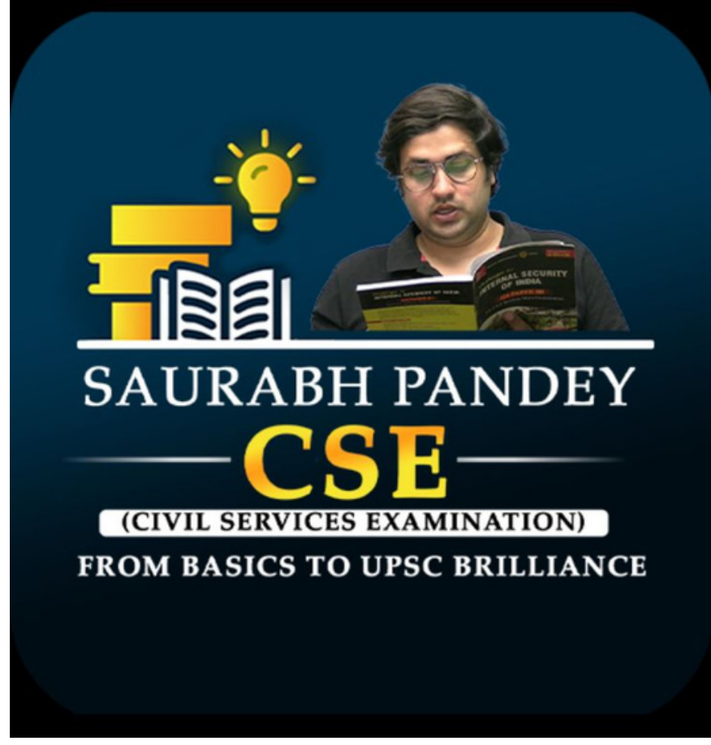
MONTHLY MAGAZINE GES REPORTER

2024



By Saurabh Pandey Sir

February 2024

UPSC

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About Author

Saurabh Pandey established Saurabh Pandey CSE Channel an online learning platform. He has 8 years of experience in teaching for the UPSC/IAS exam in various renowned institutes like Vision IAS, Study IQ, and Unacademy. He qualified for many exams like NET JRF. He appeared for a UPSC interview and wrote 3 civil services mains exams. He is MA in public administration. He did B. Tech in biotechnology.

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THE HINDU

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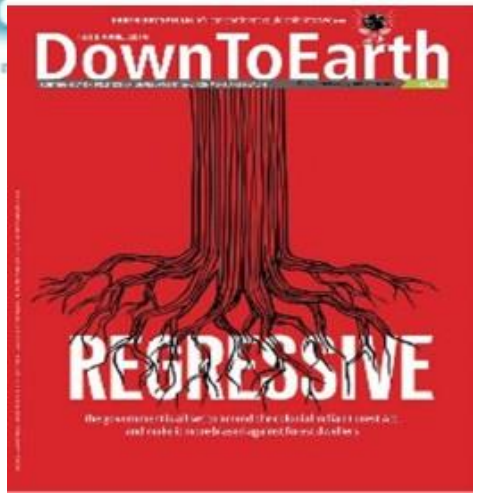

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Student name	Marks	Grade	Rank
Nimisha sharma	52.62/100	B	1
Trupti Sagar Singh	48.62/100	C	2
Anup Kumar	47.95/100	C	3
Shobhna	43.29/100	C	4th
ARCHANA KUMARI	41.93/100	C	5th
Krishan Lal	35.93/100	C	6th

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Plastic Pollution

- While the United Nations Environment Programme (UNEP) had previously identified around 13,000 plastic chemicals, the report by a team of European scientists found more than 16,000 chemicals in plastics — a quarter of which are thought to be hazardous to human health and the environment.
- The report, funded by the Norwegian Research Council, comes as government negotiators grapple with devising the world’s first treaty to tackle mounting plastic pollution, as some 400 million tonnes of plastic waste are produced every year.

The hindu analysis by saurabh pandey sir

India In Indian ocean region

- Despite New Delhi’s patience and diplomatic tact, Male continues to deepen its embrace of China.
- In contrast, Sri Lanka showed greater sensitivity to India’s security concerns by imposing a year-long moratorium on foreign research ships, including Chinese ones, to its ports.
- Last month, India’s SAGAR policy produced a valuable dividend as the Prime Ministers of India and Mauritius inaugurated a new airstrip and a jetty in the Agaléga Islands, boosting Mauritius’s capability to curb illegal activities in its vast Extended Economic Zone.

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THE HINDU

India's Presence in the Indian Ocean

Iran
(construction of Chabahar Port, submarine training)

UAE
(cooperation with India's oil reserves)

Oman
(permission for Indian Navy use of the port of Duqm)

Seychelles
(Indian base on Assumption Island (pending), provision of patrol boats, training)

Mauritius
(naval communication facility, provision of patrol boats, training)

Madagascar
(naval communication facility, permission for Indian Navy use of port)

Reunion Island, France
(permission for Indian Navy use of base)

Bangladesh
(financial aid for Air Force)

INDIA

Sri Lanka
(export of patrol boats)

Maldives
(provision of patrol planes and helicopters, training)

Diego Garcia island, US (UK)
(permission for Indian Navy use of base)

Andaman Nicobar
Islands (modernisation of bases)

Cocos Island, Australia

Myanmar
(construction of Sittwe Port, export of weapons)

Thailand
(joint patrol, Naval training)

Malaysia
(joint patrol, Air Force training)

Singapore
(joint exercises, joint patrols, leasing of training ground)

Indonesia
(joint patrol, repairing of fighter jets)

Australia
(joint exercises, joint infrastructure development, security cooperation with the US, Japan, France, India and Indonesia etc)

- The MIRV is the next technological threshold in this direction and it is now only logical and a matter of time before the MIRV is deployed on submarine-launched ballistic missiles.
- China, which is fast expanding its nuclear arsenal, has already deployed MIRV technology — first deployed by the U.S. in 1970.
- Pakistan claims to have tested it as well.
- In this regard, the other side of this development is the factor of escalation dynamics that is going to accelerate in the region with China and Pakistan.
- This spiral race of one-upmanship is only going to deepen, get more technology-intensive and turn out to be an expensive endeavour as well.

The hindu analysis by saurabh pandey sir

Contents

Neuralink Implants First Human with Brain Interface Device

Why in the News?

Elon Musk announced that the first human received an implant from the company over the weekend. This development signifies a significant milestone in the field of brain-computer interfaces and underscores Neuralink's progress towards its goal of linking the human brain to computers.

Neuralink's Milestone Achievement:

- Elon Musk announced that the first human received an implant from Neuralink, his brain-computer interface company.
- The implant, about the size of a large coin, is designed to be implanted in the skull.
- Ultra-thin wires from the device directly interface with the brain.

Objective and Applications:

- Neuralink aims to link the nervous system to computers, with applications including treating brain disorders and overcoming brain injuries.
- The initial goal of the brain-computer interface is to enable individuals to control a computer cursor or keyboard using their thoughts alone.

Current Landscape:

- More than 40 brain-computer interface trials are underway worldwide.

Technical Details:

- The wires from Neuralink's device are surgically placed in a region of the brain responsible for movement intention.

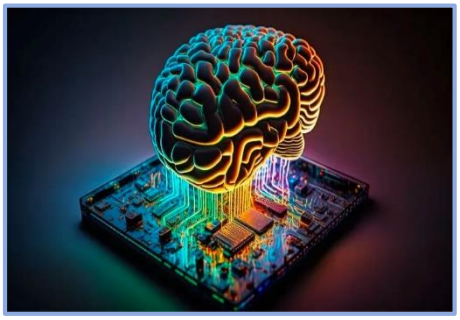
Future Developments:

- Elon Musk announced a product called "Telepathy" in a separate post.

Scandium Nitride Enables Neuromorphic Breakthrough

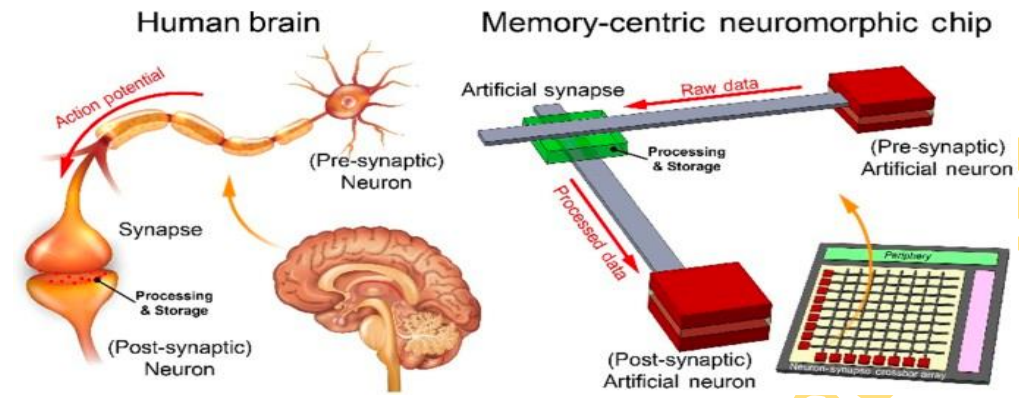
Scientists at JNCASR developed an artificial synapse using scandium nitride, a significant advancement towards brain-like computing, with potential applications in diverse fields.

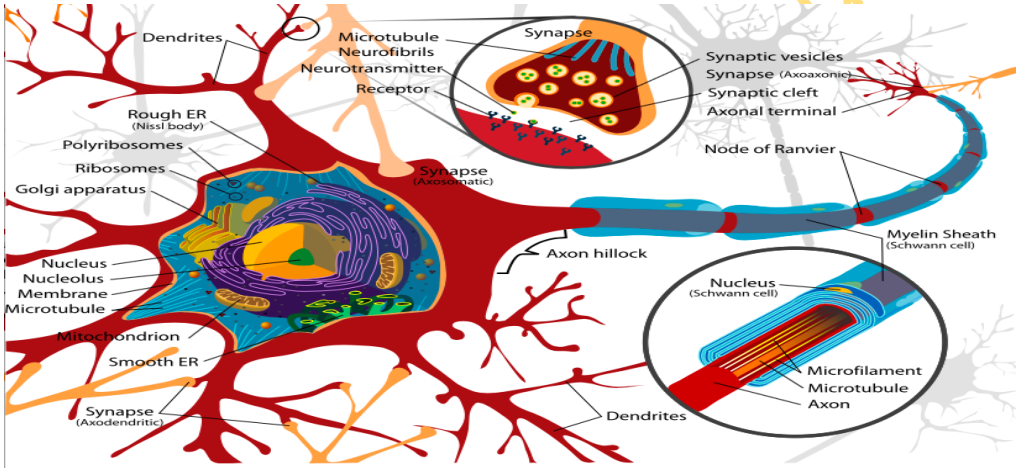
Why in the News?



About Neuromorphic Computing:

- Neuromorphic computing, a concept originating in the 1980s, refers to computing systems inspired by the structure and function of the human brain and nervous system.
- These systems aim to mimic the neurological and endocrine systems of humans, offering efficient processing while requiring minimal space for software installation.





Working Principle:

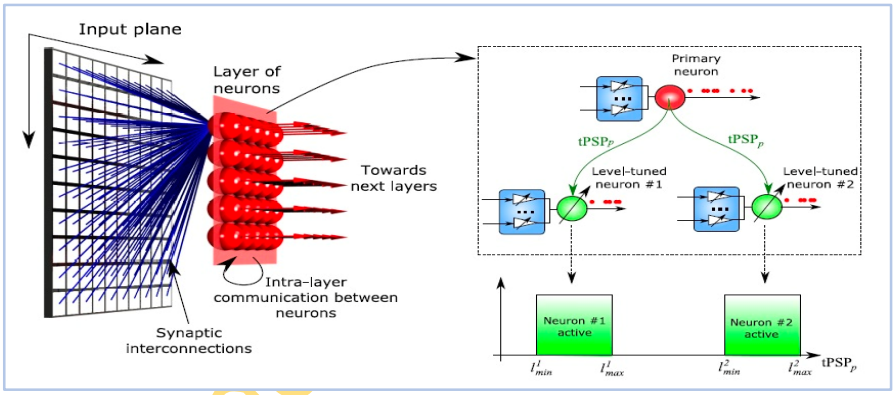
- Neuromorphic computing relies on Artificial Neural Networks (ANN), composed of millions of synthetic neurons resembling those in the human brain.
- These neurons communicate via electric spikes or signals, known as Spiking Neural Networks (SNN), enabling quick and effective tasks such as sight recognition and data interpretation.

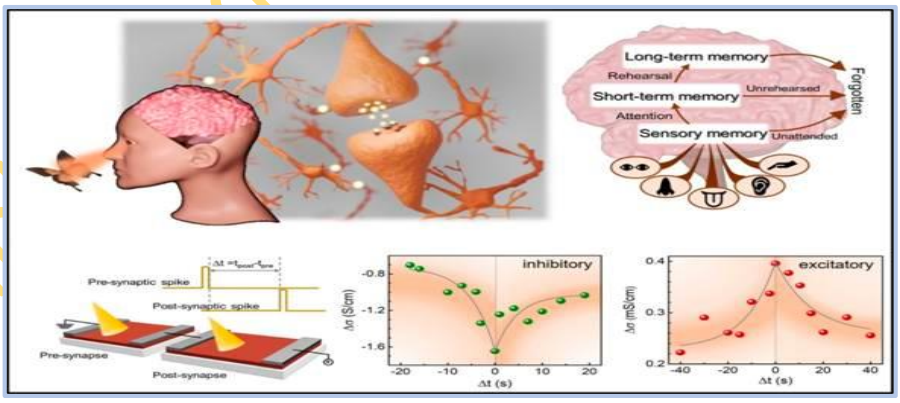
- Scientists have fused brain-like tissue with electronics to make an 'organoid neural network' that can recognize voices and solve complex mathematical problems.
- Their invention extends neuromorphic computing — the practice of modeling computers after the human brain to a new level by directly including brain tissue in a computer.
- The work comes against the backdrop of the staggering rise of artificial intelligence (AI), itself founded on the development of artificial neural networks brain-like networks of neurons except they're made with silicon chips that can process large datasets that conventional computers struggle.

Separating memory and processing

- The hardware on which these neural networks run has a problem, however: the memory units and the data processing units are separate.
- When a neural network operates, the network will have to access the data in the memory unit, bring it over to the processing unit, and work on it and it needs to do this many times over.
- Scientists have tried to build more efficient neuromorphic chips that include some short -term memory, so they can avoid going back and forth just a bit.
- These chips have been used for applications like computer vision and speech recognition.

- Brain organoids are three-dimensional aggregates of brain cells.
- The scientists made them by extracting human pluripotent stem cells, which are cells that can develop to become almost any kind of cell within the human body, and made them into brain cells.
- Brain organoids that are aggregates of such cells have a mix of the different types of cells in the brain.





Impact of heat waves on human

●Global warming is causing temperatures across the globe to rise significantly enough to cause disruptions.

●Heat waves are occurring with greater frequency and are lasting longer than ever before, with the World Meteorological Organisation declaring that 2023 was the hottest year on record.

●While humans have adapted and acclimatised themselves to several variations in climate, there is believed to be a limit beyond which our bodies cannot process this change. Powerful effects that extreme temperatures can have during pregnancy and early childhood, including impacts on learning, sleep quality, and mental and behavioural health.

●It also explains how heat amplifies systemic inequities, including air quality, access to nutritious foods, and structural disadvantages. In addition, it provides some practical solutions to mitigate climate change, slow the heating of our environment, and provide new ways of cooling our communities.

●This includes tips on how to mitigate the impact of extreme temperatures, finding new ways of cooling the communities where children live, and grow, along with some community initiatives that have reportedly started to bear fruit.

Brain

- Brain — The hypothalamus acts as a thermostat for the entire body, sensing temperatures and reacting to keep core temperatures within a healthy range.
- Continuous, high temperatures prevent the hypothalamus from shutting off these cooling responses.
- Also, when the heat shock proteins break down, the body identifies them as invaders and sends out immune cells to fight them, thus keeping them from their main task of fighting infections.
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Skin and Gut

- Skin and Gut — In response to heat, pores in the skin open to allow more sweat to pass through and evaporate, increasing the body's ability to cool itself.
- The lining of the gut can become leaky allowing bacteria to pass through to other parts of the body.

Pregnant Women and Children

- In pregnant women, high temperatures may result in reduced blood flow in the placenta, dehydration, and inflammation, which can trigger preterm birth.
- There is evidence that during times of high temperatures, there are increased rates of stillbirth, as well as more premature and lower birth weight babies, again, linked to a greater risk of a range of poor outcomes later in life, including impaired cognition, reduced growth, and chronic health issues such as cardiovascular disease and diabetes in adulthood.
    - Learning loss — heat is linked to slower cognitive function and reduced concentration ability.
    - Sleep quality — getting enough good -quality sleep is essential for healthy growth and development.

●A growing body of evidence shows associations between less sleep in infancy and childhood obesity, and sleep habits in childhood may impact weight well into adulthood.

●The third crucial factor is Mental and behavioural health because children's brains and bodies are

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Volt Typhoon

Why in the News?

Volt Typhoon captured attention following the United States government's decisive action to dismantle this China-backed hacking group. Renowned for targeting routers and critical infrastructure in the U.S. and Guam, Volt Typhoon's operations were brought to an end.

- **US authorities they had dismantled a network of hackers known as Volt Typhoon, which was targeting key American public sector infrastructure like water treatment plants and transportation systems at the behest of China.**
- **In May 2023, the United States and its allies had accused Volt Typhoon, described as a "state- sponsored hacking group" backed by China, of infiltrating critical U.S. infrastructure networks claims rejected by Beijing.**

Mindanao is the second-largest island in the Philippines, after Luzon, and seventh-most populous island in the world.

Located in the southern region of the archipelago, the island is part of an island group of the same name that also includes its adjacent islands, notably the Sulu Archipelago

Do you Know?

Mindanao, is also known worldwide for being home to the surf capital of the Philippines, a famous highly-urbanized city, and jaw-dropping beaches.

Luang Prabhang

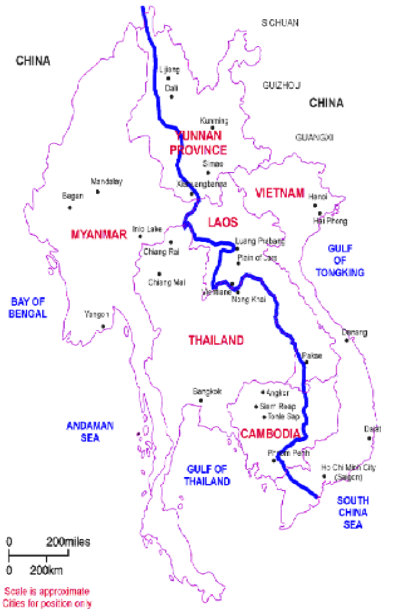
Why in the News?

Luang Prabang's UNESCO World Heritage status is under threat due to a multibillion-dollar dam project upstream, raising concerns about its cultural and environmental impact. The project highlights broader questions about the government's development plans and their implications for the Mekong River ecosystem.

- **Landlocked Laos doesn't have the famous beaches of its neighbours to attract tourists, but instead relies on the pristine beauty of its mountains and rivers and historical sites to bring in visitors.**
- **The crown jewel is Luang Prabang, a UNESCO World Heritage Site where legend has it that Buddha once rested during his travels.**
- **It brings all the elements together, with its mix of historic Laotian and French colonial architecture on a peninsula at the confluence of the Mekong and the Nam Khan rivers.**

- **It brings all the elements together, with its mix of historic Laotian and French colonial architecture on a peninsula at the confluence of the Mekong and the Nam Khan rivers.**

- **The Nam Khan is a river in Laos that is a major tributary of the river Mekong, with which it joins at Luang Prabang.**



But a multibillion- dollar dam project underway 25 kilometers upstream has prompted concerns that it could result in the city losing its UNESCO status, and broader questions about what the government's ambitious plans to build multiple dams across the Mekong will do to the river, the lifeblood of Southeast Asia.

About Luang Prabhang

●Luang Prabang, the ancient capital of Luang Prabang Province in northern Laos, lies in a valley at the confluence of the Mekong and Nam Khan rivers.

●Inhabited for thousands of years, it was the royal capital of the country until 1975.

●It's known for its many Buddhist temples, including the gilded Wat Xieng Thong, dating to the 16th century, and Wat Mai, once the residence of the head of Laotian Buddhism.

The Purépecha

●The Purépecha were an ancient civilization in western Mexico that inhabited the area of the Mexican state of Michoacán.

●They were also known as the Tarascan civilization.

● Their name comes from the Nahuatl word which means ''place of fish masters.

