



Seven Wonders of the Microbe World

Genetic Engineering

COMM

Microbes outnumber all other species and make up most living matter.

They're invaluable for humans to be able to survive and thrive - and we're continually discovering how to exploit them...including genetically modifying them to produce medicines, food and fuel.

The first organisms to be genetically modified were ECOLI bacteria, by Herbert Boyer and Stanley Cohen, in 1973. ECOLI is a common inhabitant of the human colon. It's simple to grow and can be easily manipulated and duplicated.

Today bacteria and yeast, which cause so many human diseases, are being genetically altered to help cure illness:

CHARLES

Genetic engineering is really about adding things to microbes. It's about rewriting their instruction manual to produce something different perhaps something useful to us like drugs – we're essentially turning them into tiny factories.

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One example is insulin, which should be produced naturally in the pancreas to regulate the amount of sugar in the blood. When it's not produced we get diabetes.

Previously natural insulin was extracted from the pancreases of cow and pig carcasses in abattoirs – but it was expensive, and it's difficult to ensure an adequate supply.

In the 1980s, scientists discovered how to produce human insulin by transplanting the genetic information for the human insulin hormone from a human cell into the DNA of the Ecoli bacterium.. This re-programmes the bacteria to produce insulin in just the same way as they make their own proteins.

In fact the genetic modification of microbes is transforming our ability to combat all sorts of diseases

CHARLES

A very good example of this is lacto bacillus. This is a bacterium that naturally lives in your gut. It protects you against urinary tract infections and other diseases and this microbe is now being engineered as a possible treatment for HIV.

PAULA

We have high hopes for a new malaria treatment produced by genetically engineered bacteria and yeast that will be cheap enough to give to anyone who needs it in South America and Africa.

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As demand increases for alternatives to conventional fuels, scientists are hoping that genetically modifying microbes could also produce a sustainable solution to our energy needs. They want to use bacteria and yeast to break down organic waste products like the stems, leaves and husks from crops, and excrete biofuels like ethanol and butanol as their waste product.

PAULA

Ethanol has been heralded as a cleaner, greener fuel than petrol, and yeast naturally produces ethanol from sugars, an ability traditionally used to ferment beer.

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This has huge implications since currently bio-fuel production uses starch crops like corn and sugar which are extremely expensive.

Microbes are also being genetically engineered into our clothing. Infusing clothes with bacteria or viruses may give them super properties, such as the ability to self-clean or naturally glow-in-the-dark.

So the tag on your t-shirt may one day read, "Ninety nine percent cotton and one percent E. Coli."