

1. CRISPR Technology

Topic: Science and Technology



In News: July 2022 marks ten years since CRISPR-Cas9 was repurposed as a gene editing system.

More on the Topic:

- Nobel Prize for Chemistry, 2020 was awarded to Emmanuelle Charpentier and Jennifer A Doudna for development of CRISPR-cas9 technique.
- Other genome editing systems include TALENs, Zinc-Finger Nucleases etc.

About CRISPR Technology:

- CRISPR gene editing is a **genetic engineering technique in molecular biology** by which the genomes of living organisms may be modified.
- It is based on a **simplified version of the bacterial CRISPR-Cas9 antiviral defense system.**
- By delivering the Cas9 nuclease complexed with a synthetic guide RNA (gRNA) into a cell, **the cell's genome can be cut at a desired location**, allowing existing genes to be removed and/or new ones added in vivo.
- **The Cas9 protein is used as a pair of scissors to cut off a part from the strand.** Strand when broken has self-repairing tendency.
- This way a damaged DNA strands can be removed and help the human body restore to healthy state

Significance:

- The technique is considered highly significant in biotechnology and medicine as it enables editing genomes in vivo very precisely, cheaply, and easily.
- It can be used in the creation of new medicines, agricultural products, and genetically modified organisms, or as a means of controlling pathogens and pests.

- It also has possibilities in the treatment of inherited genetic diseases as well as diseases arising from somatic mutations such as cancer.

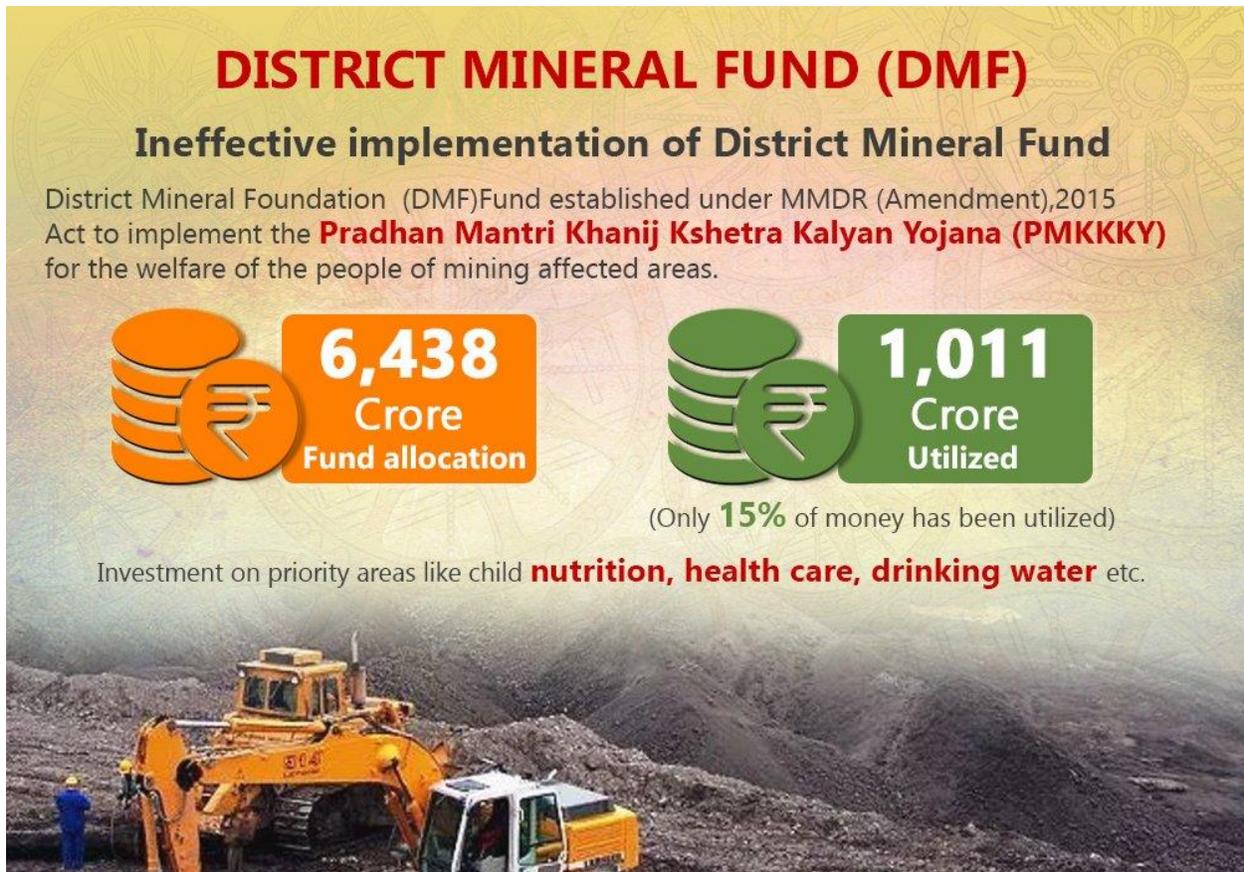
Examples of CRISPR used techniques:

