

An article in the journal Nature published on 10th Feb (*Gene transfer to plants by diverse species of bacteria*) reports that a group of researchers in Canberra Australia have demonstrated that the ability to perform transfers of DNA from microbial cells to plant cells is not, as was previously assumed, restricted to *Agrobacterium tumefaciens*. When furnished with appropriately engineered DNA vectors a variety of Rhizobial species seem to be as potent a tool as *Agrobacterium* in the production of genetically modified plants. This offers the possibility of new approaches to the construction of genetically modified plants and may alter the commercial landscape and trajectories for a technology currently so comprehensively dominated by the patent portfolios of two large companies, Syngenta and Monsanto.

Egenis Professor Steve Hughes wonders what the new research will do to open up the industry to the competition. Steve can be contacted for comments and more information on 01392 262043.

Background:

Move over *Agro-*

For over a quarter of a century the plant pathogenic microbe *Agrobacterium tumefaciens* has held centre stage as the preferred agent of gene transfer in plant genetic modification. This organism has been broadly recognised and hailed as a “natural genetic engineer” thanks to its remarkable and supposedly unique ability to mediate the transfer of part of its own DNA complement into plant cells. Thousands of man-hours of research effort, much of it funded from the public purse, went into understanding the mechanisms by which DNA transfer is achieved and into suborning this mechanism to the transfer of DNA segments chosen by plant geneticists. Latterly, timely research interventions by well resourced companies in the bio-industry community produced a robust gene transfer technology based on *Agrobacterium* and enabled these companies to control that technology as formalised intellectual property through a suite of patents (see [www. BIOS.net](http://www.BIOS.net) white papers). Consolidation within the ag-bio industry means the technology today is effectively dominated by Syngenta and Monsanto. This is reflected in the narrow agronomic consideration and social disconnectedness of chosen goals for the technology which has raised so much opposition to GM crops.

Now a group of researchers working in Canberra Australia have demonstrated that furnished with appropriately engineered DNA vectors, other plant-associating microbes are capable of performing the same technical fix as *Agrobacterium*. The fixers in this case belong to the group of bacteria better known for their ability to form associations with specific leguminous plants in the fixation of nitrogen (Rhizobial species). However, the ability to perform DNA transfer is not limited to the normal legume partners but works also for cruciferous plants and rice. In their paper, published in Nature 10th February, the Canberra workers have been scrupulous in demonstrating that the observed DNA transfer could not have resulted from chance contamination of their system by *Agrobacterium* itself and furthermore, have demonstrated that stably modified and fertile plants can be obtained via agency of a variety of Rhizobial species.

So perhaps it is time for *Agrobacterium*, at least, to move over and admit these other diverse actors to the stage. We also may have to rethink our assumptions about genetic boundaries and prepare to accommodate a broader realisation of horizontal gene flow between microbes and plants in the wild. Comfortable concepts of organism, identity, niche and network may need to be refreshed by notions of genomic gymnastics, pools and plasticity, though hopefully we can achieve this without recourse to the horrid neologism *metagenomics*.

What effect this new technological trajectory will have on the controlling positions of the *Agrobacterium* patent holders remains to be seen. It is not clear that the discovery itself yet provides for a substantial “invent-around” for other would-be users of transgenic approaches to plant breeding. However, it does seem likely that once further refined, the Rhizobium-based technology will be more tractable and have broader scope than traditional *Agrobacterium* technology. The Canberra scientists have made it clear that they do not intend to restrict access to the new technology. In fact they seek to promote access to all those who want to share in its further development and deployment. Perhaps this initiative will provide a platform for more cooperative and more broadly socially negotiated approaches to GM in agriculture and may even draw the large commercial players into sharing their own technologies in the pursuit of dissemination and diversity in innovation.

The Australian workers are based at a private but not-for profit research centre called CAMBIA (www.cambia.org.au). CAMBIA takes its name from the Italian word for change and is dedicated to providing ready access to tools to support local innovation.
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