●Every year, they celebrate the 'Fuego Nuevo Purepecha', a fire-lighting ceremony to mark the start of the new year

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Marking the year: Purepecha's Indigenous people carry incense during a three-day ceremonial procession in Michoacan State, Mexico. Every year, they celebrate the 'Fuego Nuevo Purepecha', a fire lighting ceremony to mark the start of the new year. AFP

Ammonia from crops

Why in News?

Based on machine learning, researchers have come up with detailed estimates of ammonia emissions from rice, wheat and maize crops.

More on News

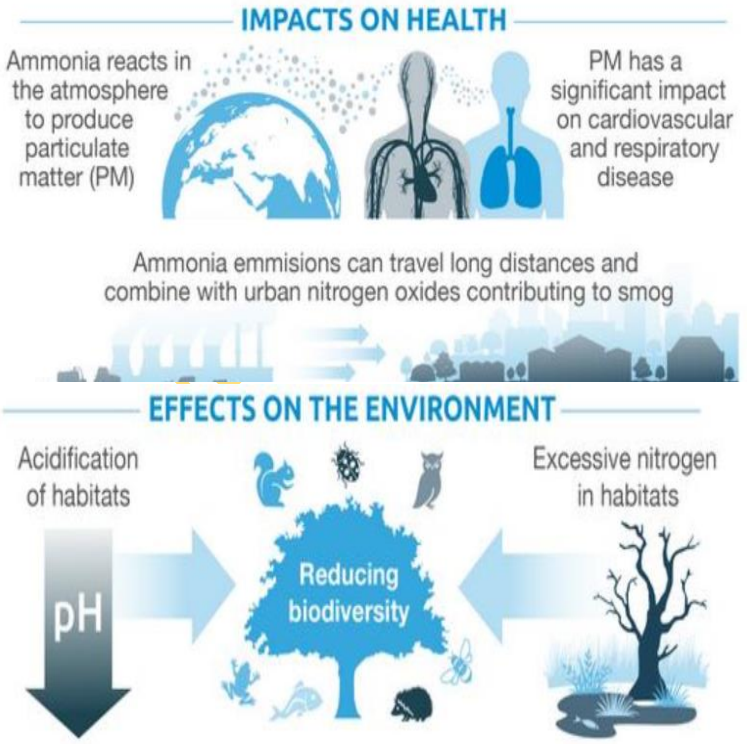
●The dataset enabled a crop land- specific assessment of the potential for emission reductions, which indicates that effective management of fertilizer in the growing of these crops could lower atmospheric ammonia emissions from farming by up to 38%.

●Atmospheric ammonia is a key environmental pollutant that affects ecosystems across the planet, as well as human health.

●Around 51--60% of anthropogenic ammonia emissions can be traced back to crop cultivation, and about half of these emissions are associated with three main staple crops: rice, wheat and maize.

●However, quantifying any potential reductions in ammonia emissions related to specific croplands at high resolution is challenging and depends on details such as nitrogen inputs and local emission factors.

Ammonia is a colourless highly irritating gas with a sharp suffocating odor. That dissolves easily in water to form ammonium hydroxide solution which can cause irritation and burns.



AI and language

●A new machine learning model trained on video and audio recorded from the first- person perspective of one young child for over a year has provided insights into early language acquisition.

●Not only do the findings offer a valuable framework to understand how children learn words and concepts, but they could be critical in developing AI systems that can learn language in more human -like way

●A new machine learning model trained on video and audio recorded from the first- person perspective of one young child for over a year has provided insights into early language acquisition.

Herbivores and ecosystem

●The effect of large herbivores on plant abundance and diversity depends more on their size and diet than whether they are native or introduced into their host ecosystems, as per a meta- analysis of over 200 studies.

●The findings counter the widely held notion that the impacts of introduced megafauna are distinct and more harmful than those of native megafauna and suggest that trait- based ecology provides better insight into mega herbivore- plant interactions than concepts of species origin.

●Ground- penetrating radar onboard NASA's Mars Perseverance rover has confirmed that the Jezero Crater, formed by an ancient meteor impact just north of the Martian equator, once harboured a vast lake and river delta.

●Over eons, sediment deposition and erosion within the crater shaped the geologic formations visible on the surface today

●The discovery of lake sediments reinforces the hope that traces of life might be found in soil and rock samples collected by Perseverance.

●The crater filled with water has layers of sediments deposited on the crater floor. The lake subsequently shrank and sediments carried by the river that fed it formed an enormous delta.

Conjugate Vaccine

Why in News?

Recently, the **Chief Minister of Andhra Pradesh** has launched **Pneumococcal Conjugate Vaccine (PCV) immunisation** drive for infants.

More on News-

• There are two conjugated typhoid vaccines the Typbar TCV typhoid vaccine manufactured by Bharat Biotech that received WHO prequalification in 2017,

●And Biological E's Vi-CRM197 conjugate typhoid vaccine, which received WHO prequalification in 2020.

What are Conjugate vaccine?

A conjugate vaccine is a type of subunit vaccine which combines a weak antigen with a strong antigen as a carrier so that the immune system has a stronger response to the weak antigen.

What are Subunit vaccine?

A subunit vaccine is **a vaccine that contains purified parts of the pathogen that are antigenic, or necessary to elicit a protective immune response.** Subunit vaccine can be made from dissembled viral particles in cell culture or recombinant DNA expression, in which case it is a recombinant subunit vaccine.

Do You Know?

Pneumococcal disease is a name for any infection caused by bacteria called ***Streptococcus pneumoniae or pneumococcus.*** Most people carry pneumococcus in their nose and throat, where the bacteria do not cause any symptoms.

However, **sometimes the bacteria grow and spread to other parts of the body** and that's when people become sick.

Humoral- and cell-mediated immunity

Humoral immunity produces antigen-specific antibodies and is primarily driven by B cells.

●Cell-mediated immunity on the other hand does not depend on antibodies for its adaptive immune functions and is primarily driven by mature T cells, macrophages and the release of cytokines in response to an antigen.

●Salmonella Typhi bacteria that causes typhoid could rebound in children aged 5- -15 years after being vaccinated due to waning protection by a single dose of the vaccine;

●The typhoid rebound in vaccinated children is based on a mathematical model of the transmission dynamics of the bacteria.

Tachykinin

Why in the News?

Researchers found that a neurochemical called tachykinin activated aversion behaviour in flies.

Flies that had a mutation that deprived them of neurons that could release tachykinin didn't display threat avoidance behaviour, even if they retained other visual and motor responses

Neurons regulating aversion behavior are in the visual region of the fly's brain, so scientists want to understand how visual information is transmitted to elicit the fear response.

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Ergosphere

Why in the News?

Some scientists have suggested using this possibility to send an object into the ergosphere and allow it to accelerate there along the black hole's direction of rotation so that it comes out moving faster. This energy 'gain' will translate to the black hole losing some angular momentum.

More on news-

Origin-Ergosphere comes from the Greek word 'ergon' that means 'work'. It has got its name because it is possible to get energy and even mass from this place.

Definition-It is the region in between the event horizon and the stationary limit.

NOTE- Event Horizon: It is a sphere around the singularity of a Black Hole. When anything enters this sphere, it can't escape unless it travels faster than light (which is impossible).

Stationary limit-It is a surface around the outside of a rotating black hole.

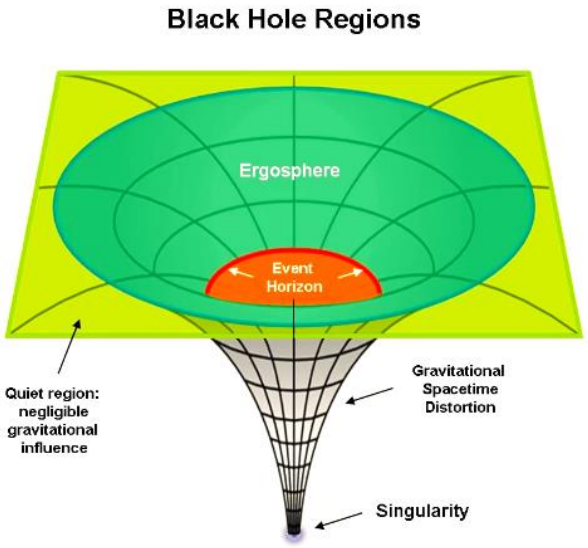
Shape: An Ergosphere is shaped like an oblate spheroid, or a pumpkin.

Do You Know?

Black Hole:

Formation: When a massive star runs out of fuel to fuse, blows up, leaving its core to implode under its weight to form a black hole.

Einstein's theory of general relativity: As per it, when a massive star dies, it leaves behind a small, dense remnant core. If the core's mass is more than about three times the mass of the Sun, the force of gravity overwhelms all other forces and produces a black hole.



Viña del Mar

Viña del Mar meaning "Vineyard of the Sea") is a city and commune on central Chile's Pacific coast.

- Often referred to as La Ciudad Jardín ("The Garden City"), Viña del Mar is located within the Valparaíso Region, and it is Chile's fourth largest city with a population of 324,836 (according to the 2008 census).
- Viña del Mar is also part of the Greater Valparaíso area, the country's second largest metropolitan area (pop. 935,602, 2017 census), after the Metropolitan area of Santiago.

Do You Know?

Viña del Mar is a beach resort town close to Santiago in Central Chile. **It's the most important beach in the country**. It plays host to a famous music festival every year in late-February.7

Micro-credentials

Why in the News?

"Micro credentials, the next chapter in Indian higher education" which was published in the Hindu. The article highlights that the higher education institutes in India can be the catalysts in integrating micro credentials with existing academic programmes to achieve excellence in the system.

What are Micro-Credentials?

- They are short- duration learning activities with proof of specific learning outcomes that are validated through a standard and reliable assessment process.
- Micro-credentials are offered in online, physical, or hybrid modes at various levels, such as beginning, intermediate, or advanced. In contrast to micro-credentials, students must study for several years to obtain macro- credentials such as undergraduate degrees.
- through a standard and reliable assessment process.
- Micro-credentials are offered in online, physical, or hybrid modes at various levels, such as beginning, intermediate, or advanced. In contrast to micro-credentials, students must study for several years to obtain macro- credentials such as undergraduate degrees.

- In addition, micro-credentials can also be designed for life-long learners, i.e., working professionals who may not be able to attend a formal degree programme in a university Micro-credentials, as a path to life-long learning, are still developing.
- An obvious sign of this is how assorted terminologies, such as digital badges, micro-master degrees, nano-degrees, and online certificates, are being used for this short -duration learning.

Conclusion

Indian higher education institutes must serve as agents of transformation and consider introducing micro credentials a vital element of their strategic institutional objectives, which requires regulators and institutes to must work towards harmonising micro credentials with existing academic programmes by coming up with clear validation metrics.

Do You Know?

About Macro Credentials

- **Formal Degrees:** It provides formal degrees like bachelor's, master's degrees that take 2-4 years of full-time study.
- **Broad-based Education:** It provides a broad-based education across many subjects.
- **Credits:** The credits are based on time spent in classrooms/labs.
- **Examples:** Btech,Mbbs

Bottom Trawling

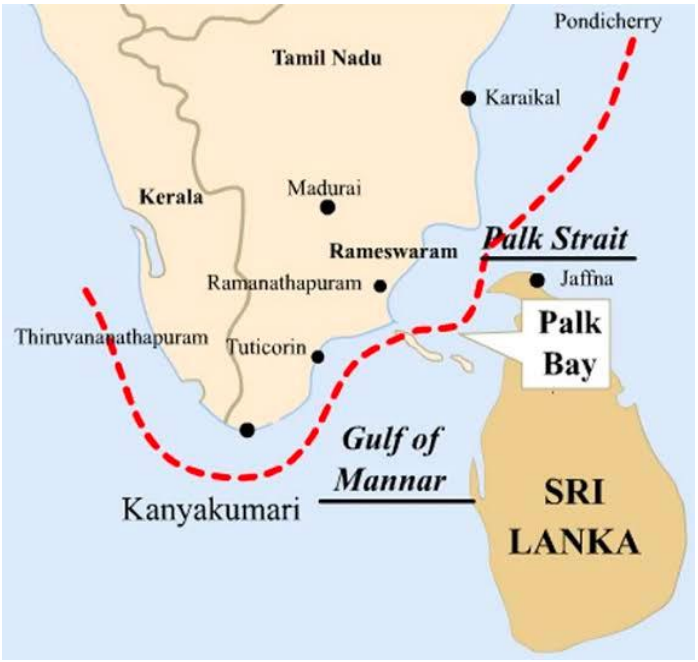
Why in the News?

Tensions between Sri Lankan and Tamil Nadu fishermen over bottom trawling practices and breaches of fishing regulations near the maritime boundary line have drawn media attention due to ongoing disputes and unfulfilled promises to address the situation.

Sri Lanka is under pressure from its northern province fishermen to act against Tamil Nadu fishermen, who they accuse of resorting to destructive bottom trawling, a practice banned by the country since July 2017.

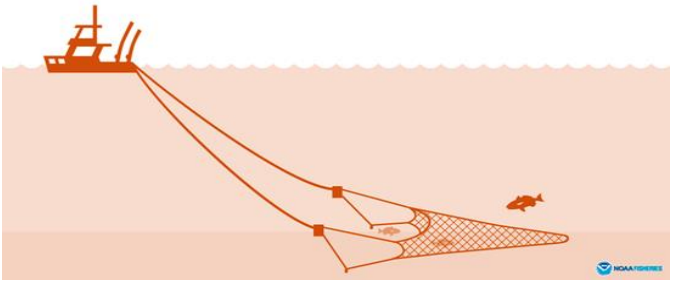
While India promised to end bottom trawling in Palk Bay and incentivise fishermen to take to deep-sea fishing under the Blue Revolution Scheme, bottom trawlers are still active.

- **Fishermen also face a practical problem as under the Tamil Nadu Marine Fishing Regulation Act 1983, mechanized fishing boats are permitted to fish only beyond three nautical miles from the coast.**
- **Since the distance between Dhanushkodi and the International Maritime Boundary Line is only nine nautical miles, breaches do occur, a point the Sri Lankan Navy should not overlook.**
- **As Prime Minister Narendra Modi emphasised in 2015, the tensions over fishing must be handled as a "humanitarian concern". Unfortunately, neither side has demonstrated consistency in the handling of the issue.**



What is Bottom Trawling?

Bottom trawling is a fishing practice that herds and captures the target species, like groundfish or crabs, by towing a net along the ocean floor.



Genocide Convention

Why in the News?

Recently, South Africa moved the International Court of Justice (ICJ), for an urgent order declaring that Israel was in breach of its obligations under the 1948 Genocide Convention.

More on News-

●The Genocide Convention was the first human rights treaty adopted by the General Assembly of the United Nations on 9 December 1948 and signified the international community's commitment to 'never again' after the atrocities committed during the Second World War.

●According to the Genocide Convention, genocide is a crime that can take place both in time of war as well as in time of peace.

●The definition of the crime of genocide, as set out in the Convention, has been widely adopted at both national and international levels, including in the 1998 Rome Statute of the International Criminal Court (ICC).

●Importantly, the Convention establishes on State Parties the obligation to take measures to prevent and to punish the crime of genocide, including by enacting relevant legislation and punishing perpetrators, "whether they are constitutionally responsible rulers, public officials or private individuals" (Article IV).

●That obligation, in addition to the prohibition not to commit genocide, have been considered as norms of international customary law and therefore, binding on all States, whether or not they have ratified the Genocide Convention.

States' obligations under the Genocide Convention

●Obligation not to commit genocide (Article I as interpreted by the ICJ)

●Obligation to prevent genocide (Article I) which, according to the ICJ, has an extraterritorial scope;

●Obligation to punish genocide (Article I);

●Obligation to enact the necessary legislation to give effect to the provisions of the Convention (Article V);

●Obligation to ensure that effective penalties are provided for persons found guilty of criminal conduct according to the Convention (Article V);

●**Obligation to try persons charged with genocide in a competent tribunal of the State in the territory of which the act was committed, or by an international penal tribunal with accepted jurisdiction (Article VI);**

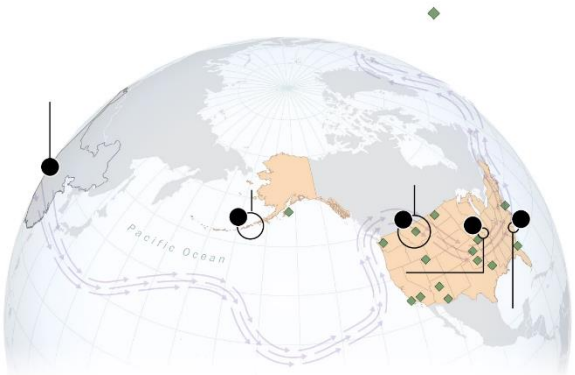
●**Obligation to grant extradition when genocide charges are involved, in accordance with laws and treaties in force (Article VII).**

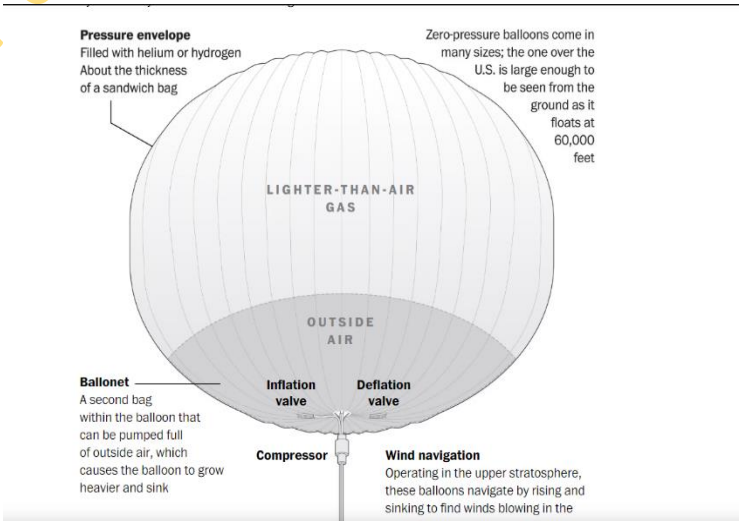
International Day

Every year on 9 December, the United Nations marks the adoption of the Genocide Convention, which is also the International Day of Commemoration and Dignity of the Victims of the Crime of Genocide and of the Prevention of this Crime.

Stratospheric balloon

The balloon floating over the United States appears to match the general characteristics of what aerospace engineers call a zero-pressure ultra-long duration balloon a high-tech eye in the sky that can hover over a target area for weeks or months.





- Balloon is using to maneuver through the stratosphere.
- Some high-altitude balloons are carried by the current, while others may use a semi-autonomous navigation system to set their course.
- In some cases, they navigate by finding a wind current heading in the intended direction and lock into it by moving up or down in the air
- The Thunderhead balloon, for instance, made by the aerospace and defence contractor Aerostar for stratospheric missions, can search independently for optimal wind conditions

Just Energy Transition Partnership (JET-P)

Why in News?

After South Africa, Indonesia, and Vietnam, India is considered the next candidate for a JET- Partnership. India's G-20 presidency could potentially be an opportune moment to forge a deal

About Just Energy Transition Partnership (JET-P)

●Just Energy Transition Partnership (JET-P) is emerging as the key mechanism for multilateral financing by developed countries to support an energy transition in developing countries.

● This has taken on particular significance following the insertion of the phrase 'phase-down' of coal in the Glasgow Pact.

However, India must develop a coherent domestic just energy transition (JET) strategy in order to negotiate a financing deal that addresses its unique set of socio-economic challenges

Issues that concern transitions

●Energy transitions could give rise to intra-generational, intergenerational, and spatial equity concerns.

●Transitions affect near-term fossil- dependent jobs, disrupt forms of future energy access, shrink State's capacity to spend on welfare programmes and thus exacerbate existing economic inequities between coal and other regions

●Existing JET-P deals, pay limited attention to intergenerational inequity, such as job losses resulting from a coal phase-down

● Energy transition in the industrialised world involves a natural tapering of energy consumption alongside fuel switching to clean energy sources;

●India's transition requires significant simultaneous growth in energy demand.

●The Central Electricity Authority projects a near doubling of electricity demand by 2030.

●A country that is likely to multiply its energy demand requires adequate supply from a diverse mix of sources. India cannot afford to put its development on hold while decarbonising

The path to a clean energy quest

India has signalled a commitment to clean energy with ambitious targets like 500GW of non-fossil, including 450 GW renewable energy (RE) capacity addition and 43% RE purchase obligation by 2030.

●These targets are supported through complementary policy and legislative mandates (Energy Conservation (Amendment) Act), missions (National Green Hydrogen Mission), fiscal incentives (production -linked incentives), and market mechanisms (upcoming national carbon market

●Acceleration in RE deployment rates to match the pace of demand growth is critical to India's JET

● Solarisation of agricultural electricity demand;

●Electrification of diesel- powered Micro, Small and Medium Enterprises (MSMEs); and decentralised RE for residential cooking and heating

●Stimulation of energy demand through rural productivity enhancement will further aid RE acceleration as well as help to address the rural- urban economic divide, create rural jobs, and thereby address inter-generational and spatial inequities.

