

# Jennifer Doudna

## BACK FROM THE DEAD

Some scientists are using CRISPR to try to bring extinct animals back to life, like the woolly mammoth, which died out about 4,300 years ago.



Jennifer Doudna in her lab.

## NOT JUST FOR HUMANS

Scientists have used CRISPR to make crops healthier, and it has even been used in cheese and yoghurt to get rid of viruses.

Meet the US scientist who might have changed our lives forever.

Inside your body is lots of DNA, a spiral-shaped chemical that tells your body how to operate and grow, decides what you look like, how tall you grow and how likely you are to get certain diseases. We all inherit half of our set of DNA from our biological mum and half from our biological dad. It is fixed from the moment that your dad's sperm met your mum's egg, but what if you could change your DNA?

In 2012, that's exactly what American biochemist (someone that studies living things) Jennifer Doudna discovered – along with French scientist Emmanuelle Charpentier – an easy way to edit DNA. It is one of the most important discoveries ever made in human biology.

Doudna was born in Washington, DC, US, in 1964, and grew up in Hawaii. As a teenager, she was fascinated by the rainforests and developed a passion for biology when she listened to a lecture about cells. This inspired her to get a degree in chemistry from Pomona College in California, US, in 1985. She then went to Harvard University to study the chemistry of living things. Doudna was studying some of the basics of how human bodies work, just

as she'd always wanted. This included looking at how the body reads messages from its DNA and delivers them to other parts of the body.

Doudna became interested in the defence systems of microscopic living things called bacteria. She began investigating how bacteria use short strings of DNA – called CRISPR – to fight off viruses.

Using a protein (an important chemical for building the body) called Cas9, bacteria find and snip out these DNA chunks. One evening, while cooking spaghetti, Doudna looked at the tangle of noodles and realised that bacteria had a ready-made natural system for finding and rearranging DNA.

When Doudna revealed her CRISPR-Cas9 research, she became a huge star and won lots of awards. This process makes

editing DNA possible. It means that babies in the future could be protected from certain diseases, but Doudna is a bit worried about other ways in which CRISPR might be used. Imagine you could change a person's eye colour, the shape of their nose, or even their height before they're born. She wants strict rules on editing babies, and lots more research so that the technology can be used responsibly.

## CRISPR CONTROVERSY

In 2018, Chinese scientist He Jiankui shocked scientists around the globe by claiming that he had created the world's first CRISPR babies.

## What is CRISPR-Cas9?

The discovery of CRISPR is said to be one of the greatest breakthroughs in modern science. So how does it work? CRISPR-Cas9 allows specific bits of DNA to be targeted and snipped out, just like a microscopic pair of scissors. Experts can identify a gene – a short strand of DNA – and cut it out or replace it, to fight illnesses, improve agricultural crops or even create designer pets. Gene editing could change mosquitoes so that they don't spread malaria, and in the future might make babies resistant to certain diseases, such as cancer. However, scientists worry that CRISPR-Cas9 might be dangerous. No one is yet sure of the long-term effect of changing a person's genes, so there are rules about using it on human embryos (an early stage of a baby). Scientists have found that changing DNA with CRISPR-Cas9 sometimes causes accidental changes elsewhere in the DNA and point out that these "off-target" alterations could cause health problems in later life for CRISPR babies.

