**Title of Research Project:** Understanding and Controlling Protein Anchoring in Health and in Parasitic Diseases

**Area of Research Focus:** Lipidomics

**Main Supervisor / Appointment / Department:** Martin J Lear, Assistant Professor / Chemistry / (http://www.chemistry.nus.edu.sg/ourpeople/academic_staff/lear.htm)

**Co-Supervisor / Appointment / Department:** Benjamin G Davis, Professor / Chemistry / Oxford University, UK (http://www.chem.ox.ac.uk/researchguide/bgdavis.html)

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**Description:** The biological roles of carbohydrates and lipids have often been viewed as simple ones: as sources of energy, e.g., glucose, fats, or as polymeric building materials, e.g., chitin in crab shells, cellulose in wood, lipids in membranes. However, it is becoming increasingly clear that glycolipids, carbohydrates in small clusters, and oligosaccharides act as markers in important recognition processes such as microbial infection, cancer metastasis and cellular adhesion in inflammation, in addition to many intracellular communication events. Their remarkable structural diversity means that glycolipids can mediate highly specific and therefore complex processes.

The post-translational modifications of proteins by glycolipids is believed to exquisitely modulate the activity of proteins in all higher organisms. In humans a high proportion of all cell surface proteins are modified in this way but we currently have little understanding of their precise role.

Working together to combine synthetic molecular assembly of glycolipid motifs with engineered proteins, the Lear and Davis groups are aiming to construct the first fully synthetic and functional protein models of 'anchored-proteins'. This will use methods in Organic Chemistry, Chemical Biology, Molecular Biology, Cell Biology and Imaging to understand the role of this fundamental process in healthy and diseased organisms. Together this work might also lead to novel approaches to both understand, diagnose and treat diseases such as malaria and leishmaniasis.

The selected student is expected to have excellent ability in organic synthesis and a strong aptitude to learn the biological techniques necessary. Accordingly, the student is expected to travel and work between NUS, Singapore, and Oxford University, UK.

For initial selection for this competitive PhD-research position, please email both parties (Martin.Lear@nus.edu.sg and Ben.Davis@nus.edu.sg) with your application package. This should include: (1) your full CV, (2) research summaries of undergraduate work and other laboratory experience, and (3) two referee reports.

For information how to apply formally for NUS Graduate (NGS) and A*STAR Graduate (AGS) scholarships, please see the following web-pages:
http://www.nus.edu.sg/ngs/apply_proc_AGS.html
http://www.nus.edu.sg/ngs/apply_proc_NGSS.html