P047 Ammonium sensing in *E. coli*

Arnaud Javelle and Mike Merrick
John Innes Centre, Norwich

The Amt proteins are ammonium transporters that are conserved in all domains of life. In bacteria and archaea the Amt structural gene (*amtB*) is invariably linked to *glnK*, which encodes a member of the P_{II} signal transduction protein family that regulate many facets of nitrogen metabolism. This conserved linkage is strongly suggestive of a functional interaction between their products.

We have shown that in *Escherichia coli*, AmtB is inactivated by formation of a membrane-bound complex with GlnK. Complex formation is reversible and occurs within seconds in response to micromolar changes in the extracellular ammonium concentration. Regulation is mediated by the uridylylation/deuridylylation of GlnK in direct response to fluctuations in the intracellular glutamine pool. Furthermore under physiological conditions AmtB activity is required for GlnK deuridylylation. Hence AmtB is an integral part of the signal transduction cascade and can be formally considered to act as an ammonium sensor. The interaction provides a mechanism whereby not only is the activity of AmtB regulated in response to the cellular demand for ammonium but the cellular pool of GlnK can also be modulated rapidly in response changes in the extracellular ammonium availability. Changes in the subcellular localisation of proteins are emerging as important factors in controlling cellular physiology and this system offers an attractive model to study one such mechanism.