- It is being tried out in agriculture primarily to increase **plant yield, quality, disease resistance, herbicide resistance and domestication of wild species.**
- CRISPR/Cas9 has also been seen as a promising way to create potential genome editing treatments for diseases such as **HIV, cancer or sickle cell disease.**
- **Germline Editing** means deliberately changing the genes passed on to children and future generations – in other words, creating genetically modified people.
- It is the most of the ethical discussions related to genome editing center around human germline editing. This is because changes made in the germline would be passed down to future generations.

Source: Indian Express

2. District Mineral Funds

Topic: Governance



In News: The Centre has tightened the criteria for use of district mineral funds to ensure they are used for the specified purpose.

More on the Topic:



- DMF is intended for **redevelopment of areas and people affected by mining activities.**
- The fund is accrued from miners' contribution as a percentage of royalty.
- The district mineral foundations (DMFs) will now **have to prepare a five-year perspective plan to ensure systematic development of the area affected by mining-related activities.**

About District Mineral Fund:

- **The Mining and Minerals Development and Regulation (MMDR) Act, 2015,** mandates every state to set up DMFs in each mining-affected area.
- **Leaseholders are required to contribute to the not-for-profit DMFs** between 10 and 30% of the royalty, in addition to the royalty paid to state governments.
- Using the funds generated, DMFs are expected to implement **the Pradhan Mantri Khanij Kshetra Kalyan Yojana (PMKKKY).**
- DMF funds are treated as **extra-budgetary resources.**
- As per the DMF guidelines issued by the Centre, **60% of the fund needs to be used for high priority works such as drinking water supply, health, education, sanitation** among others;
- while the rest 40% can be used in "other priority work" such as physical infrastructure, irrigation, energy and watershed development among others.
- According to the act **the combination and functions of the DMF shall be prescribed by the states, the Centre has the power to give directions** regarding composition and utilisation of funds.

Source: TOI

3. National Emblem

Topic: Art and Culture



In News: Prime Minister Narendra Modi has unveiled the national emblem cast atop the new Parliament building.

More on the Topic:

- The emblem is an adaptation of the Lion Capital of Ashoka, an ancient sculpture dating back to 280 BCE during the reign of the Maurya Empire.
- The statue is a three dimensional emblem showing four lions. It became the emblem of the Dominion of India in December 1947, and later the emblem of the Republic of India.
- In the original, there are four lions, mounted back to back, on a circular abacus, which itself rests on a bell-shaped lotus.
- The frieze of the abacus has sculptures in high relief of an **elephant, a galloping horse, a bull and a lion separated by intervening Dharma Chakras.**
- The bell-shaped lotus was omitted.
- The motto **Satyameva Jayate, which means 'Truth Alone Triumphs', written in Devanagari script** below the profile of the Lion Capital is part of the State Emblem of India.

Source: Hindu

4. Bacillus thuringiensis israelensis

Topic: Environment and Ecology



In News: The Indian Council of Medical Research (ICMR)'s research centre in Puducherry has developed a technology to produce Bacillus thuringiensis israelensis (Bti strain VCRC B-17), a strain of bacteria that kills mosquito and black fly larvae without harming other animals.

More on the Topic:

- VCRC's Bti technology is equivalent to the WHO standard strain of bacteria in terms of its effectiveness.
- India's Bti B-17 strain is extensively tested and is now designated as the Indian Standard strain by the Central Insecticide Board of India.