●Second, domestic manufacturing of clean energy components is critical to sustain a JET, build energy self-sufficiency, and tap the green jobs promise of 21st century energy

●While India has recognised the importance of domestic manufacturing, the challenge is in achieving cost competitiveness — Indian components are 20% costlier than Chinese components.

●Giving preference to domestic components without addressing cost competitiveness may slow down the pace of deployment.

●Third, there is a case for re-aligning the current use of coal resources to enhance efficiencies until the period of phase-down.

●One option is to optimise use of coal- fired power plants closer to where coal is mined rather than based on energy demand in States.

Mistiness

●Mistiness is caused by tiny droplets of water that scatter light and make the glass opaque.

● Wiping the glass with a cloth which is soaked in a detergent leaves a residue which lowers the surface tension of the water droplets enough to allow them to spread as a thin film.

Zodiacal dust

Zodiacal Dust and Zodiacal Light:

- Zodiacal dust refers to cosmic dust found mainly between the Sun and Jupiter.
- It causes Zodiacal light, a faint, diffuse white glow seen along the ecliptic in the night sky.

Cause of Zodiacal Light:

- Sunlight scattering by space dust in the zodiacal cloud creates Zodiacal light.
- The large collection of dust particles in this area contributes to the effect, along with the reflection of sunlight off the dust.

Observation Timing:

- Best observed just after sunset in spring and just before sunrise in autumn.
- Visibility is limited due to the faintness of the glow and potential obstruction by moonlight or light pollution.

Characteristics of Zodiacal Dust:

- Dust particles are typically between 10 and 300 micrometres in diameter.
- Most particles have a mass around 150 micrograms.
- refers to cosmic dust found mainly between the Sun and Jupiter.
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Rare Observation:

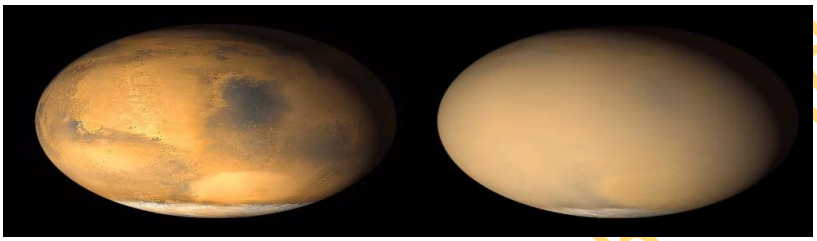
- Forward scattering, a type of light deflection, makes observing Zodiacal light rare.
- It's visible only under specific conditions when the zodiac is at a steep angle to the horizon, but often rendered invisible due to moonlight or light pollution.

Recent study on Mars

●The study compared the flux of dust near Mars, and the number of particles escaping the two moons of Mars and concluded that these moons could be the dust source.

●No other phenomenon in the neighborhood was found that could release as much dust

●The study incorporated the shapes of the two Martian moons along with the gravitational effects of Mars, incoming and outgoing dust particles, the effect of spacecraft ejecta, and other parameters in models for the dust.

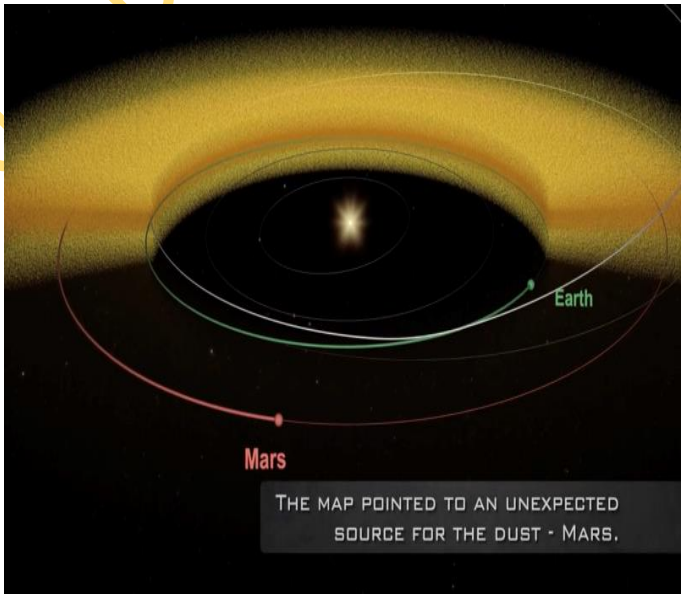


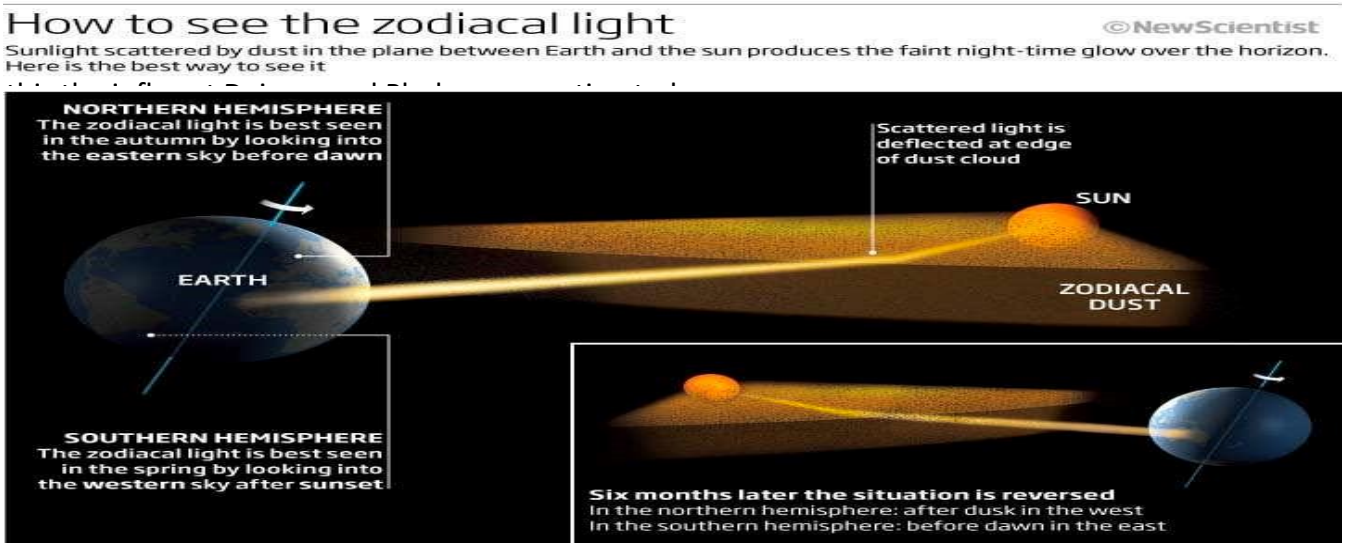
●From this the influx at Deimos and Phobos was estimated.

●This combined with observational data led to a mechanism that could explain how Deimos and Phobos could be contributing to the zodiacal dust

●These dust particles can easily escape Phobos and Deimos because of the moons' low gravity.

●The smaller of these particles escape into space whereas Mars's gravity pulls in the larger ones.





Zaporizhzhia

Why in News?

The risks and safety measures at the Zaporizhzhya Nuclear Power Plant (NPP) in Ukraine, particularly in the context of the military conflict in the region.

●The Zaporizhzhia Nuclear Power Station in southeastern Ukraine is the largest nuclear power plant in Europe and among the 10 largest in the world.

● It has been under Russian occupation since 2022. It was built by the Soviet Union near the city of Enerhodar, on the southern shore of the Kakhovka Reservoir on the Dnieper river.

●It is operated by Energoatom, who operate Ukraine's other three nuclear power stations.

Human ashes

●Among the payloads aboard a recent private moon mission by U.S. company Astrobotic which ultimately failed to reach the moon's surface were dozens of capsules of human ashes and a can of Japanese sports drink Pocari Sweat.

●The exact purpose of the can was unclear.

●Under U.S. law, those items and anything else can go to the moon, as long as the U.S. Federal Aviation Administration and other agencies certify a rocket payload's launch of Earth does not "jeopardise public health and safety .

●U.S. national security or international obligations of the United States."

●The issue will gain more attention as the National Aeronautics and Space Administration leans heavily on private companies to cut the costs of its trips to the moon.

●Lawyers with space-law expertise worry that the absence of regulations could pit U.S. companies against other countries operating on the lunar surface or spark international disputes over which private endeavours could be considered land appropriation or claims of sovereignty.

Determining State Finances

According to Article 293(3) of the Constitution, the State has to obtain the consent of the Centre to raise 'any loan', if 'any part of the previous loan' extended by the Centre is outstanding.

●The imposition of the Net Borrowing Ceiling (NBC) is done by invoking the powers of the Centre under Article 293(3).

●On close scrutiny, the Centre's decision to include extra-budgetary borrowings by state-owned enterprises in the total debt of the State is constitution

●The Union Finance Minister justified the decision by relying on the 15th Finance Commission Report, which says, "Governments at all tiers may observe strict discipline by resisting any further additions to the stock of o-budget transactions and contingent liabilities which is against the norms of Fiscal transparency and detrimental to fiscal sustainability.

●One very important purpose of our recommendation for higher borrowing limit to the Union and State Government is to foster transparency and to avoid build-up of non-transparent liabilities."

●Notably, the Finance Commission has not called for the inclusion of the debt of state-owned enterprises in the NBC.

●Parliament does not have the power to legislate upon the 'Public Debt of the State' as this finds place in Entry 43 of the State List of the Constitution.

●Therefore, the power to make laws on, administer and determine aspects of the public debt of the State falls squarely on the State Legislature.

●The State government raises another crucial argument that the balances in the public account of the State should not be included in the NBC.

●The State relies upon Article 266(2) of the Constitution which indicates that the money collected by the Central or State government, which do not pertain to the consolidated fund, can be brought under the head of 'public accounts'.

●Small savings, security deposits, provident funds, reserve funds and other treasury deposits constitute 'public accounts'.

●All activities related to public accounts fall within the domain of the State Legislature and the Centre has no power to include the withdrawals from public accounts in the NBCnally suspe

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Use of deep learning and antibiotic resistance

●All artificial neural networks are made of artificial 'neurons'.

●These are algorithms that receive an input, perform a computation, and relay the output.

●Deep-learning neural networks have three or more layers of such 'neurons'.

●Using these neural networks to make predictions has two steps: training and testing.

●In training, the network is provided with a large amount of annotated inputs.

● For example, if the network is being trained to identify pictures of cats, it is provided with many such pictures labelled "cat".

● If deep-learning can identify potential antibiotics and also explain what substructures may contribute to its antibiotic activity, scientists can synthesise and test compounds with these substructures faster.

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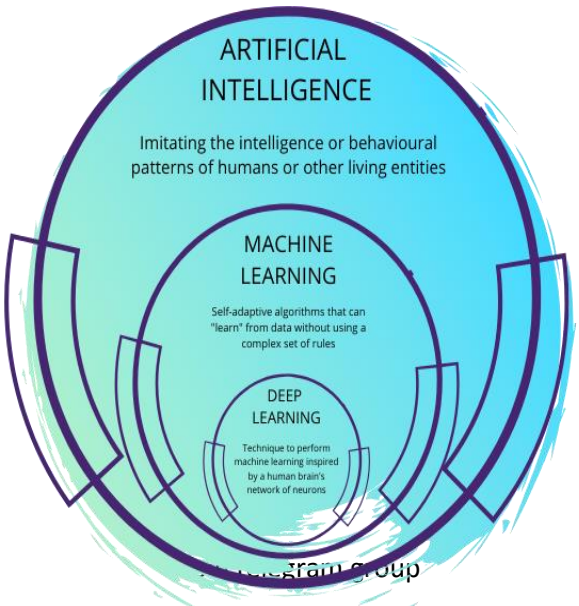
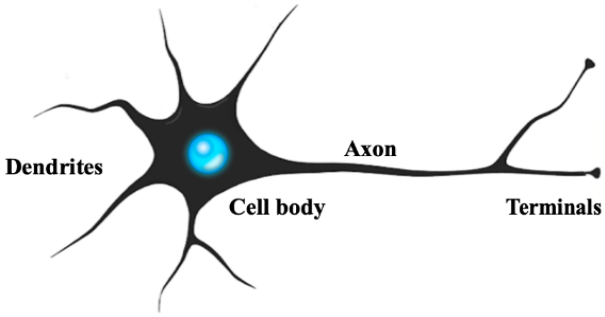
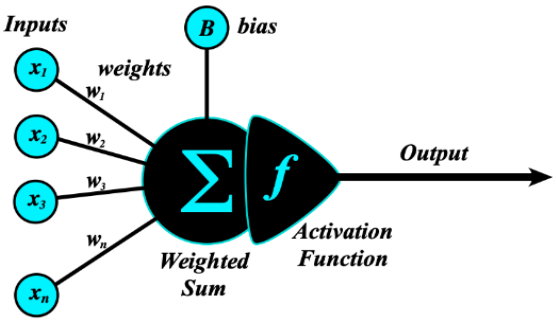


Background of Neural Network

- In 1944, artificial neural networks were first proposed by Warren McCullough and Walter Pitts.
- Later, it led to the birth of deep-learning and artificially intelligent systems like ChatGPT.
- Today, deep learning, a branch of artificial intelligence, is being used to discover new antibiotics.
- The second wave of deep learning revolutions started in 1990 with advances in algorithms and computational power revitalising neural networks.





Do you Know?

What is Deep Learning?

- Subset of Machine learning: Utilises neural networks, but with specific characteristics.
- Key feature: Involves multiple hidden layers of these networks, stacked like building blocks.
- Applications: Excels in tasks requiring learning from massive datasets, like self-driving cars, medical diagnosis, and financial forecasting.

A neural network, also known as an Artificial Neural Network (ANN) is a powerful tool in the field of artificial intelligence (AI), inspired by the structure and function of the human brain.

Against MRSA (methicillin-resistant Staphylococcus aureus) and VRE

●While determining the rationales for 380 compounds from the set of 3,646, the team found some that had not been previously reported and which the GNNs predicted could confer antibiotic properties to molecules.

●One such rationale was N-[2-(2-chlorophenoxy)ethyl]aniline

●On further tests, two compounds containing this rationale were found to inhibit the growth of MRSA cultures by changing the concentration of hydrogen ions across the bacterial cell membrane.

●Notably, the compounds were also effective against vancomycin-resistant enterococci (VRE), a bacteria responsible for more than 5,400 deaths in the U.S. in 2017

USA Steps against soot pollution

Context:

●The Biden administration is setting tougher standards for deadly soot pollution, saying that reducing fine particulate matter from tailpipes, smokestacks and other industrial sources could prevent thousands of premature deaths a year.

●Environmental and public health groups hailed the new Environmental Protection Agency rule finalised as a major step in improving the health of Americans, including future generations.

●Industry groups warned it could lead to loss of manufacturing jobs and even shut down power plants or refineries.

Definition: Fine black or dark brown powder from incomplete combustion.

Composition:

Primary Component: Carbon, in amorphous and crystalline forms.

Additional Contents: Metals, dust, sulphates, nitrates, and polycyclic aromatic hydrocarbons (PAHs).

Health Impact:

- Respiratory Issues: Bronchitis, asthma exacerbation.
- Cardiovascular Problems: Increased risk of heart attacks, strokes.
- Cancer Risk: Particularly lung cancer due to PAH exposure.

Environmental Effects:

- Air Pollution: Contributes to smog, acid rain.
- Climate Change: Absorbs sunlight (black carbon), reduces albedo effect on snow/ice, accelerating melting.

Mitigation Efforts:

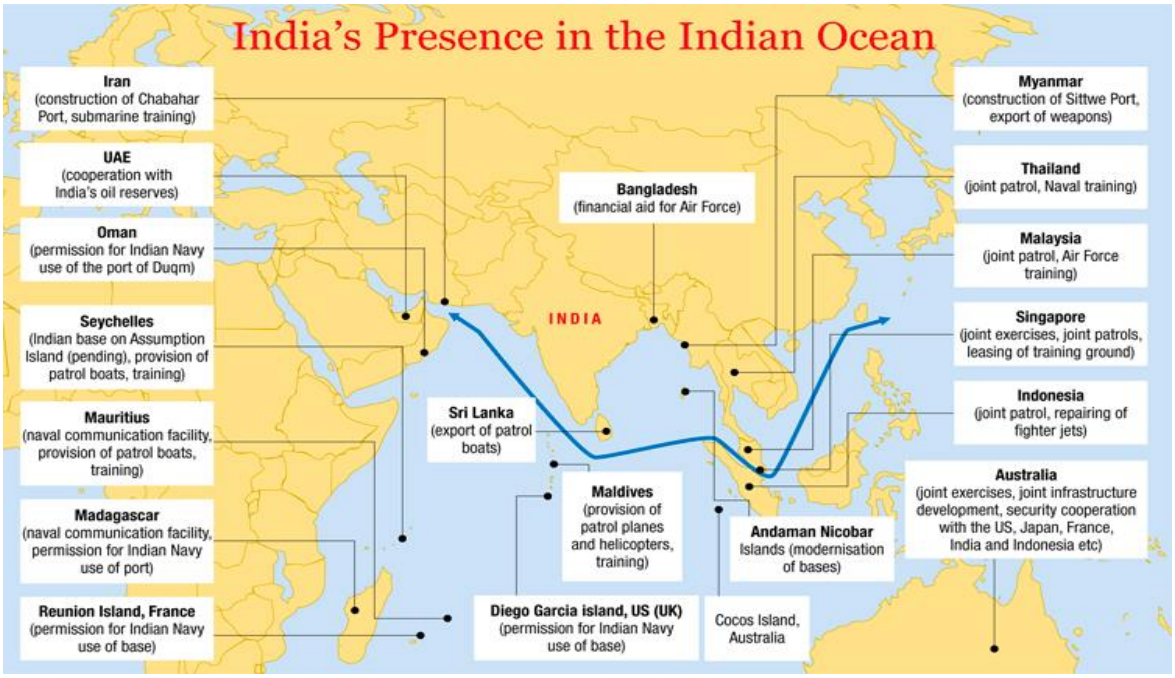
- Improved Technology: Enhancing combustion efficiency.
- Regulatory Measures: Industrial emissions, vehicle exhaust standards.
- Promotion of Clean Energy: Encouraging renewable sources to reduce emissions.

Indian ocean conference

Context:

●External Affairs Minister S Jaishankar addresses the 7th Indian Ocean Conference in Australia's Perth that gets underway today with the theme "Towards a Stable and Sustainable Indian Ocean."

●The Indian Ocean Conference is a flagship consultative forum for a country in the Indian Ocean Region, organized annually by the Ministry of External Affairs, in association with the India Foundation.



Do you Know?

IOR is a geographical region that encompasses the Indian Ocean and its surrounding areas, including the littoral states and islands.

The region spans from: African coast in the west to the Australian coast in the east, and Arabian Peninsula and the Persian Gulf in the north to the southern coast of Sri Lanka and Australia in the south.

The conference will be held in association with the Department of Foreign Affairs and Trade, Government of Australia, along with the S Rajaratnam School of International Studies, Singapore and the Perth-US Asia Centre in Australia.

●According to Ministry of External Affairs press release, "The theme of this edition of the conference is Towards a Stable and Sustainable Indian Ocean.

●Since its inception in 2016 in Singapore, the Indian Ocean Conference has been instrumental in fostering collaboration among nations and principal maritime partners in the region.

●Through its platform, the Conference endeavors to facilitate discourse on the prospects of regional cooperation for Security and Growth for All in the Region (SAGAR).

●The 7th Indian Ocean Conference stands as a testament to the collective commitment towards enhancing stability and sustainability across the Indian Ocean Region

CRISPER cas9 and sickle cell anaemia

Context:

Sickle cell anaemia is the first disease that is being targeted for CRISPR-based therapy in India. Casgevy and Lyfgenia, the two cell-based gene therapies approved by the Food and Drug Administration (FDA) for sickle cell anemia treatment and beta-thalassemia utilise the Nobel-winning CRISPR/Cas 9 genome editing technology.

●Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR), a feature of the bacterial immune system, forms the basis for this technology.

●In a nutshell, the system in bacteria serves as a warehouse for past infections by storing a part of the viral genetic material and incorporating it into its own, so the next time it is attacked, the bacteria is capable of recognising the virus and destroying it.

●The bacteria, in short, is immunised when it employs the CRISPR system.

● The CRISPR-Cas system is effective and easy to manipulate.

