Prelim Bits 14-08-2023 | UPSC Daily Current Affairs

CATCH DNA

Researchers used CRISPR to engineer bacteria to detect colorectal cancer in mice.

The technology

- **Tumour DNA –** Researchers working at the frontiers of advanced biological sensors have engineered bacteria that can detect the presence of tumour DNA in a living organism.
- **Biosensors –** This new technology, which detected cancer in the colons of mice, can pave the way for new biosensors that can be used to detect cancers, infections and other diseases.
- In the past, researchers have used bacteria for many medical purposes, but this is the first time they have engineered it to identify specific DNA sequences and mutations outside of cells.

CATCH

- CATCH or the Cellular Assay for Targeted CRISPR-discriminated Horizontal gene transfer has been described in a research article published in the journal Science.
- **Tumours –** They often disperse their DNA into their surroundings.
- This DNA can be purified and analyzed in labs but it is difficult to detect in the environments where it is released.
- To develop CATCH, the researchers engineered bacteria using CRISPR technology to test free-floating DNA sequences and compare them with predetermined cancer sequences.

Many bacteria have a skill called natural competence where they can take up DNA from the environment.

Acinetobacter baylyi

- The researchers employed Acinetobacter baylyi, a bacteria with this skill, to detect cancer.
- A.baylyi was engineered using CRISPR technology to detect a mutated KRAS gene which helps colorectal cancer grow.
- **Resistance Gene –** When the engineered bacteria detect any of the mutated tumour DNA, it turns on an antibiotic resistance gene, which makes them resistant to a specific drug.
- Once researchers find bacteria that are resistant to the drug, they know that cancer

has been detected.

Reference

1. The Indian Express – Scientists engineer bacteria to detect cancer DNA

Pradhan Mantri Uchchatar Shiksha Abhiyan (PM-USHA) Scheme

Around 14 States yet to join Centre's flagship education scheme.

- **New name –** PM-USHA is the new name for the Ministry of Education's scheme to improve the quality of higher education in State Universities.
- **Aim –** To improve quality through curricular & programme changes, teacher training, physical and digital infrastructure, accreditation, and enhancing employability, while ensuring equity, access, and inclusion.
- States are required to sign a MoU with the Centre.
- The MoU mandates the implementation of the National Education Policy in order to avail funds for the next 3 years, under the Centre's flagship scheme for State-run higher education.

Kerala, Tamil Nadu and West Bengal are among 14 States and Union Territories, which are yet to sign a crucial Memorandum of Understanding (MoU) with the Union Education Ministry.

- Nearly 40% of the PM USHA budget must be borne by the States themselves, and no extra funds have been earmarked for NEP reforms.
- The MoU makes it mandatory for States to undertake the administrative, academic, accreditation, and governance reforms detailed in the NEP.
- These include an academic credit bank, entry and exit flexibility, and the Samarth e-governance platform.
- PM-USHA carries forward the vision of the earlier Rashtriya Uchstar Shiksha Abhiyan (RUSA), to improve the access, equity and quality of higher education in States.
- PM-USHA reduces the fragmentation of resources by streamlining the number of (scheme) components to six.

References

1. The Hindu – 14 States yet to join Centre's flagship education scheme
2. Education.gov – Pradhan Mantri Uchchatar Shiksha Abhiyan (PM-USHA)

Manuscripts

India has a large collection of ancient manuscripts, a part of the country's cultural heritage, but over the years many have been lost or lie in museums abroad.

The Bill

- The government is planning to introduce the National Manuscripts Bill, 2023, in the

Winter Session of Parliament.

- The Bill is still being worked out, and the primary aim is to document and catalogue Indian heritage texts wherever they may be, in India or abroad.
- It also aims to maintain accurate and up-to-date information about them, and detail the conditions under which they may be consulted.
- The Bill envisages setting up a 10-member National Manuscripts Authority (NMA).
- The National Manuscripts Authority would be the apex policy making body with regard to digitisation, conservation, preservation, editing, and publication work of manuscripts.

75% of the existing manuscripts are in Sanskrit, 25% are in regional languages.

