# Application summary

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| **Application number:** | ERMA200332 |
| **Application type:** | Rapid Assessment, GM Development, Containment |
| **Applicant contact:** | Christina Moon |
| **Applicant:** | AgResearch Limited<br>Private Bag 11008<br>Manawatu Mail Centre<br>Palmerston North 4442 |
| **Purpose:** | To genetically modify *Escherichia coli* to understand the evolutionary processes involved in coping and repairing genetic material, and adapting to living, with or without oxygen |
| **Date formally received:** | 15 March 2010 |

**Application summary prepared by AgResearch Limited**

In this project, we seek to gain a more detailed understanding of the basic processes involved in evolution. In particular, we are interested in how different concentrations of oxygen affect the evolution of a common laboratory bacterium, *Escherichia coli*, where oxygenic conditions are known to impose cellular stress through damage to cellular components. Here, we will investigate the processes responsible for generating genetic variation, and also, which inherited qualities are favourable (and unfavourable) for allowing the bacteria to adapt to living with and without oxygen. We will grow cultures of *E. coli* in the laboratory under highly controlled conditions, and then monitor them for any genetic changes.

We will need to genetically modify *E. coli* to help determine the mechanisms that contribute to the faithful replication of genetic material and for adapting to living with and without oxygen, to confirm the effects of genes that are suspected to have important roles in these processes. Furthermore, to increase the chances of discovering genetic changes, the bacteria may be genetically modified to compromise the faithful reproduction of genetic material, and hence speed up the rate at which errors occur.