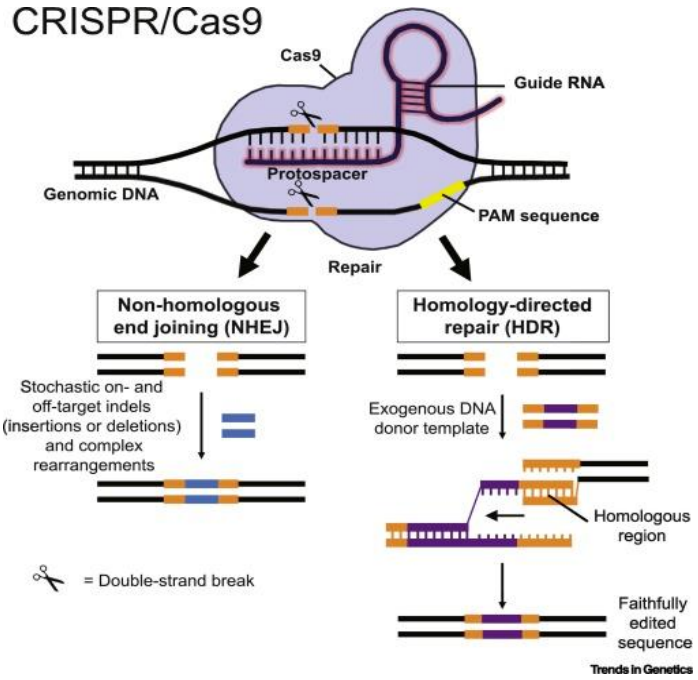
●Researchers have adapted it as a tool to cut, delete, or add DNA sequences at precise locations, opening different windows to treat genetic disorders, develop drought-resistant plants, modify food crops, or experiment with de-extinction projects involving the woolly mammoth and the dodo.

●Sickle-cell anemia (SCA) is an inherited disorder where red blood cells contort to a sickle or crescent shape because of defective hemoglobin, restricting its ability to carry oxygen. A.

●Casgevy costs $ 2.2 million per patient to treat sickle-cell anemia.

●Indian researchers are working on indigenous treatment involving CRISPR genome editing to reduce the cost. “

●The tribal population that is affected the most has limited healthcare access for various reasons: one being that they live in remote areas where there is a scarcity of healthcare professionals.

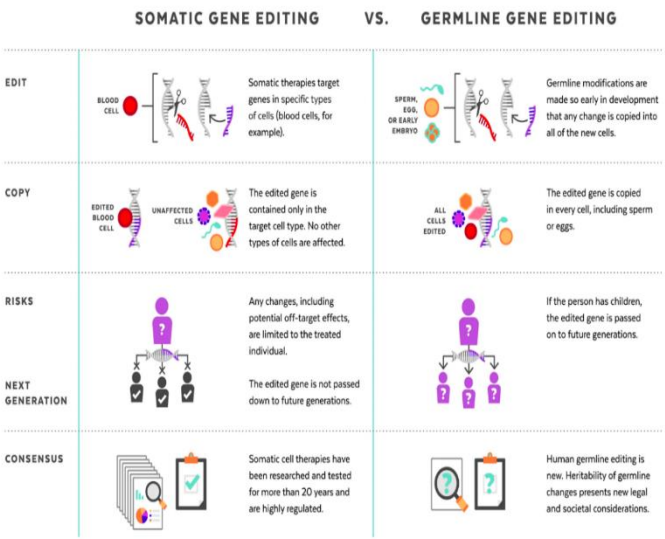


The Sickle Cell Anemia Elimination Mission launched in India on 1st July 2023 aims to strengthen the existing healthcare system and improve primary, secondary, and tertiary healthcare teams.

Germline editing and CRISPR

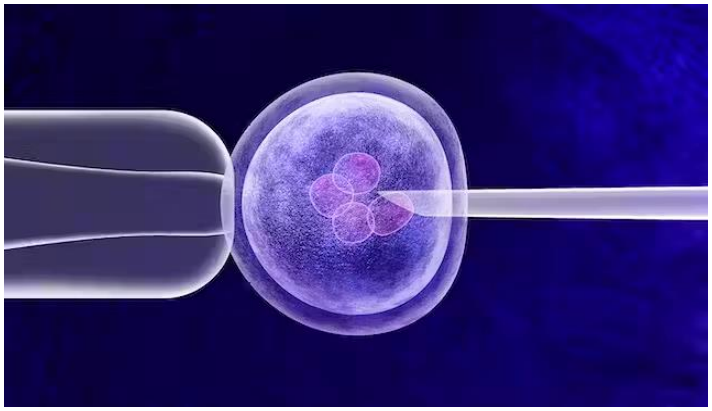
●Apart from the health equity and disparities associated with CRISPR, one of the biggest controversies has been about germline editing.

●Most of the scientific community supports the use of CRISPR to treat monogenic diseases.



●As of now, genome editing is restricted to somatic cells as there is a moratorium on germline editing.

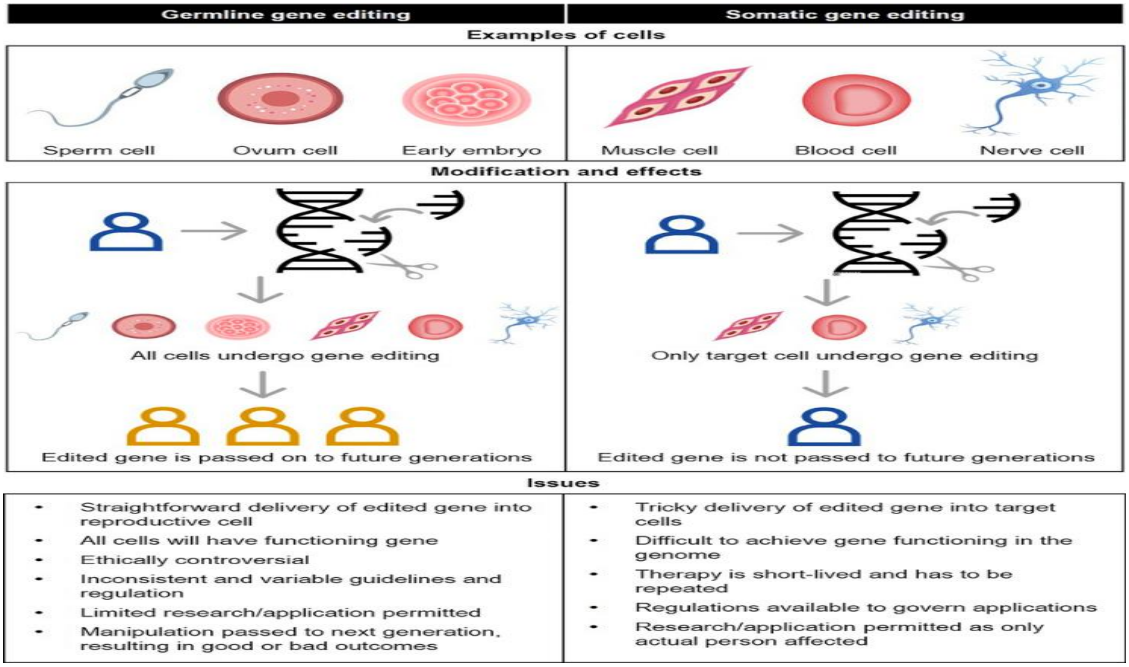
●The gene editing technology has also raised concerns regarding it becoming a commodity that wealthy parents will exploit to improve the fate of their children not only for therapeutic purposes but for genetic enhancement.



Do you Know?

Sickle Cell is an inherited blood disease that is most common among people of African, Arabian, and Indian origin.

It is a group of disorders that affects hemoglobin, the molecule in red blood cells that delivers oxygen to cells throughout the body.



Kyasanur Forest disease (KFD)

●Kyasanur Forest disease (KFD) is caused by Kyasanur Forest disease virus (KFDV), a member of the virus family Flaviviridae.

●KFDV was identified in 1957 when it was isolated from a sick monkey from the Kyasanur Forest in Karnataka (formerly Mysore) State, India. Since then, between 400-500 human's cases per year have been reported.

● Hard ticks (Hemaphysalis spinigera) are the reservoir of KFD virus and once infected, remain so for life. Rodents, shrews, and monkeys are common hosts for KFDV after being bitten by an infected tick.

●KFDV can cause epizootics with high fatality in primates.

Transmission

- Transmission to humans may occur after a tick bite or contact with an infected animal, most importantly a sick or recently dead monkey.
- No person-to-person transmission has been described.
- Large animals such as goats, cows, and sheep may become infected with KFD but play a limited role in the transmission of the disease.
- These animals provide the blood meals for ticks and it is possible for infected animals with viremia to infect other ticks, but transmission of KFDV to humans from these larger animals is extremely rare.
- Furthermore, there is no evidence of disease transmission via the unpasteurized milk of any of these animals.
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Diagnosis

●Diagnosis can be made in the early stage of illness by molecular detection by PCR or virus isolation from blood.

●Later, serologic testing using enzyme-linked immunosorbent serologic assay (ELISA) can be performed.

Treatment

●There is no specific treatment for KFD, but early hospitalization and supportive therapy is important. Supportive therapy includes the maintenance of hydration and the usual precautions for patients with bleeding disorders.

Rice price

Why in News?

The Indian government recently made it mandatory for all traders, wholesalers, retailers, and millers to declare their respective rice stocks.

What are the measures taken so far?

●The government has asked traders, wholesalers, retailers, chain retailers and millers to report the stocks online in the categories of broken rice, non-basmati white rice, par-boiled rice, basmati rice, and paddy.

● It has also launched the retail sale of 'Bharat Rice' to general consumers at ₹29 per kg.

●Moreover, in September 2022, the export of broken rice was banned, and a 20% duty was imposed on par-boiled rice.

● Non-basmati white rice exports was also put under the prohibited category from July 2023.

●The government has procured 600 lakh tonnes of paddy during the current Kharif marketing season, starting October 1, 2023.

●With this, the central pool has 525 lakh tonnes of rice as against the annual requirement of almost 400 lakh tonnes for welfare schemes.

●Till the end of January this year, the government has sold 1.66 lakh tonnes of rice in the open market.

●Traders and millers cite several reasons for the higher retail rice prices.

●The Minimum Support Price for rice has gone up in the last ve years and the cost of transport, storage, etc. is also escalating.

●In rice consuming States, the varieties consumed in large quantities have seen a drop in production this year.

●Further, despite government measures, the export of non-basmati rice has seen a multi-fold jump during the last three years compared to the previous years.

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What should the government do ?

●According to the millers in the northern States, there is a demand for rice for consumption, ethanol production, and cattle feed.

●The government should prioritise sale for consumption.

●The stock data collected by the government is expected to give an indication of the stock levels.

●It should look at capturing data for the most consumed varieties too before deciding the future course of action

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Cardiopulmonary resuscitation (CPR)

●Cardiopulmonary resuscitation (CPR) is a lifesaving technique that's useful in many emergencies in which someone's breathing or heartbeat has stopped.

●For example, when someone has a heart attack or nearly drowns.

●The American Heart Association recommends starting CPR with hard and fast chest compressions.

When Should One Perform CPR?

CPR is the first line of treatment that is offered to the patient suffering from unconsciousness. CPR is performed on those who show no signs of breathing or consciousness. Here are the major signs that one should look for before starting the CPR method.

- Cardiac Arrest
- Absence of Normal Breathing
- Drowning
- Choking
- Drug Overdose or Poisoning

Weather Forecast

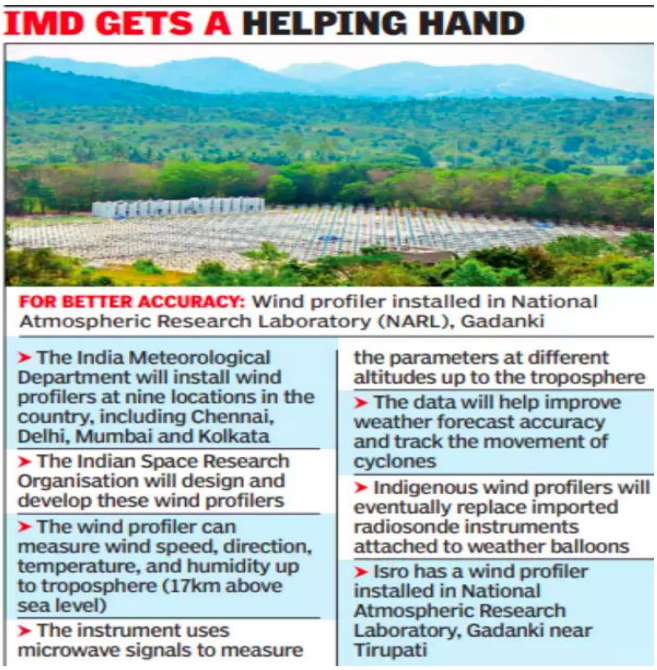
●One of the major hurdles is the lack of weather monitoring ground stations

●Currently, most of the prediction software used in forecasting is based on the global forecasting system and weather research and forecasting models, both of which are not the most modern

●A promising step forward was that recently, the Department of Agriculture & Farmers Welfare and the Ministry of Agriculture & Farmers Welfare have initiated the weather information network and data system (WINDS) to generate long-term, hyper-local weather data.

●The system will also promote the data for wider applications in agriculture and other sectors, it will help in creating a national-level database, and it will assist in establishing the protocols required to access the country-wide data by the various public and private concerns.

●Under this program, more than 200,000 ground stations (AWS and ARG) will be installed, which can help in enhancing weather data utilisation and thus in improving weather predictions and decision making.



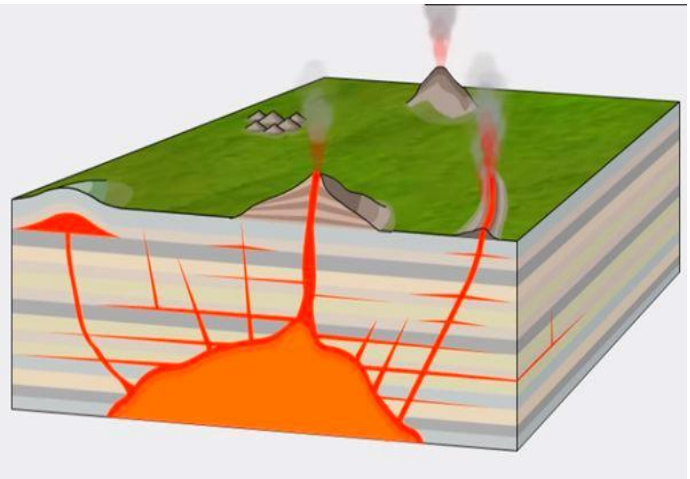
Dike & Grindavík, Iceland

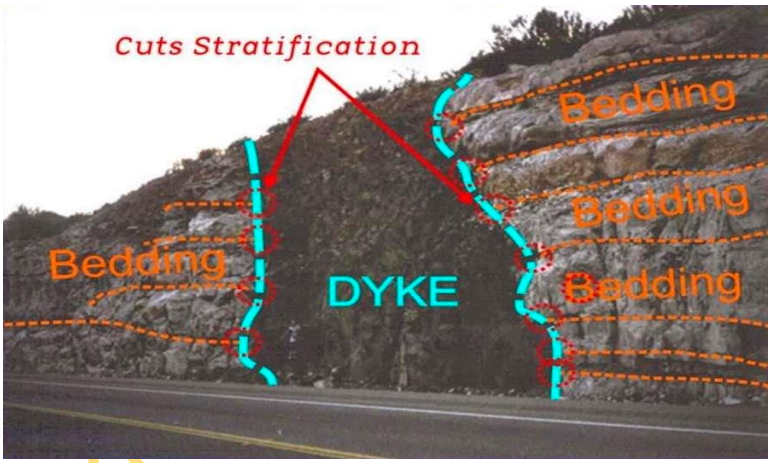
The 15-km-long magma dike that formed beneath Grindavík, Iceland, in November 2023 reached an unprecedented subsurface magma ow rate of 7,400 cubic meters per second.

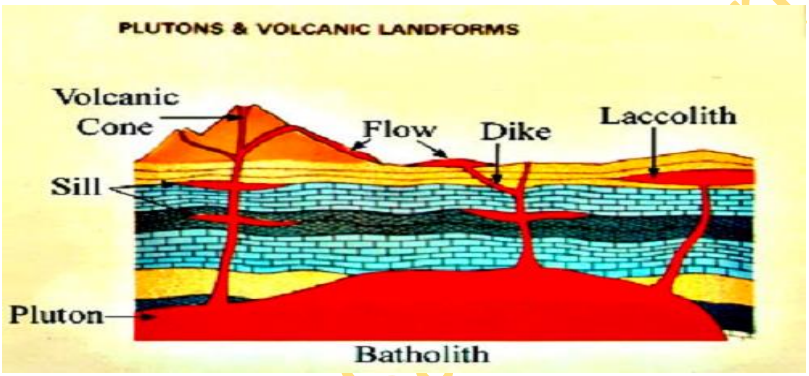
●The dike formation preceded the more recent Sundhnúkur eruptions in December 2023 and January 2024.

●The study shows how tectonic stress can drive magma ow into dikes with only modest overpressure in the feeding magma body.

●The measurement of such ow rates provide insight into the formation of major dikes.







Grindavík is a currently abandoned fishing town on the Southern Peninsula of Iceland.

Bulqizë chromium mine in Albania

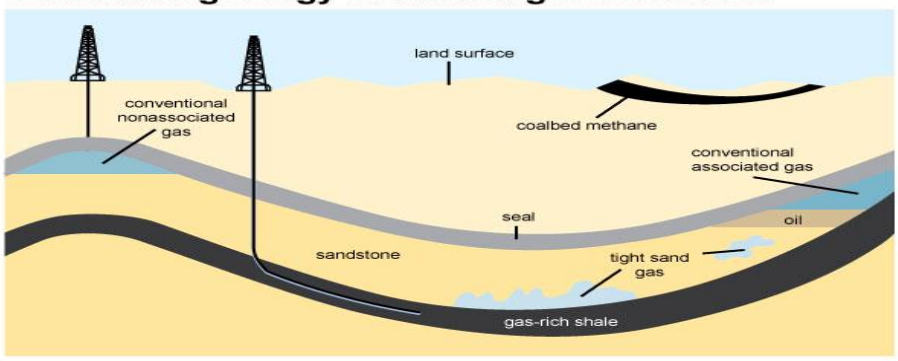
- Direct measurements from deep within the Bulqizë chromium mine in Albania have revealed large quantities of outgassing natural hydrogen, researchers report, suggesting the presence of a faulted reservoir of the gas deeply rooted in the surrounding ophiolite massif.
- The Findings shed light on the geological contexts in which other natural hydrogen sources may be found.
- At least 200 tonnes of nearly pure hydrogen gas are released from the mine each year.

The depths of a chromite mine in Albania have turned out to be a massive natural hydrogen reservoir, an international scientific team recently discovered.

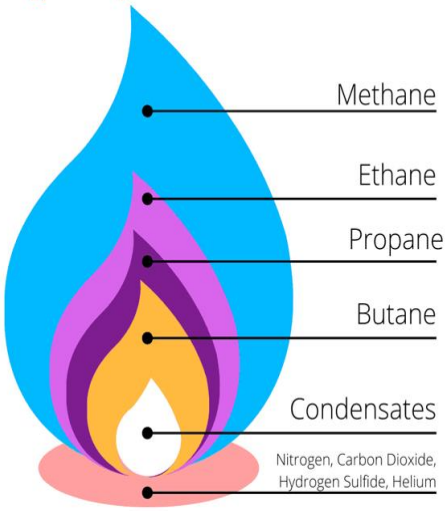
Natural gas composition

Natural gas is a hydrocarbon mixture consisting primarily of saturated light paraffins such as methane and ethane, both of which are gaseous under atmospheric conditions. The mixture also may contain other hydrocarbons, such as propane, butane, pentane, and hexane.

Schematic geology of natural gas resources



Source: Adapted from *United States Geological Survey factsheet 0113-01* (public domain)



- Often natural gases contain substantial quantities of hydrogen sulfide or other organic sulfur compounds. In this case, the gas is known as “sour gas.”
- Coalbed methane is called ‘sweet gas’ because of its lack of hydrogen sulfide.
- On the market, natural gas is usually bought and sold not by volume but by calorific value.
- Natural gas is odorless and colorless. The slightly sour smell that we associate with the gas coming from a stovetop is due to an odorization process (for safety and leak detection) which adds mercaptan compounds to the end-use gas.

Human papillomavirus (HPV) and vaccine

●The Cervavac vaccine is a quadrivalent vaccine that targets four HPV (Human papillomavirus (HPV) pa subtypes — 6, 11, 16, and 18, and was compared with Gardasil vaccine which contains the same four HPV subtypes.

●Serum Institute of India's human papillomavirus (HPV) vaccine Cervavac.