About Bacillus thuringiensis israelensis:

- The Bti bacteria has been in use for decades for **mosquito control and is considered safe for other animals and the environment.**
- This mosquito larvicidal activity of Bti is due to a **toxin present in the bacterium.** When ingested by mosquito larvae, the bacterial toxins destroy their gut within 10-30 minutes upon ingestion.

Significance:

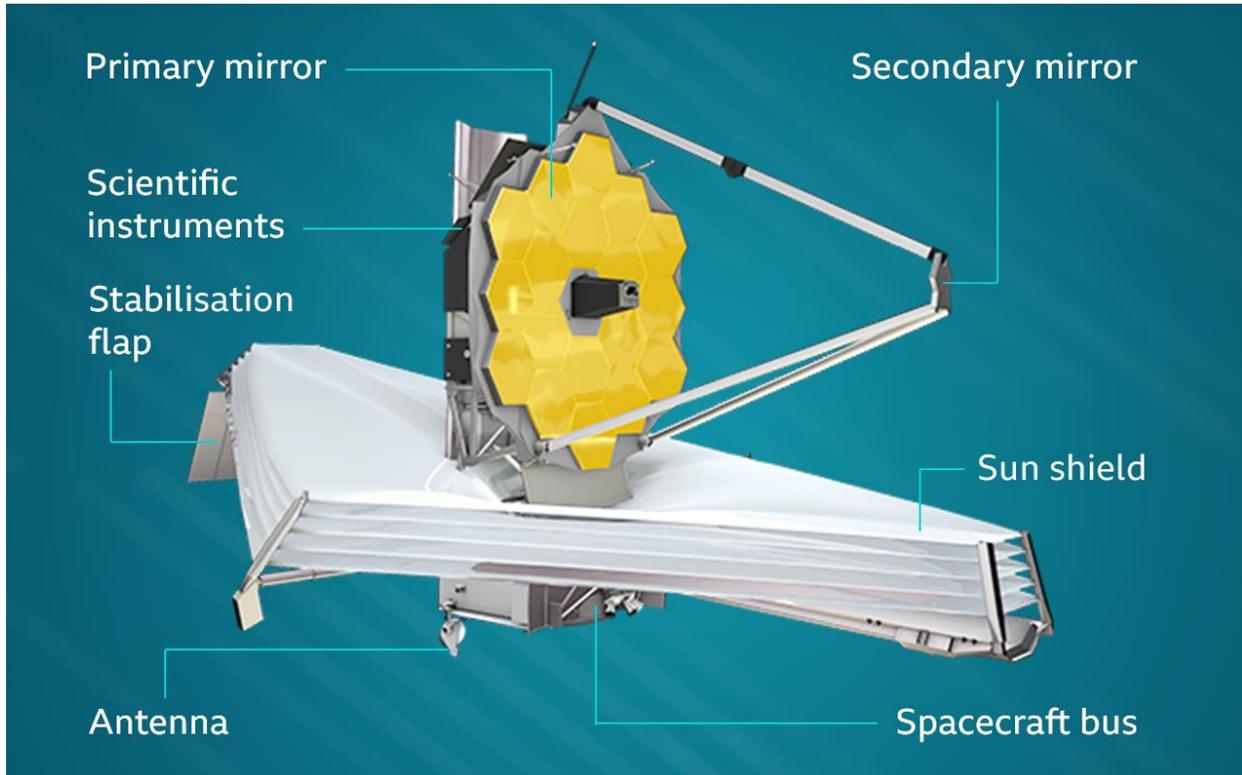
- The commercial production of Bti is a shot in the arm for **India's fight against vector-borne diseases such as malaria, filariasis, Japanese encephalitis, dengue, chikungunya and zika.**
- According to the World Health Organization (WHO), vector-borne diseases account for more than 17% of all infectious diseases, causing more than 700,000 deaths annually. They can be caused by parasites, bacteria or viruses.
- The estimated market size for Bti technology is about ₹1,000 crores annually in India.

Source: Indian Express

5. James Web Telescope

Topic: Science and Technology

James Webb Space Telescope



Source: Nasa

B B C

In News: NASA's James Webb Space Telescope has delivered the deepest and sharpest infrared image of the distant universe so far.

