

## THE NOBEL PRIZE IN CHEMISTRY 2020



**Emmanuelle Charpentier**

*Born: 1968, Juvisy-sur-Orge, France.*

*Affiliation at the time of the award:  
Max Planck Unit for the Science of  
Pathogens, Berlin, Germany*



**Jennifer A. Doudna**

*Born: 1964 Washington, DC., USA.*

*Affiliation at the time of the award:  
University of California, Berkeley,  
CA, USA*

**T**he Nobel Prize in Chemistry 2020 was awarded jointly to **Emmanuelle Charpentier** and **Jennifer A. Doudna** “for the development of a method for genome editing”.

**Emmanuelle Charpentier** and **Jennifer A. Doudna** have discovered one of gene technology’s sharpest tools: the CRISPR/Cas9 genetic scissors.

Researchers need to modify genes in cells if they are to find out about life’s inner workings. This used to be time-consuming, difficult and sometimes impossible work. Using the CRISPR/Cas9 genetic scissors, it is now possible to change the code of life over the course of a few weeks.

As so often in science, the discovery of these genetic scissors was unexpected. During *Emmanuelle Charpentier’s* studies of *Streptococcus pyogenes*, one of the bacteria that cause the most harm to humanity, she discovered a previously unknown molecule, *tracrRNA*. Her work showed that *tracrRNA* is part of bacteria’s ancient immune system,

*CRISPR/Cas*, that disarms viruses by cleaving their DNA. *Emmanuelle Charpentier* initiated collaboration with **Jennifer Doudna**, an experienced biochemist with vast knowledge of RNA. Together, they succeeded in recreating the bacteria’s genetic scissors in a test tube and simplifying the scissors’ molecular components so they were easier to use.

In an epoch-making experiment, they then reprogrammed the genetic scissors. In their natural form, the scissors recognize DNA from viruses, but **Charpentier** and **Doudna** proved that they could be controlled so that they can cut any DNA molecule at a predetermined site. Where the DNA is cut it is then easy to rewrite the code of life.

Using this technology, researchers can change the DNA of animals, plants and microorganisms with extremely high precision. This technology has had a revolutionary impact on the life sciences, is contributing to new cancer therapies and may make the dream of curing inherited diseases come true.

<https://www.nobelprize.org/prizes/chemistry/2020>