●Merck's Gardasil vaccine

●GARDASIL 9 helps protect individuals ages 9 to 45 against the following diseases caused by 9 types of HPV

Sturtian glaciation & Rodinia

Human papillomavirus vaccines are vaccines that prevent infection by certain types of human papillomavirus. Available HPV vaccines protect against either two, four, or nine types of HPV. All HPV vaccines protect against at least HPV types 16 and 18, which cause the greatest risk of cervical cancer.

● Australian geologists have used plate tectonic modelling to determine what most likely caused an extreme ice-age climate in Earth's history, more than 700 million years ago.

●The researchers have proposed that all-time low volcanic carbon dioxide emissions triggered the 57 million year-long global 'Sturtian' ice age.

●The extended ice age stretched from 717 to 660 million years ago, a period well before the dinosaurs and complex plant life on land existed.

●The team went back to a plate tectonic model that shows the evolution of continents and ocean basins at a time after the breakup of the ancient supercontinent Rodinia

The Sturtian glaciation

●The Sturtian glaciation was a worldwide glaciation during the Cryogenian Period when the Earth experienced repeated large-scale glaciations.

●As of January 2023, the Sturtian glaciation is thought to have lasted from c. 717 Ma to c. 660 Ma, a time span of approximately 57 million years.

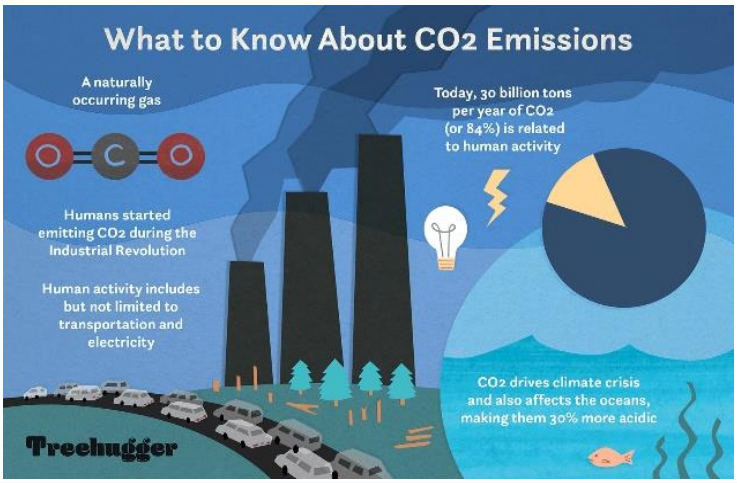
● It is hypothesised to have been a Snowball Earth event, or contrastingly multiple regional glaciations, and is the longest and most severe known glacial event preserved in the geologic record, after the much earlier Huronian glaciation.

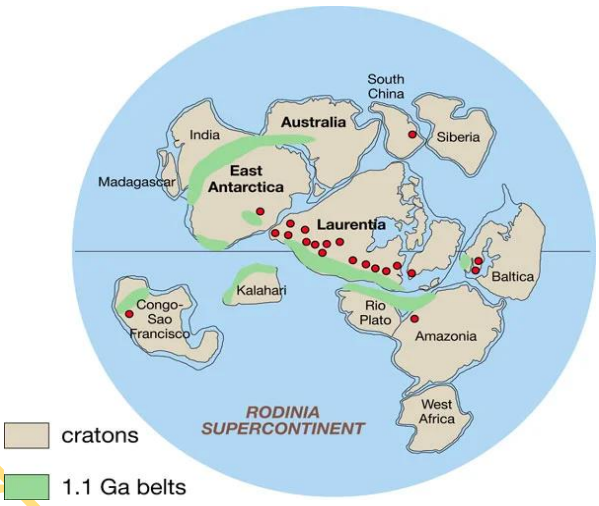
Rodinia

●Rodinia was a Mesoproterozoic and Neoproterozoic supercontinent that assembled 1.26–0.90 billion years ago and broke up 750–633 million years ago.

●Valentine & Moores 1970 were probably the first to recognise a Precambrian supercontinent, which they named 'Pangaea I'.

●It was renamed 'Rodinia' by McMenamin & McMenamin 1990 who also were the first to produce a reconstruction and propose a temporal framework for the supercontinent.





What is the Water (Prevention and Control of Pollution) Act, 1974?

●

●The Lok Sabha this week passed the Water (Prevention and Control of Pollution) Amendment Act, 2024.

●The legislation, which was introduced and passed in the Rajya Sabha on February 5, makes important changes to the Water (Prevention and Control of Pollution) Act, 1974.

●This Act was the first piece of legislation in independent India that identified the need to have an institutional structure to address contamination of water bodies.

● This led to the creation, in September 1974, of the Central Pollution Control Boards (CPCB) and State Pollution Control Boards (SPCB) that were charged with monitoring and preventing public water resources from getting contaminated by sewage and industrial effluents. .

●This Act made it mandatory for industrial units to get permission from their respective State boards before setting up factories and submitting themselves to checks on whether their manufacturing and other processes were complying with prescribed norms.

●"The Parliament of India in its wisdom enacted the Water (Prevention and Control of Pollution) Act in 1974 with a view to maintaining and restoring wholesomeness of our water bodies.

●One of the mandates of the Central Pollution Control Board (CPCB) is to collect, collate and disseminate technical and

● The original Act, passed in 1974, is applicable in 25 States.

●The most important change is that it removes the provisions of imprisonment for several violations, deemed "minor", and replaces them with to the tune of ₹10,000 extending up to ₹15 lakh.

● As per the original Act, the SPCB's permission is needed for establishing any industry or treatment plant, which could discharge sewage into a water body, sewer, or land.

What are the amendments?

●Water is a State subject, and the Centre cannot directly pass legislative laws influencing water management.

●However, the Centre can create legislation, if two or more States demand it, and this can be made applicable by States over their territories if they adopt the legislation in their Assemblies.

●The amended version of the Act, passed by both Houses of Parliament, will currently apply to Himachal Pradesh and Rajasthan and the Union territories.

●In the amendment, the Bill specifies that the Centre, "... in consultation with the CPCB, may exempt certain categories of industrial plants from obtaining such consent...."

●However, operating or establishing an industrial unit without SPCB consent can still land you in jail for six years along with a fine.

●The Bill also adds that the Centre may issue guidelines for the grant, refusal, or cancellation of consent granted by the SPCB.

● It also penalizes tampering with monitoring devices used in determining whether any industry or treatment plant can be set up.

●The penalty will be between ₹10,000 and ₹15 lakh.

●The amended Act also empowers the Centre to frame rules to select the chairpersons of SPCBs and frame guidelines that States can follow on matters for establishing industries and new operating processes.

White Paper

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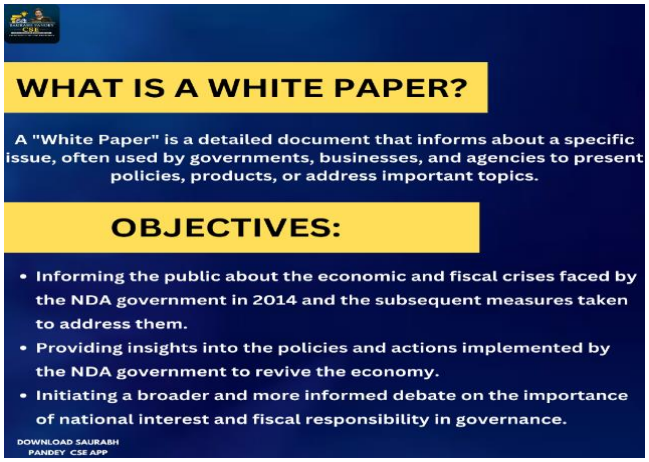


Paleo proxies

Why in News?

limitations of temperature estimates from before the invention of thermometers, based on **"palaeo proxies**." It calls the claims that a specific day was the **warmest in over 100,000 years as scientifically unfounded.**

● A new study, published on February 5 in Nature, has added fuel to there of the threshold-crossing controversy.

●Based on estimates of warming from palaeo-thermometry, scientists from Australia and the U.S. have said that the earth's surface has already warmed by more than 1.5 degrees C on average over pre-industrial levels.

●A major caveat of the study is that the scientists have collected warming data from only one location and have extrapolated it to be indicative of the global mean temperature trend.

●This said, these so-called 'palaeo proxies' constitute an amazing technique that uses chemical evidence stored in various organic matter, such as corals, stalactites, and stalagmites, to approximate the temperature at some point in the past.

●But just as insightful as this chemical evidence can be, we should remember that it is still only indirect evidence of temperature changes with respect to a baseline temperature.

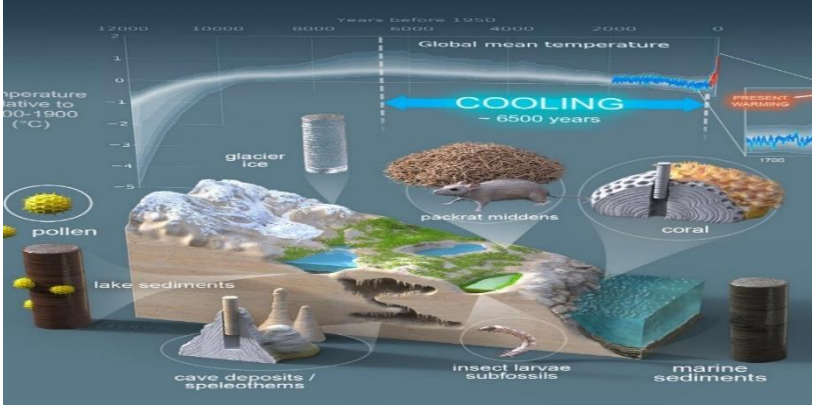
What are paleo proxies data?

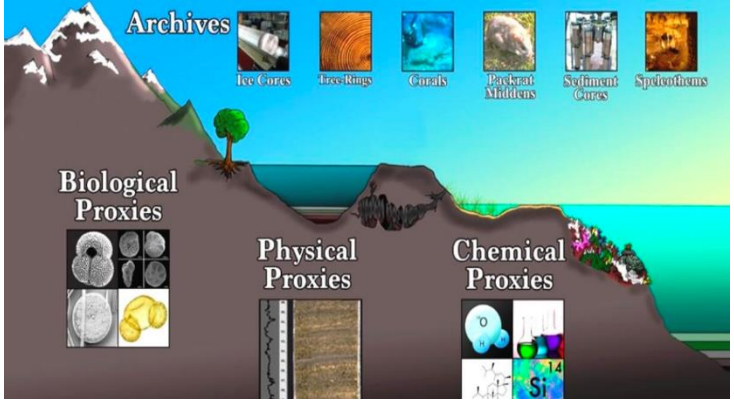
●In paleoclimatology, or the study of past climates, scientists use what is known as proxy data to reconstruct past climate conditions.

●These proxy data are preserved physical characteristics of the environment that can stand in for direct measurements.

●Paleoclimatologists gather proxy data from natural recorders of climate variability such as corals, pollen, ice cores, tree rings, caves, pack rat middens, ocean and lake sediments, and historical data.

●By analyzing records taken from these and other proxy sources, scientists can extend our understanding of climate far beyond the instrumental record



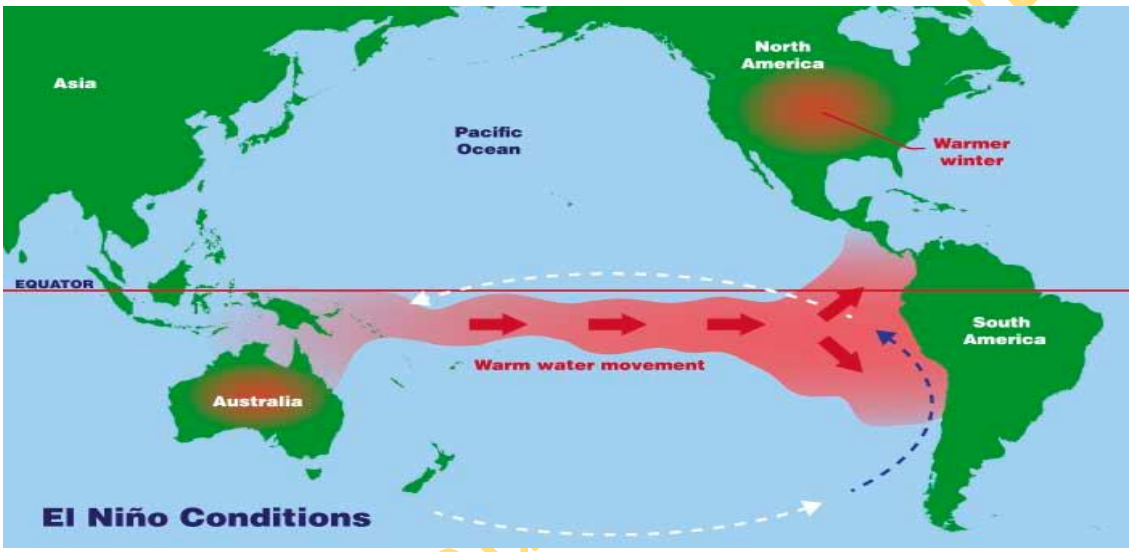


El Niño as a warming paradigm

●The tropical Pacific Ocean keeps soaking up heat during normal and La Niña years and belches it out in an El Niño year.

●This causes a mini global warming, with consequences at distant locations — the so-called teleconnections; the latter is what tells us that the pattern of warming really matters.

● Depending on whether warming due to an El Niño is in the eastern Pacific Ocean or closer to the international date line, the impacts on the monsoon and the other parts of the world can be very different.



El Niño is a loose translation of “little boy” or “Christ child” in Spanish.

Earlier, it was also called “El Niño de Navidad” since it peaks around December.

El Niño is the warming of sea waters in Central-east Equatorial Pacific that occurs every few years (Warm phase off the coast of Peru).

●An added difficulty is that the El Niño teleconnections themselves also modify the warming pattern.

●As a result, droughts can have a stronger feedback that affects temperature than floods in many instances.

●The massive deluges that California is experiencing this winter are driven by the El Niño but likely amplified by global warming.

●The amounts of rain and snow will subsequently feedback to local and global temperatures.

●These same processes work in the global warming regime as well.

●As human-made greenhouse gases initiate the warming, the warming pattern is applied in the Arctic and over the desert regions of the Middle East but damped over the eastern Pacific and the northern Atlantic oceans.

●These local warmings and coolings and their magnitudes determine the net effect of natural variability and global warming in a particular locality

Brumation

What is Brumation?

●This is the name to describe a period of dormancy or slowed activity in reptiles, much like hibernation in mammals.

●It typically occurs during colder months, when temperatures drop and food becomes scarce.

●Reptiles enter a state of brumation to conserve energy and survive these adverse environmental conditions.

●During brumation, reptiles may retreat to underground burrows, rock crevices or other sheltered areas where temperatures are relatively more stable.

●Their metabolism slows significantly, allowing them to go weeks or even months without eating.

●This period of reduced activity allows reptiles to conserve energy and minimise their resource requirements.

●Researchers have observed instances of brumation in various reptilian species across habitats.

●Such species include box turtles and painted turtles, which burrow into the mud at the bottom of ponds or lakes.

●Snakes may seek refuge in underground dens or caves while lizards may hide under rocks or within vegetation.

●Brumation is crucial for reptiles to survive cold climes and endure challenging environmental conditions, until they can reemerge to feed and reproduce in more favourable climes

Do you Know?

Mammals include humans and all other animals that are warm-blooded vertebrates (vertebrates have backbones) with hair. They feed their young with milk and have a more well-developed brain than other types of animals.

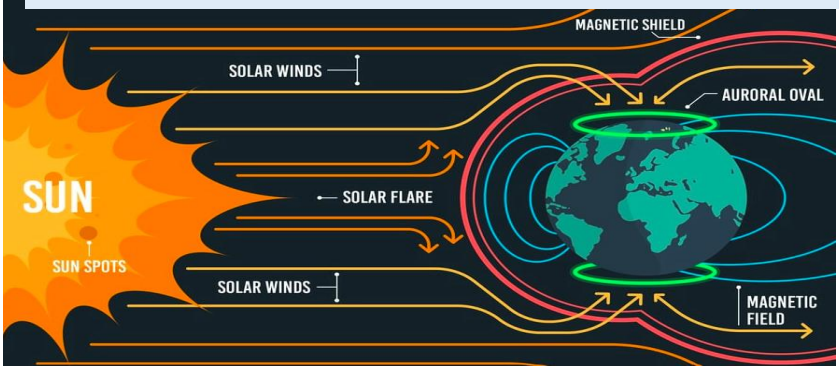
Do you Know?

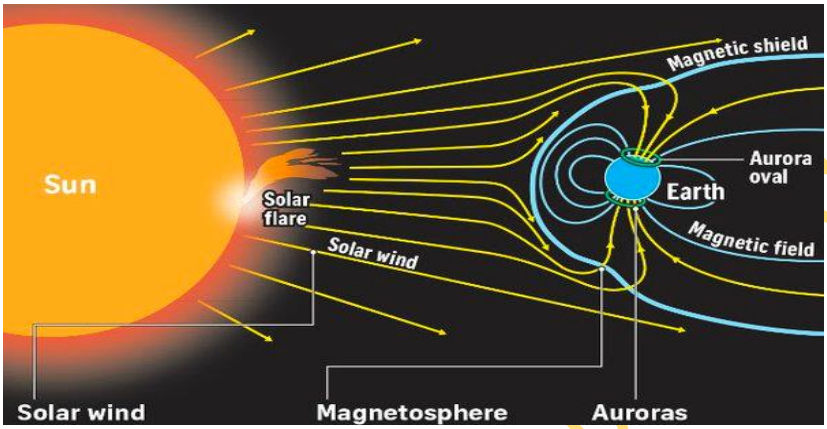
Brumation is crucial for reptiles to survive cold climes and endure challenging environmental conditions until they can reemerge to feed and reproduce in more favourable climes.

Auroras

How is it formed? The sun is ejecting charged particles from its corona, creating solar wind. When that wind slams into Earth's ionosphere, the aurora is born.

- In the Northern Hemisphere, the phenomenon is called the northern lights (aurora borealis), while in the Southern Hemisphere, it's called the southern lights (aurora australis).
- The hemispheric asymmetry of the aurora is due in part to the sun's magnetic field interfering with Earth's magnetic field.
- The usually observed green and red auroras happen between 100 kilometres and 250 kilometres above the surface of the planet due to an excited state of atomic oxygen.





Event Horizon telescope

●The Event Horizon Telescope (EHT) Collaboration is a group of observatories united to image the emission around supermassive black holes.

●The Event Horizon Telescope (EHT) is a large telescope array consisting of a global network of radio telescopes.

●The project's observational targets include the two black holes with the largest angular diameter as observed from Earth: the black hole at the center of the supergiant elliptical galaxy Messier 87 and Sagittarius A* at the center of the Milky Way

● The Event Horizon Telescope project is an international collaboration that was launched in 2009 after a long period of theoretical and technical developments.

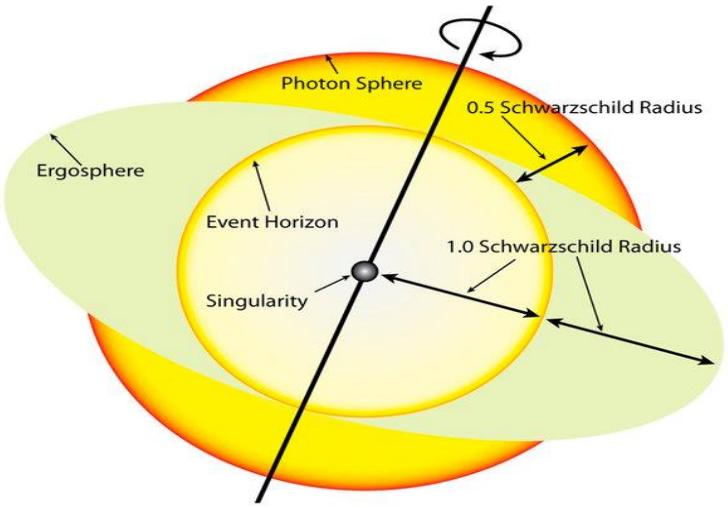
●The collaboration now comprises over 300 members, and 60 institutions, working in over 20 countries and regions.

What is gravitational lensing??

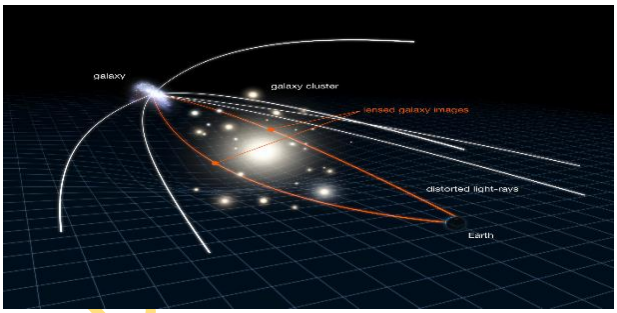
●It occurs when a massive celestial body, such as a galaxy cluster, causes a sufficient curvature of spacetime for the path of light around it to be visibly bent, as if by a lens.