More on the Topic:

- Known as Webb's First Deep Field, image shows the galaxy cluster SMACS 0723 as it appeared 4.6 billion years ago.
- Light from these galaxies took billions of years to reach us.
- We are looking back in time to within a billion years after the big bang when viewing the youngest galaxies in this field.
- **The light was stretched by the expansion of the universe to infrared wavelengths that Webb was designed to observe.** Researchers will soon begin to learn more about the galaxies' masses, ages, histories, and compositions.

The James Webb Space Telescope:

- The James Webb Space Telescope is **the world's premier space science observatory.** Webb will solve mysteries in our solar system, look beyond to distant worlds around

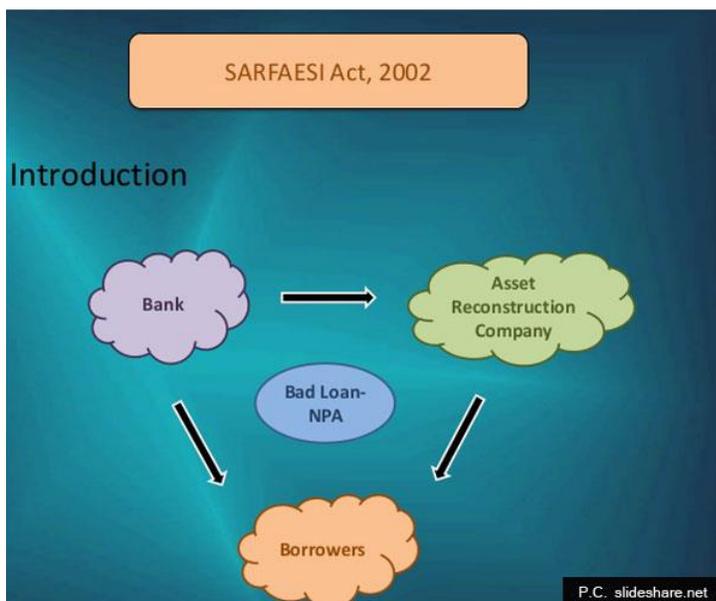
other stars, and probe the mysterious structures and origins of our universe and our place in it.

- Webb is an international program led by **NASA** with its partners, **ESA (European Space Agency)** and **CSA (Canadian Space Agency)**.

Source: Business Standard

6. Securitization and Reconstruction of Financial Assets and Enforcement of Security Interest Act, 2002 (SARFAESI Act)

Topic: Economy



In News: IDBI Bank has invoked SARFAESI act against a defaulter GTL Ltd.

More on the Topic:

- The Securitisation and Reconstruction of Financial Assets and Enforcement of Securities Interest Act, 2002 (also known as the SARFAESI Act) is an Indian law.
- It allows banks and other financial institutions to auction residential or commercial properties of defaulters to recover loans.
- The first asset reconstruction company (ARC) of India, ARCIL, was set up under this act.
- By virtue of the SARFAESI Act 2002, **the Reserve Bank of India has the authority to register and regulate Asset Reconstruction Companies (ARCs)**.
- **The SARFAESI act applies to the whole of India for the securitisation, reconstruction of financial assets and enforcement of the security interest.**
- The act applies to all the financial institutions established as securitisation companies or asset reconstruction companies registered by the reserve bank of India.

Source: Hindu

7. Interpol's International Child Sexual Exploitation (ICSE) initiative

Topic: Social Issues



INTERPOL

In News: India's Central Bureau of Investigation has joined the Interpol's International Child Sexual Exploitation (ICSE) initiative.

More on the Topic:

- This move will allow CBI to collaborate with investigators in other countries for detecting child sex abuse online and identifying abusers, victims, and crime scenes from audio-visual clips using specialised software.
- India is the 68th country to have access to this database and software. Interpol's website said that on average, the database helps identify seven child victims everyday globally.

What is Interpol?

- **Interpol is the world's largest international police organisation with 195 member countries**, and is headquartered in Lyon, France.
- Each member country hosts an Interpol National Central Bureau that connects their national law enforcement to it and in India, the CBI is that nodal agency.

Source: Hindu
