Chemistry Nobel Prize 2020

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In News

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.**