●The body causing the light to curve is accordingly called a gravitational lens.

●An important consequence of this lensing distortion is magnification, allowing us to observe objects that would otherwise be too far away and too faint to be seen.



- Gravitational Lensing was first predicted in 1915 by Albert Einstein, which involves the bending of light by objects of great mass.
- According to Einstein's general theory of relativity, time and space are fused together in a quantity known as spacetime.
- Within this theory, massive objects cause spacetime to curve, and gravity is simply the curvature of spacetime.
- As light travels through spacetime, the theory predicts that the path taken by the light will also be curved by an object's mass.
- Gravitational lensing is a dramatic and observable example of Einstein's theory in action.
- Extremely massive celestial bodies such as galaxy clusters cause spacetime to be significantly curved. In other words, they act as gravitational lenses.
- When light from a more distant light source passes by a gravitational lens, the path of the light is curved, and a distorted image of the distant object, maybe a ring or halo of light around the gravitational lens can be observed



Do you Know?

Bodies involved in EHT: Thirteen partner institutions worked together to create the EHT. Key funding was provided by the US National Science Foundation (NSF), the EU's European Research Council (ERC), and funding agencies in East Asia.

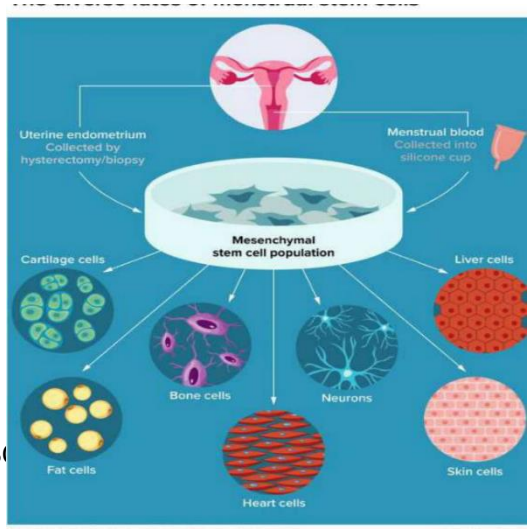
Endometrium

●The endometrium is the inner lining of your uterus.

●This tissue is what is shed during a menstrual period.

●Think of endometrium as layers of tissue that build up along the inside lining of the uterus.

●When have a period, these layers fall away from the walls of your uterus and leave body..

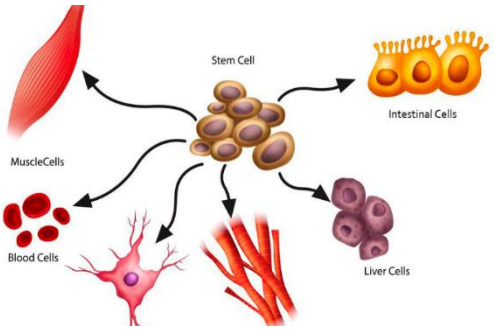


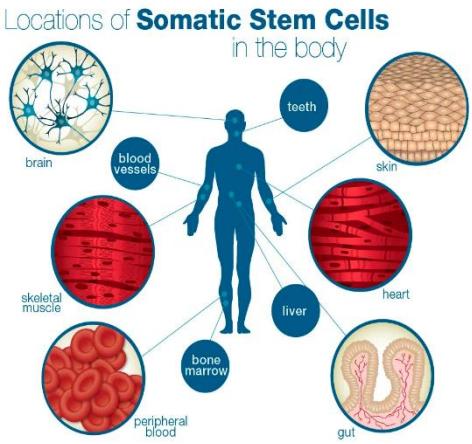
●Researchers had long hypothesised that the endometrium contained stem cells, given its remarkable capacity to regrow itself each month.

●The tissue, which provides a site for an embryo to implant during pregnancy and is shed during menstruation, undergoes roughly 400 rounds of shedding and regrowth before a woman reaches menopause.

●Such cells are highly valued for their potential to repair damaged tissue and treat diseases such as cancer and heart failure.

●But they exist in low numbers throughout the body, and can be tricky to obtain, requiring surgical biopsy, or extracting bone marrow with a needle.





Autoimmune disease

●Several factors can cause autoimmune disease such as environmental factors, genetics, hormonal imbalance and lifestyle habits.

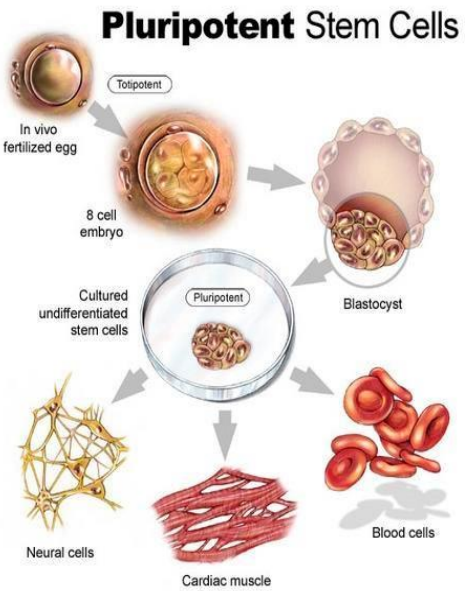
●However, since women are more susceptible to these diseases, scientists previously thought that it could be related to sex hormones or faulty regulation of the X chromosome.

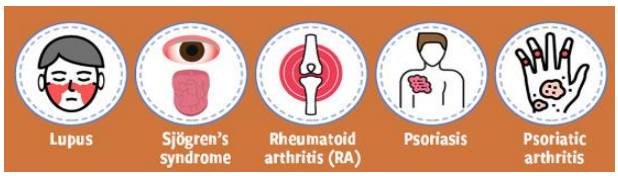
●Now, a group of scientists have found a molecular coating that is found in half of the X chromosomes in women might be the reason behind this phenomenon.

●Human females (and most mammals) contain two X chromosomes while the males of of the species contain one X and one Y chromosome.

●The molecular coating of the X chromosome is a combination of RNA and proteins and is crucial to a process called X-chromosome inactivation which ensures that one set of X chromosomes in.

●Females remain active and functional in all the cells of the body while the other is muffled.





How is this achieved?

●The chromosome is wrapped in long strands of RNA called XIST that attract proteins and tamp down the expression of the gene inside.

● However, not all genes are muffled in this manner and the ones that escape the X inactivation process are thought to be the cause of autoimmune diseases.

●Not only this, the XIST molecule too has been known to elicit inflammatory immune responses. .

Satyendra Nath Bose

●Bose, a graduate of the University of Calcutta, taught at the University of Dacca (1921–45) and then at Calcutta (1945–56).

●Bose's numerous scientific papers (published from 1918 to 1956) contributed to statistical mechanics,

●the electromagnetic properties of the ionosphere, the theories of X-ray crystallography and thermoluminescence, and unified field theory.

● Bose's Planck's Law and the Hypothesis of Light Quanta (1924) led Einstein to seek him out for collaboration.

Terms

●Ionosphere and magnetosphere, regions of Earth's atmosphere in which the number of electrically charged particles—ions and electrons—are large enough to affect the propagation of radio waves.

●The charged particles are created by the action of extraterrestrial radiation (mainly from the Sun) on neutral atoms and molecules of air.

●The ionosphere begins at a height of about 50 km (30 miles) above the surface, but it is most distinct and important above 80 km (50 miles).

●Crystallography, a branch of science that deals with discerning the arrangement and bonding of atoms in crystalline solids and with the geometric structure of crystal lattices. Classically, the optical properties of crystals were of value in mineralogy and chemistry for the identification of substances. Modern crystallography is largely based on the analysis of the diffraction of X-rays by crystals acting as optical gratings

● Thermoluminescence, emission of light from some minerals and certain other crystalline materials.

●The light energy released is derived from electron displacements within the crystal lattice of such a substance caused by previous exposure to high-energy radiation

Mimas

Astronomers believe Mimas, the smallest of the major moons of Saturn, known as the "big seven" or the "inner moons", may have a liquid ocean around 20-30 km under its heavily cratered ice shell.

●Nicknamed "Death Star" for the resemblance of its cratered surface to a space station in the Star Wars franchise, Mimas was an unlikely candidate to host an ocean because the presence of these water bodies is generally marked by modifications of the surface by internal dynamics

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- Mimas is one of the moons of Saturn, and it's known for its striking appearance due to a large crater named Herschel that dominates one side of its surface. Here's some key information
- Mimas was discovered by the astronomer William Herschel in 1789, making it one of the first moons of Saturn to be observed.

Man Animal conflict

What are the reasons for the increase in human-wildlife conflict?

- Experts cite increased area under cultivation around wildlife habitats, changing cropping patterns, a significant increase in the population of animals like elephants and tigers due to conservation efforts, and movement of livestock and humans in wildlife habitats during odd hours as the main reasons for the rise in human-wildlife conflict incidents.
- There has also been a substantial increase in the population of prolific breeders like wild boars and peacocks.
- However, an increased number of incidents involving elephants are due to habitat depletion and fragmentation caused by human activities.
- Moreover, invasive alien species have reduced the availability of food and water.
- Monoculture of species such as eucalyptus and acacia has also adversely affected plant biodiversity.

What are the proposed solutions and why are they not effective?

Elephant-proof trenches and solar power fences are widely used in Kerala, and they are considered largely effective, provided they are properly maintained.

- **As part of the State government's new eco-restoration policy, the Forest department is aiming to plant suitable indigenous plants (wild mango, wild gooseberry, and wild jackfruit) in the forest to ensure wild animals' food security and dissuade them from entering agricultural lands.**
- **Such measures need to be supplemented by creating early warning systems that can track the movement of elephants and other dangerous animals using drones and watchers.**

Critical minerals in Africa

The Copperbelt straddling northern Zambia and the southern part of the Congo still contains some of the richest copper and cobalt deposits in the world.

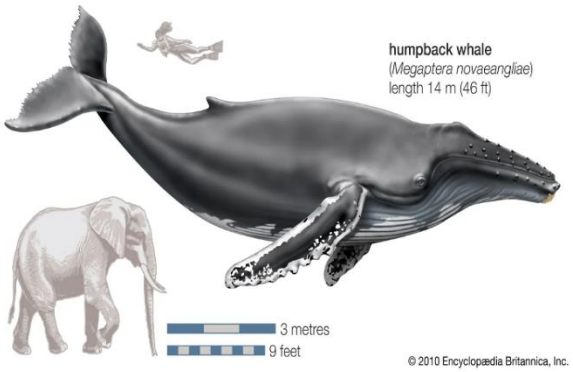
Do you Know?

- Zambia has about 6 percent of the world's copper reserves and was the eighth-largest producer of copper in 2022.
- India already has a limited presence in Zambia's copper mining sector.
- In September last year, Vedanta regained control of Konkola Copper Mines (KCM) after it was seized by Zambian authorities in 2019.
- The Zambian government owns a 20 percent stake in KCM. In 2023, Vedanta also pledged to invest over $1.2 billion in Zambia to increase the output of mined copper and pay outstanding debt.

Humpback Whale

- Post -whaling increases in eastern Australian humpback whale numbers may have led to males shifting their mating tactics from singing to physically competing with other males (Communications Biology), highlighting how humpback whales have adapted their social behaviours as their populations have recovered.
- Whaling is the process of hunting of whales for their usable products such as meat and blubber, which can be turned into a type of oil that became increasingly important in the Industrial Revolution.
- Male eastern Australian humpback whales may be less likely to use singing as a mating tactic when the population size is larger in order to avoid attracting males to their potential mate.

- Found in every ocean and many nearshore areas associated with coastal and marine tourism, they are the focus of whale watching countries around the world.
- The species is known for its spectacular "surface active behaviour", which can include breaching (leaping clear of the water) and flipper and tail slapping, its occasional curiosity around tour boats, and its complex 'song', which is heard on the breeding grounds in the tropics.



- A humpback whale's blow or the splash of a breach can be seen from a distance of several kilometres, making the humpback one of the more conspicuous targets of whale watching around the world.
- Tsetse flies & Trypanosome
- The study discovered several volatile compounds that promoted rapid mating behaviour in the tsetse flies.
- Infection of female flies by trypanosomes alters both the pheromone profile and mating behaviour, and has the effect of reducing mating receptivity in females.

Trypanosome

- Trypanosome, any member of a genus (Trypanosoma) of parasitic zooflagellate protozoans belonging to the order Kinetoplastida.
- Adult trypanosomes are mainly blood parasites of vertebrates, especially fishes, birds, and mammals.
- Most species require an intermediate host (often an insect or a leech) to complete their life cycle. Sleeping sickness (q.v.; also called African trypanosomiasis), for example, caused by T. gambiense or T. rhodesiense, is transmitted by tsetse flies.

Frozen water

●Ball milling “ordinary” ice at low temperatures a process that involves vigorously shaking a cryogenically-cooled container full of ice and steel balls creates an amorphous form with a density close to liquid water (Science).

●The finding suggests that water is more complex at low temperatures than previously recognized.

● Frozen water can take many forms.

● There are 20 known crystalline phases of water ice and at least two families of amorphous form.

Aubrites

- Aubrites are “igneous rocks” that form in oxygen-poor conditions, and thus “contain a variety of exotic minerals that are not found on Earth
- Meteors are pieces of some solid object in space that broke away, descended onto a planet or moon.
- Once they reach the surface, they are called meteorites. Aubrites are a type of meteorite

- Around 90% of the meteorite was composed of orthopyroxene.
- Pyroxenes are silicates consisting of single chains of silica tetrahedra (SiO4); orthopyroxenes are pyroxenes with a certain structure.
- Pyroxenes such as diopside and jadeite have been used as gems.
- Spodumene was historically used as lithium ore.
- Rocks with pyroxene have also been used to make crushed stone used in construction
- The group also classified the meteorite as a monomict breccia since it consisted of several pyroxenes -bearing pieces held together by a scaffold of rocky material

Environmental surveillance

- India is the fastest growing egg producer in the world, but unlike in Europe, poultry birds here are not vaccinated against flu.
- Furthermore, the farms with a diversity of animals or in the vicinity of nearby wetlands increases the potential for the viruses to undergo reassortment that can potentially generate more virulent strains — H5N1 or H7N9 — which could then infect humans.
- Despite this potential, there is no active surveillance in the poultry sector
- We need an active and passive year -round surveillance network under One Health which connects monitoring of human and animals in a shared environment.
- Wastewater-based epidemiology or pathogen surveillance has become an integral component of environmental surveillance providing near real-time information on health and community exposure to pathogens
- While environmental surveillance is not a new concept and has been used widely for monitoring several pathogens, it offers an excellent tool.

- Birds infected with avian influenza virus shed large quantities of virus in their faeces, saliva and nasal **secretions for about a week.**
- **Avian influenza viruses have been isolated from unconcentrated water in lakes in the U.S., Canada and China**
- Avian influenza viruses can remain viable for extended periods of time in surface water and carcasses, suggesting that lakes and wetlands can act as environmental reservoirs at variable temperatures for several months
- Environmental surveillance is an important area that can enhance the information on prevalence diversity of avian influenza viruses in free-ranging domestic flocks or under confinement conditions where faeces or other effluent are deposited into the environment.

Virus surveillance

●Currently, virus surveillance is reactive and relies on sampling dead birds.

● Environmental surveillance would be a great non-invasive tool that can be done without disturbing the birds and can be used to obtain both host

Sago

- World Health Organization (WHO) has created a new advisory group named, The International Scientific Advisory Group for Origins of Novel Pathogens, or SAGO.
- The function of SAGO will be to systematically study the emergence of future emerging pathogens with pandemic potential, and advise the development in this regard to WHO.
- The SAGO will advise the Secretariat on technical and scientific considerations regarding emerging and re-emerging pathogens, and will be composed of experts acting in a personal capacity.
- **It will be established in accordance with the WHO Regulations for Study and Scientific Groups, Collaborating Institutions and Other Mechanisms of Collaboration.**

Poliovirus

What is polio?

- Poliovirus can invade the central nervous system and as it multiplies, destroy the nerve cells that activate muscles, causing irreversible paralysis in hours.
- There are three types of polio virus serotypes: types 1, 2 and 3.
- According to the India Polio Learning Exchange (along with UNICEF), of those paralysed, 5--10% die when their breathing muscles become immobilised.
- There is no cure for polio, but there are safe, effective vaccines which, given multiple times, protect a child for life.
- Polio held the world in a bind of fear until Jonas Salk developed the first polio vaccine.
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- Polio held the world in a bind of fear until Jonas Salk developed the first polio vaccine.
- Later, Albert Sabin made a 'live' polio vaccine that could be administered orally which became the tool

What was the recent global polio crisis?

- **Dr. Jacob John, who co-authored Polio: The Eradication Imbroglio with Dhanya Dharmapalan, says in a paper published in Vaccines, in 2022: "Genetic variants of vaccine poliovirus type 2, imported from an unknown source, were detected in waste waters in Jerusalem, London and New York in early 2022.**

- **The wild poliovirus type 2 was globally eradicated in 1999, but vaccine virus type 2 continued for 16 more years; routine use of the vaccine was discontinued in 2016 and reintroduced occasionally on purpose.**
- **As an unintended consequence, type 2 vaccine virus variants (circulating vaccine -derived polioviruses) that mimic wild viruses' contagiousness and neurovirulence, have been emerging and spreading."**
- **He also posits the theory of respiratory transmission of polio, 'as was the classical teaching of polio epidemiology'.**

What is the News?

Sporadic cases of cytomegalovirus (CMV) are being reported from Delhi, Pune, Bengaluru, making it the latest post-covid complication.

●Cytomegalovirus, or CMV, is a common virus that infects people

of all ages.

●Over half of adults have been infected with CMV by age 40. Most people infected with CMV show no signs or symptoms.

●When a baby is born with cytomegalovirus (CMV) infection, it is called congenital CMV.

● About one out of every 200 babies is born with congenital CMV infection.

Innate and adaptive immunity

●Pregnant with immune system is weakened, CMV is cause for concern.

●Women who develop an active CMV infection during pregnancy can pass the virus to their babies, who might then experience symptoms.

●For people who have weakened immune systems, especially people who have had an organ, stem cell or bone marrow transplant, CMV infection can be fatal.

●CMV spreads from person to person through body fluids, such as blood, saliva, urine, semen and breast milk.

●There is no cure, but there are medications that can help treat the symptoms.

Balance of species interactions

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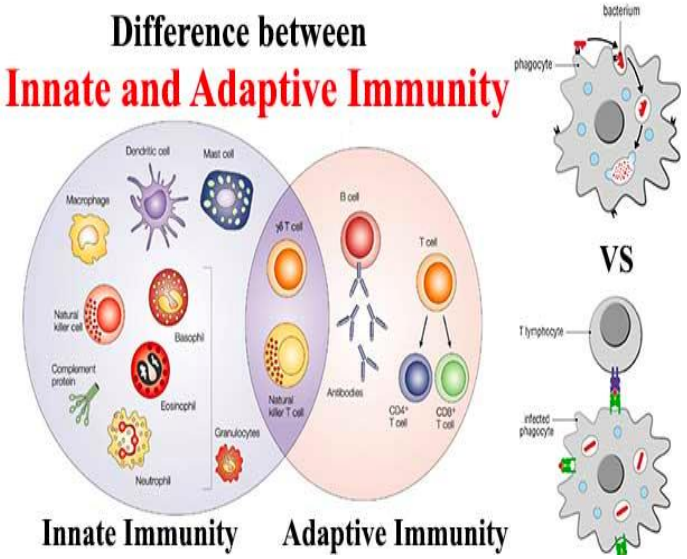
Differences b/w innate and adaptive immunity

Characteristics	Innate Immunity	Adaptive immunity
Presence	Innate immunity is something already present in the body.	Adaptive immunity is created in response to exposure to a foreign substance.
Specificity	Non-Specific	Specific
Response	Rapid	Slow (1-2 weeks)
Potency	Limited and Lower potency	High potency
Memory	No memory	Long term memory
Allergic Reaction	None	Immediate and Delay hypersensitivity



Balance of species interactions

- Researchers have finally unravelled a longstanding question on why Serengeti zebra, wildebeest, and gazelle, which share limited food resources, follow the same migratory routes, in a body size dependent way.
- **The researchers used novel data to show how a balance of species interactions and ecological factors regulate this process.**
- **They say competition pushes zebra ahead of wildebeest, and wildebeest then eats plants in a way that facilitates the development of newer growth for the trailing gazelle.**

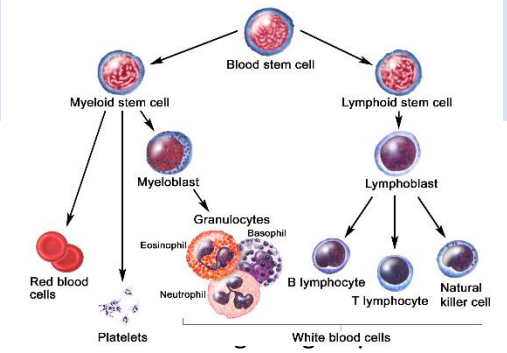
T-Cells

●Scientists have engineered a new variant of cancer-fighting T cells that can suppress multiple myeloma tumours in mice while showing superior persistence and endurance compared with standard CAR T cell designs.

