, daydreaming, cooking & the great outdoors. Microbrew beer is welcome at any point and my lab like to visit the Birmingham Beer Festival each year for scientific discourse in the company of real ale.

Publications

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