



Transformation Techniques

Using Biotechnology for Plant Research

Transformation is the genetic alteration of a cell by the introduction, and expression, of foreign genetic material (DNA). Transformation is a widely used technique in plant science.

There are several methods of introducing this new genetic information into the cell. **Biolistic Transformation** is the most commonly used at the Plant Energy Biology laboratories.

Biolistic Transformation involves shooting tiny tungsten, or gold particles, coated with DNA with a high pressure blast of helium gas from a "gene gun".



Benchtop Biolistic Gun



Handheld Gene Gun

The target of a gene gun is often a **callus** of undifferentiated plant cells growing on gel medium in a petri dish. After the tungsten particles have impacted the dish, the gel and callus are largely disrupted.

However, some cells were not obliterated in the impact, and have successfully enveloped a DNA coated tungsten particle, whose DNA eventually migrates to and integrates into a plant chromosome (picture b)

Cells from the entire petri dish can be re-collected and selected for successful integration and expression of new DNA using modern biochemical techniques (picture c)

Selected single cells from the callus can be treated with a series of plant hormones, such as auxins and gibberellins, and each may divide and differentiate into the organized, specialised, tissue cells of an entire plant (picture d) This capability of total re-generation is called totipotency. The new plant that originated from a successfully shot cell may have new genetic (heritable) traits (picture e,f).

