Chemistry Nobel Prize 2020

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

More About the Discovery

- They have discovered one of gene technology's sharpest tools: the CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats)/Cas9 genetic scissors.
- Using these, 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.
- 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.
- 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.
- Charpentier published her discovery in 2011. The same year, she initiated a 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.
- They then reprogrammed the genetic scissors. In their natural form, the scissors recognise 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.
- A DNA strand, when broken, has a natural tendency to repair itself. But the auto-repair mechanism can lead to the re-growth of a problematic sequence. Scientists intervene during this auto-repair process by supplying the desired sequence of genetic codes, which replaces the original sequence.
- The use of genetic scissors has exploded. This tool has contributed to many important discoveries in basic research, and plant researchers have been able to develop crops that withstand mould, pests and drought.