●The new cells' promising effects and durability suggest they could grant badly needed treatment options to patients with refractory or relapsed multiple myeloma.

●Multiple myeloma is the second most common type of blood cancer in adults.

Myeloma cancer



Myeloma is a type of blood cancer that develops from plasma cells in the bone marrow.

Myeloma is often called multiple myeloma because most people (90%) have multiple bone lesions at the time it is diagnosed.

Plasma cells are a type of white blood cell found in the bone marrow.

About T Cell

●A type of white blood cell.

●T cells are part of the immune system and develop from stem cells in the bone marrow.

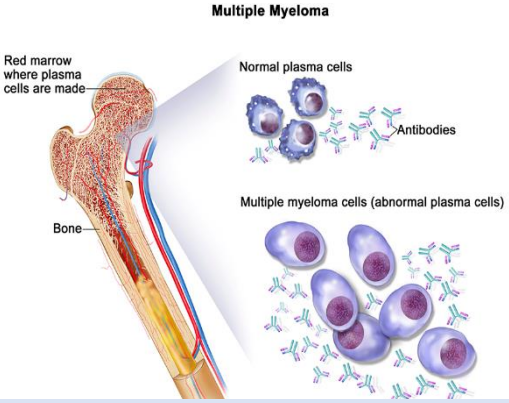
● They help protect the body from infection and may help fight cancer.

●Also called T lymphocyte and thymocyte.

●It was long thought that the fluid-filled sac around our lungs function merely as a cushion from external damage.

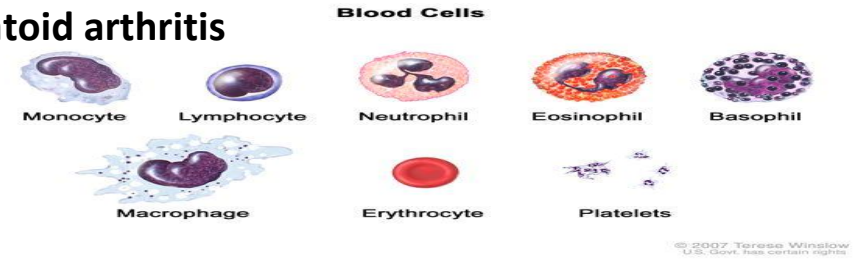
●About Macrophage

●A type of white blood cell that surrounds and kills microorganisms, removes dead cells, and stimulates the action of other immune system cells



Balance of species interactions

Rheumatoid arthritis

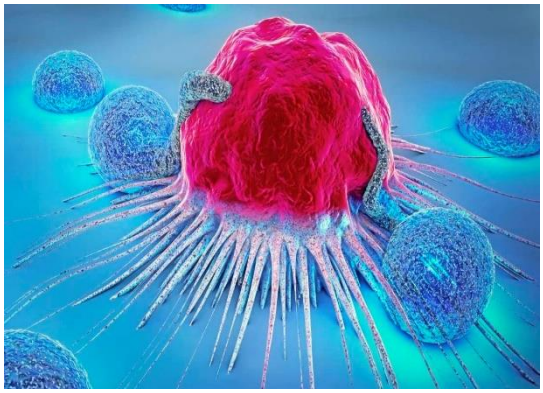


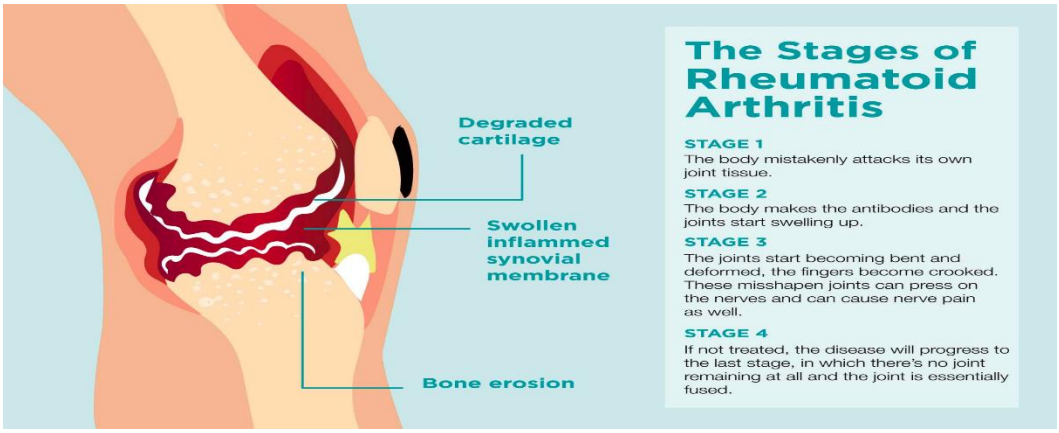
●The Lancet published the results of a study that proposed to repurpose an existing drug to treat rheumatoid arthritis as prophylaxis, to prevent disease.

●Prophylaxis requires daily administration of anti-migraine compounds, whether or not a migraine attack is occurring.

●All the drugs used for migraine prevention have potential and often relevant adverse events or contraindications, and may also interfere with other concurrent conditions and treatments.

●The results of the study showed that “rheumatoid arthritis prevention trials are feasible and targeting the adaptive immunity of such individuals at an early stage, can prevent the onset of rheumatoid arthritis.”





What is rheumatoid arthritis?

●It is a chronic, autoimmune condition that mostly affects the joints.

●Scientists have not yet understood why an autoimmune condition occurs, allowing the immune system that protects the body, to attack itself.

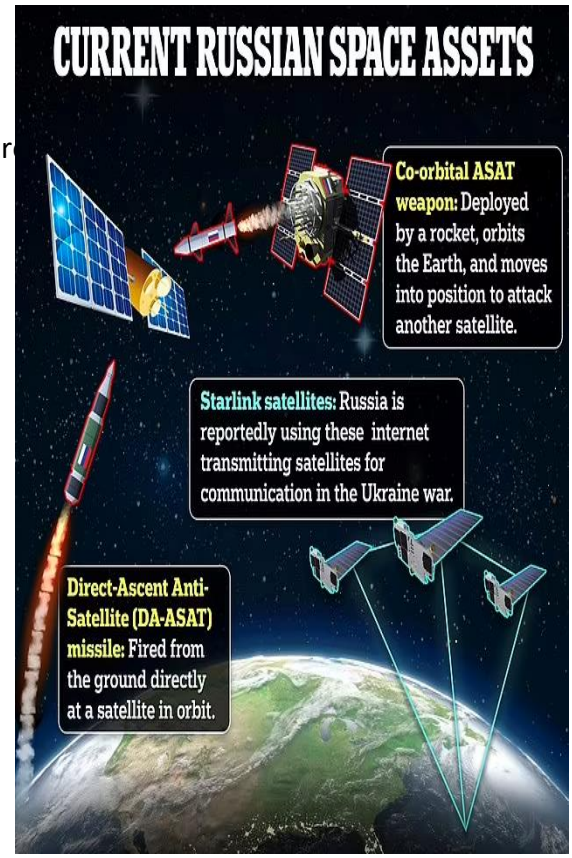
●A patient experiences pain, swelling of joints and loss of function and mobility as a result of stiffness.

●As can be expected, this is likely to significantly lower a patient's quality of life.

●As per the National Institute of Arthritis and Musculoskeletal and Skin Diseases, of the National Institutes of Health, U.S., rheumatoid arthritis affects the lining of the joints, and damages the tissue that covers the ends of the bones in a joint.

●It often occurs in a symmetrical pattern, meaning that if one knee or hand has the condition, the other hand or

ASAT



What are anti-satellite weapons?

●Anti-satellite (ASAT) weapons are designed to debilitate and/or destr operational.

●ASAT weapons violate the OST through the latter's Article VII, which holds parties to the treaty liable for damaging satellites belonging to other parties, and Article IX, which asks parties to refrain from the "harmful contamination" of space.

●Russia, in the form of the erstwhile Soviet Union, has had ASAT capabilities since at least 1968.While the Cold War motivated ASAT weapon tests on either side of the Atlantic, the respective programmes refused to dwindle once relations thawed.

●Most of these weapons are kinetic, meaning they destroy satellites in orbit by rocketing into them or detonating an explosive near them, and blowing them to pieces.

●Because of the low gravity and lack of an atmosphere, the resulting debris can stay in orbit for a long time depending on their size. This result violates Article IX of the OST...

EU digital service act

Digital Services Act (DSA) overview

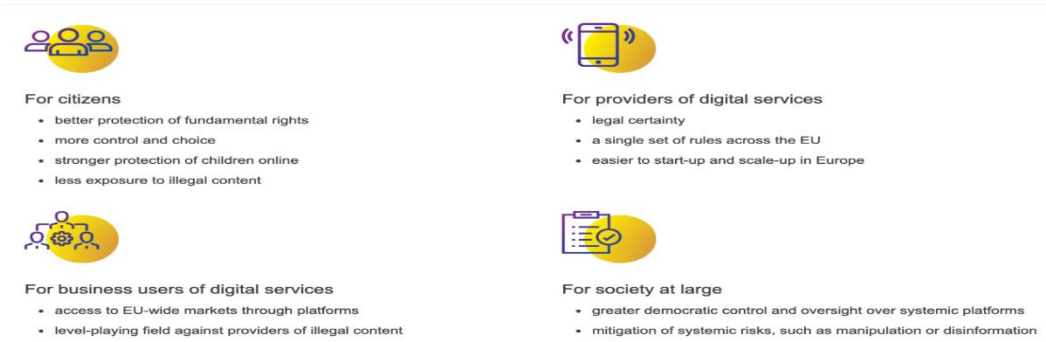
●The DSA regulates online intermediaries and platforms such as marketplaces, social networks, content-sharing platforms, app stores, and online travel and accommodation platforms. Its main goal is to prevent illegal and harmful activities online and the spread of disinformation.

●It ensures user safety, protects fundamental rights, and creates a fair and open online platform environment.

What are the key goals of the Digital Services Act?

●The DSA protects consumers and their fundamental rights online by setting clear and proportionate rules.

●It fosters innovation, growth and competitiveness, and facilitates the scaling up of smaller platforms, SMEs and start-ups. The roles of users, platforms, and public authorities are rebalanced according to European values, placing citizens at the centre.



Ladakh demand

- The protests were jointly organized by the Leh Apex Body (LAB) and Kargil Democratic Alliance (KDA), and saw men and women marching through the main city of Leh despite freezing temperatures.
- The LAB and KDA, representing the two regions of Ladakh, have been advocating for statehood and Sixth Schedule status since its conversion into a Union Territory.
- Protestors raised slogans calling for Ladakh's statehood, the implementation of the sixth schedule of the Constitution, and the establishment of separate parliamentary seats for Leh and Kargil districts.
- Ladakh transitioned into a Union Territory without a legislature following the abrogation of Article 370 and 35A, leading to the bifurcation of Jammu and Kashmir into two Union territories on August 5, 2019
- residents of Ladakh have expressed dissatisfaction with prolonged bureaucratic rule in the Union Territory and assert that only full statehood, enabling them to elect their representatives to govern the region, can meet their demands.

Do you Know?

Ladakh is situated over 3,000 meters above the sea level and features, the highest bridge – Bailey Bridge over Suru and Dras rivers, the highest salt water lake – Pangong Tso, the highest farmed fields close to

SIXTH SCHEDULE

[Articles 244(2) and 275(1)]

Provisions as to the Administration of Tribal Areas in 1[the States of Assam, Meghalaya, Tripura and Mizoram]

1. **Autonomous districts and autonomous regions.**—(1) Subject to the provisions of this paragraph, the tribal areas in each item of [3][4[Parts I, II and IIA] and in Part III] of the table appended to paragraph 20 of this Schedule shall be an autonomous district.

2. **Constitution of District Councils and Regional Councils.**—2[(1) There shall be a District Council for each autonomous district consisting of not more than thirty members, of whom not more than four persons shall be nominated by the Governor and the rest shall be elected on the basis of adult suffrage.]

(2) There shall be a separate Regional Council for each area constituted in an autonomous region under sub-paragraph (2) of paragraph 1 of this Schedule.

(3) Each District Council and each Regional Council shall be a body corporate by the name respectively of "the District Council of (*name of district*)" and "the regional Council of (*name of region*)", shall have perpetual succession and a common seal and shall by the said name sue and be sued.

Kosovo and schengen

Why was Kosovo's application kept pending for years?

●The case of Kosovo is egregious given that the European Commission had in 2018 cleared Pristina's preparedness to tackle illegal migration and corruption, preconditions for the entry.

●Arguably, the single biggest obstacle to the country's Schengen visa waiver was strong opposition from several EU members, which do not recognise the 2008 unilateral declaration of independence by the breakaway state from Serbia.

●Kosovo has not been accorded legal statehood by the UN and denied recognition by Russia and China

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Is admission to Schengen mandatory for EU members?

●Yes and no.

●When the Schengen agreement took eect in 1995, only seven of the entire 15-member union at the time joined the passport-free area. Today, 23 of the 27 EU states are part of the passport-free zone, excluding Cyprus, Romania, Bulgaria and Ireland.

●But then, the Schengen area comprises 27 countries, including four non-EU members: Iceland, Liechtenstein, Switzerland and Norway.

Schengen Agreement

- Schengen Agreement signed on 14 June 1985, near the town of Schengen, Luxembourg
- This treaty that led most of the European countries towards abolishment of their national borders, to build a Europe without borders known as "Schengen Area"
- Initially there were five European countries France, Germany, Belgium, Luxemburg, and Netherlands and now it increased to 26.
- Liechtenstein was the 26th and the last country so far to sign the Schengen Agreement and become part of the Schengen Area.

Why is food insecurity in nigeria?

●With over 220 million people, Nigeria is the most populated country in Africa and the sixth in the world.

●It is the tenth-largest producer of crude oil in the world and achieved lower-middle-income status in 2014. However, around 84 million Nigerians, representing about 37 percent of the total population, live below the poverty line.

●Conflict and insecurity, rising inflation and the impact of the climate crisis continue to drive hunger in Nigeria – with 26.5 million people across the country projected to face acute hunger in the June-August 2024 lean season.

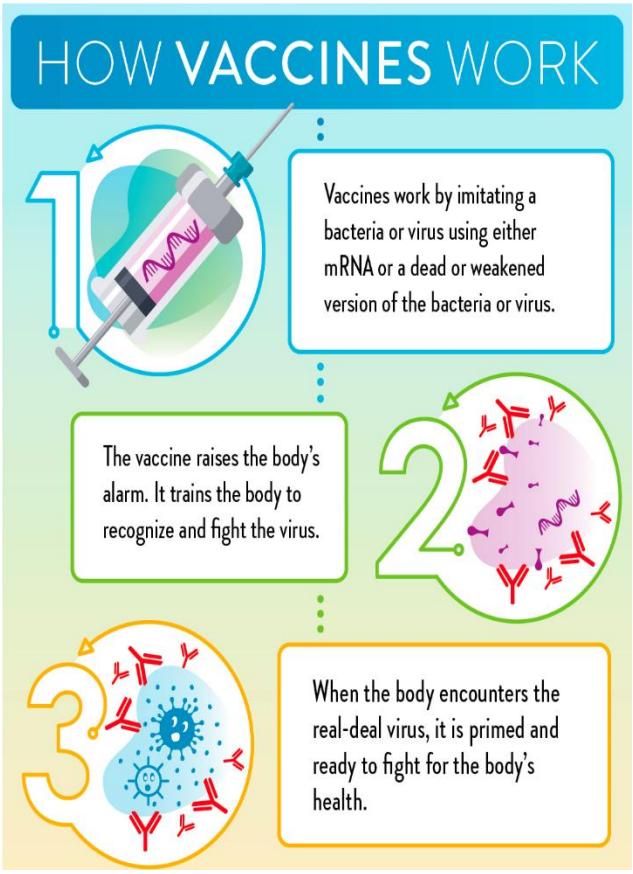
●This is a staggering increase from the 18.6 million people food insecure at the end of 2023.

Vaccine Efficacy

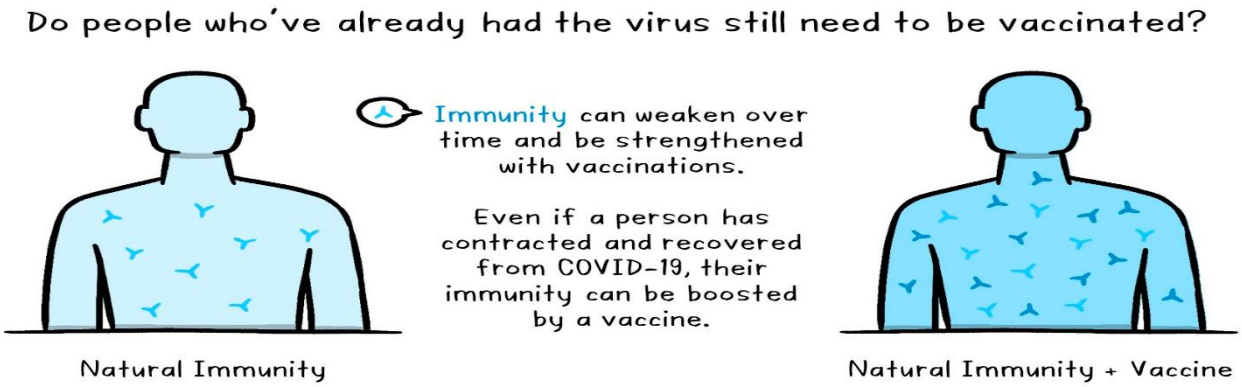
●Researchers update the composition of influenza vaccines every six months to match the strains of the virus that are circulating in the wild, so that the shots may provide protective immunity against the flu.

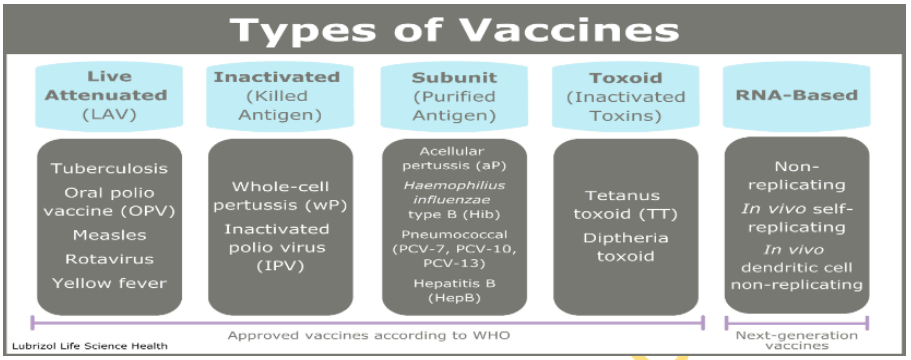
●But despite their best efforts, researchers rarely perfectly match the strains loaded in the vaccine with the strains circulating by the time the vaccines reach the market.

● The reason for this is the long gestation period usually at least six months between identifying the circulating strain and the development, manufacturing, and distribution of the vaccines.



- By the time the updated flu vaccine is available, the circulating strain may have drifted from the one contained in the vaccine, thanks to the high mutational rates of influenza viruses.
- The 'match' between strains included in the vaccine and strains in circulation is the most important factor controlling the vaccine effectiveness (VE) of flu vaccines.





Horseshoe crab

- Environmental groups petitioned the U.S. government seeking endangered species protection for the American horseshoe crab, a "living fossil" under threat from commercial harvests for bait and biomedical use as well as from habitat loss and climate change.
- These spine-tailed sea creatures, named for the shape of their body shells, were once a familiar sight to summer beachgoers along the U.S. mid-Atlantic and Gulf Coasts.
- But populations have crashed in recent decades, with spawning numbers down two-thirds from 1990 in the Delaware Bay estuary that was once their biggest stronghold, according to conservation groups.
- Research also shows their egg densities falling more than 80% in the past four decades.
- Those trends are tied to stress on other marine species that feed on their larvae and eggs, including the rufa red knot, a migratory shorebird whose own 2014 threatened-species listing cited horseshoe crab harvests as a contributing factor.
- Classied not as true crabs but as marine arthropods more closely related to spiders and scorpions, horseshoe crabs are among the oldest living on the earth, with fossils of their ancestors.

