

GENETIC MODIFICATION

BIOLOGY FACT

The first GM plant to be commercialised was a virus-resistant tobacco in 1992, China.

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Genes – instructions on how to grow, what to look like and what to do – are wrapped up inside the building blocks (cells) of every living thing from humans, to plants, to bacteria.

Scientists have learnt how to modify these instructions artificially, and have found a range of practical applications.

Genetic modification (GM) can have an impact on our lives in areas such as healthcare and food production. However, some say we don't know enough about the possible, negative long term effects.

MEET THE SCIENTIST

Dr Mary Hamilton is a biochemist. Her research uses genetic modification to make algae that produces large amounts of omega-3 fatty acids.

Omega-3 fatty acids are beneficial to our health. Two types (EPA and DHA) are produced by marine algae. Humans don't eat marine algae, so we eat the fish – such as mackerel and salmon – that do. However, much of the fish we eat is farmed, and doesn't actually eat algae; instead, the fish are fed fish oil – a limited resource.

Mary's research aims to meet this demand. She says: "No known algae species makes high levels of EPA and DHA and we need both. If I succeed, then this algae can be grown on a large scale to supply the fishing farming industry with an alternative source of omega-3 fatty acids."



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Control in the food industry

For centuries, farmers have endeavoured to get the most out of their animals or crops. By choosing which animals reproduce, or which crops are fertilised, farmers can influence which genes are passed on to the next generation. For example, crossing your strongest bull with your strongest cow is likely to produce muscular calves, which makes for more meat. This is called selective breeding.

It's not an exact science. For every good trait, such as muscle mass or plentiful seed production, there's a chance of passing on a bad trait, such as weakness or genetic disease.

What is genetic modification (GM)?

GM offers a much more controlled solution which relies less on chance. By taking cells from a plant, animal or microbe, scientists can change specific genes and put the altered genes back into a new plant, animal or microbe.

This idea has revolutionised food production in a number of ways. For example, scientists can alter certain genes in dairy cows in order to produce milk safe for people with dairy allergies. The technology holds many more future possibilities – imagine a nutritious plant that can grow in the desert to feed hungry people.

How does it work?

Genes from the male's sperm or from the female's egg can be modified before the animals are crossed, or the genes from the embryo can be altered after fertilisation. Either way, the baby produced will be genetically modified (transgenic).

Genetically modified plants are made using different techniques. For example, scientists have found ways of using bacteria and viruses to transfer desirable genes into plants.



Some people are concerned that not enough is known about the safety of GM crops for human health and the environment. Scientists have been examining this for even longer than crops have been grown – now 15 years in Europe, and 20 years in the US – and they have not found any greater dangers from GM crops.