Manuscripts

- A manuscript is a handwritten composition on paper, bark, cloth, metal, palm leaf or any other material dating back at least seventy-five years that has significant scientific, historical or aesthetic value.
- Lithographs and printed volumes are not manuscripts.
- Manuscripts are found in hundreds of different languages and scripts.
- Often, one language is written in a number of different scripts.
- For example, Sanskrit is written in Oriya script, Grantha script, Devanagari script and many other scripts.
- Manuscripts are distinct from historical records such as epigraphs on rocks, firmans, revenue records which provide direct information on events or processes in history.
- Manuscripts have knowledge content ranging from history and religion to literature, astrology, and agricultural practice.

India possesses an estimated 10 million manuscripts in 80 ancient scripts like Brahmi, Kushan, Gaudi, Lepcha, and Maithili.

- **National Mission for Manuscripts (NMM) –** It is an autonomous body under the Culture Ministry, which is mandated with preserving the vast manuscript wealth of India.
- **The Bakhshali manuscript –** It is an ancient Indian mathematical text written on birch bark, is considered to be the earliest recorded example of the use of zero.
- The seminal text, dating back roughly to the third or fourth century A.D., is in one of the Bodleian Libraries of the University of Oxford.
- Many other Indian manuscripts lie in libraries across the globe or are with private collectors, both in India and abroad.

References

1. The Hindu – Government plans law on protection of Indian manuscripts
2. NMM – Manuscripts

National Syllabus and Teaching Learning Material Committee (NSTC)

NCERT forms 19-member panel for textbooks revision and the committee will formulate new textbooks for grades 3 to 12, under the NEP.

- In an internal note circulated in the Ministry of Education, the high-powered committee is named, The National Syllabus and Teaching Learning Material Committee (NSTC).
- National Curriculum Framework for School Education (NCF-SE 2023) was initiated with the constitution of National Steering Committee, as a follow up to the National Education Policy (NEP).
- The NCF-SE is now in the advanced stages of development and shall act as the reference point and guiding roadmap for the syllabus and textbook developers for School Educational over the country.
- The NSTC will be assisted by Curricular Area Groups (CAGs) to develop textbooks and other teaching learning materials for each of the subjects included in the syllabus.
- The Chairperson and Co-chairperson of NSTC will constitute the CAGs with appropriate experts and with the support of NCERT.
- The NSTC will be free to invite other experts for advice, consultation, and support as and when required.
- The NSTC will be assisted by a Programme Office set-up by the NCERT and NCERT shall provide all necessary expertise and support as per the needs of the INSTC.

References

1. The Hindu – NCERT forms 19-member panel for textbooks revision
2. Times of India – NCERT forms committee to develop school syllabus

India-made MRI scanner

First India-made MRI scanner to be launched for clinical work in October.

Helium

- Since 2006, the world has been battling a shortage of helium, which despite being the second most abundant element in the universe, is a rare commodity on earth.
- The only way to source helium is to extract it from natural gas reserves.
- Helium is used in a variety of applications, from electronic components to rocket propulsion.
- Helium's most common use is as a coolant in large superconducting magnets powering Magnetic Resonance Imaging (MRI) scanners.
- The Russia-Ukraine war has further squeezed liquid helium supply with ripple effects on diagnostic facilities around the world, including India, thus unable to fully utilize their MRI scanners.

Indian MRI

- The indigenously developed machine is characterized by several innovations, including avoiding reliance on scarcely available liquid helium, bottom-up software design, and

customized hardware.

- This MRI scanner is designed in a way to avoid reliance on liquid helium.
- If at all there is a need to rapidly cool the scanner's magnets, the far cheaper and more abundant liquid nitrogen can be used to get the job done.
- These and other innovations characterize the first made-in-India MRI scanner developed by the Bangalore-based Voxel grids Innovations Private Limited.
- MRI, the definitive tool to provide three-dimensional images of tissues, and the best bet for warning of nascent Tumours, continues to be inaccessible to several Indians who require it.
- The Voxel grids scanners, is not different from the conventional doughnut-shaped machines into which people, shorn of any metal on their persons, must lie perfectly immobile while they are scanned.

Reference

1. The Hindu – First India-made MRI scanner to be launched for clinical work

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