About Horseshoe crabs

- **Horseshoe crabs have been around for more than 300 million years, making them even older than dinosaurs.**
- **They look like prehistoric crabs, but are actually more closely related to scorpions and spiders. The horseshoe crab has a hard exoskeleton and 10 legs, which it uses for walking along the seafloor.**
- **The body of the horseshoe crab is divided into three sections.**

- **Female horseshoe crab is about one-third larger than the males. They can grow to be 18 to 19 inches (46 to 48 centimeters) from head to tail, while the males are approximately 14 to 15 inches (36 to 38 centimeters)**
- **The horseshoe crab species found around the United States *(Limulus polyphemus)* lives in the Atlantic Ocean along the North American coastline.**
- **Horseshoe crabs can also be seen along the East and Gulf coasts of the United States and Mexico. There are three other species of horseshoe crab worldwide, which are located in the Indian Ocean and in the Pacific Ocean along the coast of Asia.**
- **Horseshoe crabs utilize different habitats depending on their stage of development. The eggs are laid on coastal beaches in late spring and summer.**
- **After hatching, the juvenile horseshoe crabs can be found offshore on the sandy ocean floor of tidal flatsThreats to horseshoe crabs include habitat loss and overharvesting. Beach developments hinder horseshoe crab breeding. *Limulus polyphemus* is internationally listed as vulnerable**

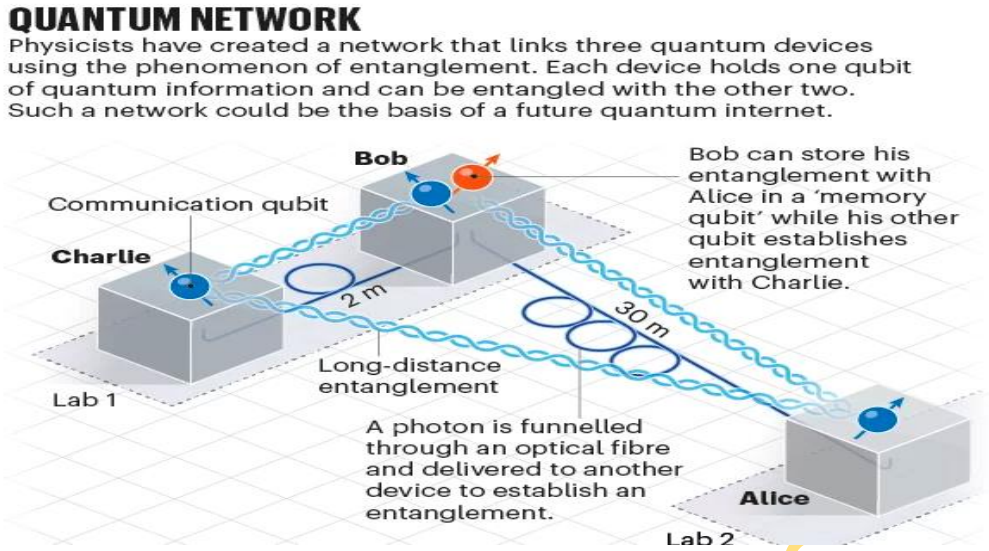
Gas flaring

- Gas flaring is the burning of the natural gas associated with oil extraction. The practice has persisted from the beginning of oil production over 160 years ago.
- It takes place due to a range of issues, from market and economic constraints, to a lack of appropriate regulation and political will.
- Flaring and venting are a waste of a valuable natural resource that should either be used for productive purposes, such as generating power, or conserved. For instance, the amount of gas currently flared each year – about 139 billion cubic meters – could power the whole of sub-Saharan Africa.

Quantum internet

WHAT IS THE QUANTUM INTERNET?

- **The quantum internet is a network that will let quantum devices exchange some information within an environment that harnesses the weird laws of quantum mechanics.**



Quantum entanglement is the phenomenon that occurs when a duet of particles are generated, interact, or share spatial proximity in such a way that the quantum state of each particle of the group cannot be described independently of the state of the others, including when the particles are separated by a large distance.

Boroujen (mapping)

●Boroujen also known as Urjen, or Oorjen) is a city in the Central District of Borujen County, Chaharmahal and Bakhtiari province, Iran, and serves as capital of the county.

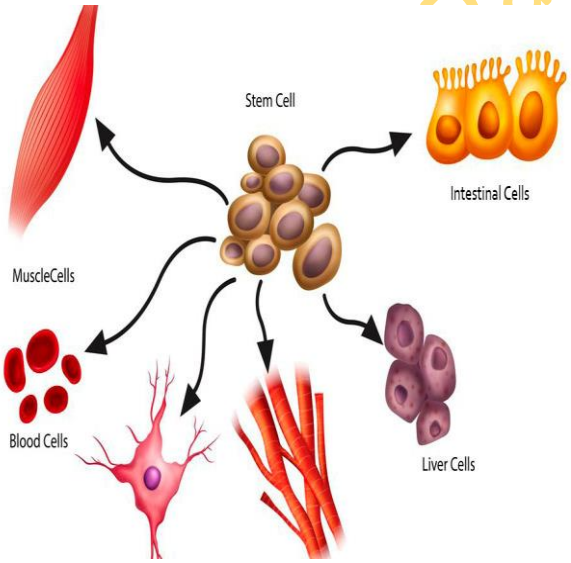
●The city is populated by Persians with a minority of Lurs and Turkic peoples.

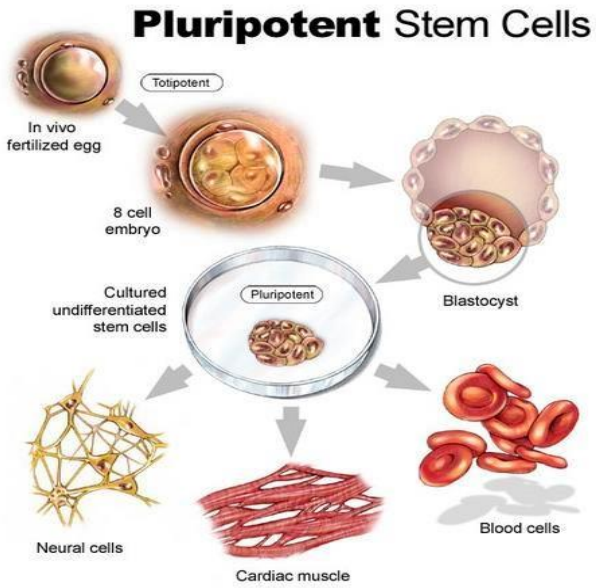
●Borujen is well known for its extremely cold weather, usually mentioned as one of the coldest Iranian cities in national weather forecaust

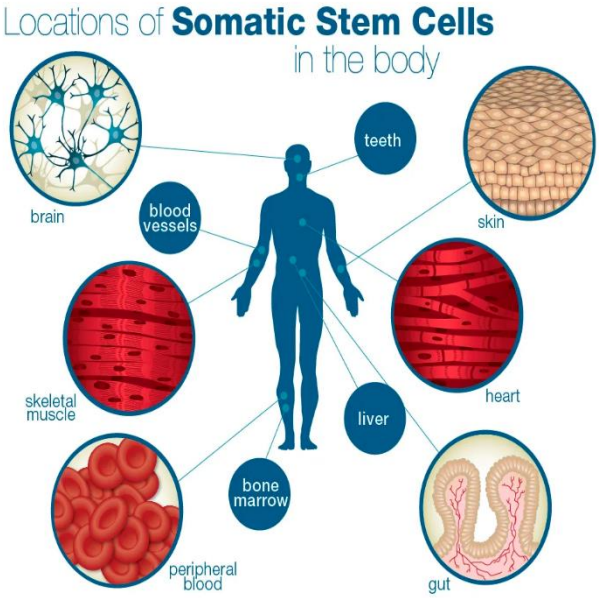
Endometrium

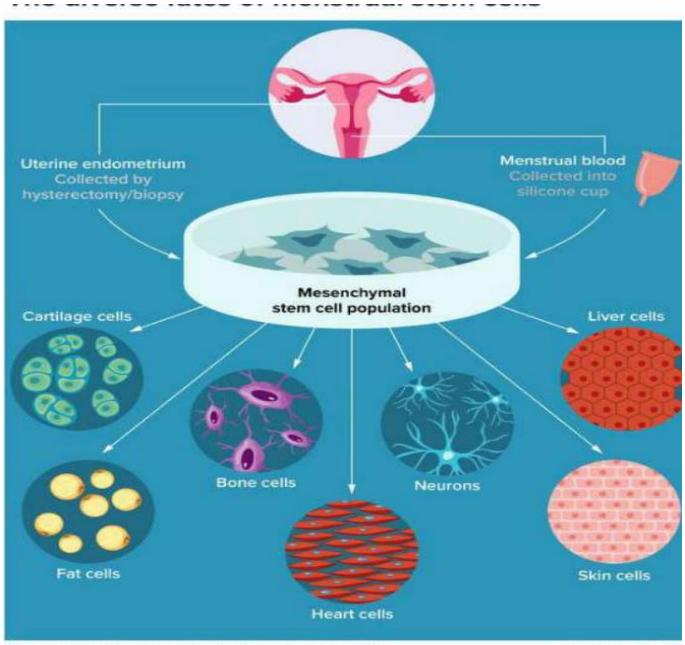
- The endometrium is the inner lining of your uterus.
- This tissue is what shed during a menstrual period.
- Think of endometrium as layers of tissue that build up along the inside lining of uterus.
- When have a period, these layers fall away from the walls of your uterus and leave body.

- researchers had long hypothesised that the endometrium contained stem cells, given its remarkable capacity to regrow itself each month.
- The tissue, which provides a site for an embryo to implant during pregnancy and is shed during menstruation, undergoes roughly 400 rounds of shedding and regrowth before a woman reaches menopause.









- Why autoimmune disease?
- Several factors can cause autoimmune disease such as environmental factors, genetics, hormonal imbalance and lifestyle habits.
- However, since women are more susceptible to these diseases, scientists previously thought that it could be related to sex hormones or faulty regulation of the X chromosome.
- Now, a group of scientists have found a molecular coating that is found in half of the X chromosomes in women might be the reason behind this phenomenon.
- Human females (and most mammals) contain two X chromosomes while the males of of the species contain one X and one Y chromosome.
- The molecular coating of the X chromosome is a combination of RNA and proteins and is crucial to a process called X-chromosome inactivation which ensures that one set of X chromosomes in.
- females remain active and functional in all the cells of the body while the other is muffled.

How is this achieved?

- The chromosome is wrapped in long strands of RNA called XIST

that attract proteins and tamp down the expression of the gene inside.

- However, not all genes are muffled in this manner and the ones that escape the X inactivation process are thought to be the cause of autoimmune diseases.
- Not only this, the XIST molecule too has been known to elicit inflammatory immune responses. .

FRA vs WLPA ACT

- In 1990, the Union Ministry of Environment and Forests (MoEF) had ordered that all forest villages be converted to revenue villages.
- The FRA, enacted 18 years ago, also required all forest villages to be converted to revenue villages.
- During conversion, "the actual land use of the village in its entirety, including lands required for current or future community uses, like schools, health facilities and public spaces," were to be recorded as part of the revenue village.

What does the WLP Act 1972 provide?

- Sanctuaries and national parks are notified under the Wildlife (Protection) Act (WLPA) 1972.
- People inside sanctuaries continue to enjoy all their rights unless prohibited, but they don't in National Parks.
- No new rights are permitted once the notice of intent is issued.

- The Collector is to inquire into the rights of all persons, their nature and extent, in the proposed sanctuary or national park.
- Then, the Collector's office has to decide whether to admit the claims in sanctuaries and to acquire all rights in national parks.
- The law mandates similar procedures when some land is initially notified as forest. But governments have not followed them.
- In 2006, the Indian government enacted the FRA to explicitly undo this "historical injustice" resulting from the inadequate recognition of "forest rights on ancestral lands and their habitat in the consolidation of State forests during the colonial period as well as in independent India".
- The FRA requires and authorizes the gram sabhas to determine and recognize forest rights and protect and preserve the forests, wildlife, and biodiversity within their customary and traditional boundaries, including inside Protected Areas.
- These responsibilities were earlier vested with the Forest Department.

Rights for the dwellers

What the Forest Rights Act, 2006, entails

- Tenurial security over the forestland under occupation prior to December 13, 2005
- Recognition of community right over forest and forest products
- Protection and conservation of community forest resources
- Conversion of all forest villages and habitation located inside the forestland into revenue villages
- In situ rehabilitation of displaced persons evicted without compensation prior to December 13, 2005
- Recognition of ancestral domain (habitat) right to

Residents of Gunduribadi village in Odisha's Nayagarh district get ready for mapping their land boundaries for the Forest Rights Act implementation. ■ SPECIAL ARRANGEMENT

Particularly Vulnerable Tribal Groups

- Seasonal access to nomadic, pastoral and semi-nomadic communities over forestland
- Conversion of all leases granted by erstwhile governments, zamindars and king into permanent land records

How do FRA and WLPA compare?

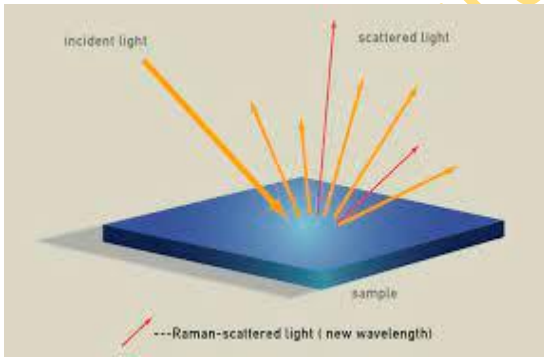
- **Being a later law, the FRA overrides the WLPA. All provisions in the WLPA that contravene provisions in the FRA are null and void.**
- **As a result, when notifying a Protected Area under the WLPA, the government needs to determine rights under the FRA and acquire the consent of the gram sabhas.**
- **The government specifically incorporated these requirements in a 2006 amendment vis-à-vis the notification of tiger reserves.**

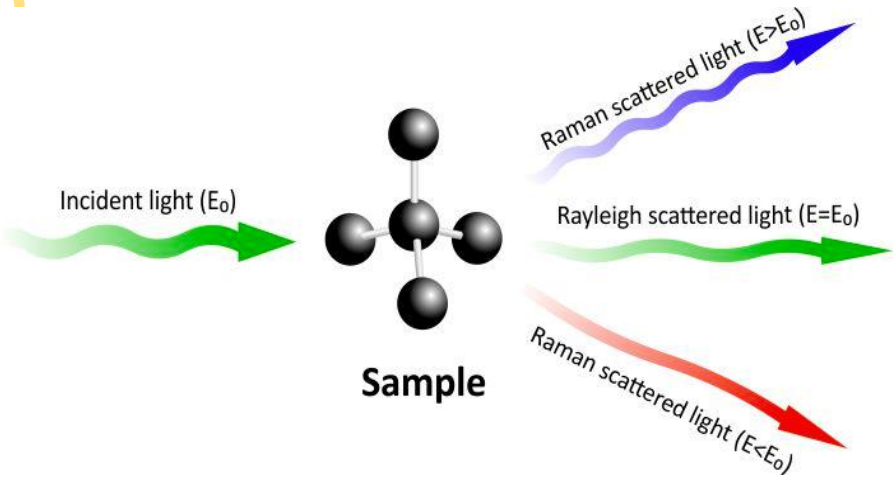
Nanoplastics

- **Nanoplastics are difficult to analyse due to their size and also due to the inability of different diagnostic techniques to identify them. Researchers used a SRS imaging platform along with an automated algorithm to identify plastics.**
- **The algorithm extracted detailed information about the chemical makeup from data produced by the SRS (Raman scattering imaging) platform**
- **Studies have found that plastic items can break down into sub-micrometre pieces, meaning they can breach biological barriers and enter different parts of the bodies of living beings.**
- **the presence of plastics in bottled water could spot following the types: polyamide 66, polypropylene (PP), polyethylene, polymethyl methacrylate, polyvinyl chloride (PVC), polystyrene, and polyethylene terephthalate (PET).**

What is raman scattering imaging?

- **Raman scattering is an optical process where incoming excitation light interacting with a sample produces scattered light that is lessened in energy by the vibrational modes of the chemical bonds of the specimen**
-





Skywalker hoolock gibbon

- **When the Skywalker hoolock gibbon was first discovered in 2017 by a group of Star Wars-loving scientists, its only confirmed population (fewer than 200 individuals) was in neighbouring China.**
- **But in a new study, researchers confirmed Myanmar has the largest known population of Skywalker gibbons in a single location.**
- **The Skywalker hoolock gibbon or Gaoligong hoolock gibbon (*Hoolock tianxing*) is an arboreal primate in the gibbon family, Hylobatidae.**
- **It is one of three species of hoolock gibbon and was first described in January 2017 in the *American Journal of Primatology*.**
- **The Skywalker hoolock gibbon can be found in the montane forests of eastern Myanmar and southwestern China in the Mt. Gaoligong region, located between the Salween River and the Nmai tributary of the Irrawaddy River.**
- **Hoolocks were first recorded in this region in 1917, and this is the easternmost habitat of any hoolock species**

- **Mechanism happens if the star is part of a binary system — i.e. as one of two stars that are orbiting each other.**
- **(Most stars heavier than the Sun are in such binaries.)**
- **The gravitational attraction of one star can peel away the**
- **hydrogen layer of the other, leaving an exposed surface of helium.**

- Peeling of stars
- When a star no longer fuses material and allows gravity to gain the upper hand, it blows up in an explosion called a supernova if it's heavy enough. Scientists have extensively studied the light from many supernovae.
- The light contains signatures of the various elements it has passed through near the dying star's surface. Scientists have observed that some supernovae have shown no signs of hydrogen.

Nusantara 2

- Malfunctioned shortly after launch in April 2020, destroying Indonesia's $220 million Nusantara-2 satellite, it was a blow to the archipelago's efforts to strengthen its communication networks.
- But it presented an opportunity for one man

Global Housing Challenge

About Global House challenge

The Ministry of Housing and Urban Affairshas conceptualized a Global Housing Technology Challenge - India (GHTC India) which aims to identify and mainstream a basket of innovative technologies from across the globe for the housing construction sector that are sustainable, eco-friendly and disaster resilient.

The Prime Minister declared the year 2019-20 as 'Construction Technology Year' while inaugurating GHTC-India in March 2019.

- **3 Components of GHTC-India**
- **Grand Expo and Conference Proven Demonstrable**
- **Technologies for the**
- **Construction of Lighthouse Projects**
- **Potential Future Technologies for Incubation and**
- **Acceleration Support:**

What is happening in WAYANAD?

Specific to WAYANAD The trend of monoculture plantations and the usage of pesticides and insecticides depleted the soil.

- **The tourism industry has**
- **expanded to bustling**
- **destinations towards the forest edges and wildlife corridors. The connectivity with the nearby cities of Bengaluru and Mysuru and the post lockdown induced revenge tourism have aggravated this steep climb in tourist arrivals**

the peaks, lakes, waterfalls,
sanctuaries, dams, and plantations are all converted as tourism products to make human activities appear harmless without sucient studies on their several impacts. non-native trees planted inside the forests have denied food and water for the animals which is resulting in the evacuation of animals from the forest areas as the interiors are turning to barren lands.

Guinea worm disease

Guinea worm disease, a neglected tropical disease (NTD), is caused by the parasite Dracunculus

medinensis.

The disease affects poor

communities in remote parts of Africa that do not have safe water to drink.

There is neither a drug treatment for Guinea worm disease nor a vaccine to prevent it.

- **A parasite is an organism that feeds off another organism to survive.**
- **GWD is spread by drinking water containing Guinea worm larvae.**
- **Larvae are immature forms of the worm**

India UK relationship

separated by thousands of miles, we are inherently connected by the ocean, the world's great global commons.

Trade in food and goods underwrites our mutual prosperity, supporting the lives and livelihoods of so many.

Global trade is predominantly a maritime activity, and this remains a fundamental truth in the Information Age too.

But, today, our reliance on the maritime is only increasing, with the recognition that the data supporting online banking and capital ows also moves via underwater cables.

The global lifelines of goods and resource that flow across the seas and on which our economies rely.

But the norms of behaviour upon the seas — norms which have enabled globalisation flourish, and the wider rules-based International Order of which they are a part — are all increasingly under threat, from the Black Sea to the Red Sea to the South China Sea.

the United Kingdom, the United States and other partners joined in Operation Prosperity Guardian to defend and protect commercial shipping in the Red Sea and Gulf of Aden.

The Houthi attacks are indiscriminate and putting at risk the lives of innocent seafarers who seek to make their livelihood at sea

Our defence industrial partnership is, similarly, going from strength to strength. From electric warship propulsion to complex weaponry to jet engines.

Space technologies

Context- Regulation of space sector Space technologies and space flight are expensive, risky endeavours that only national agencies were suited to engage in for decades.

- **This is no longer true as private sector players are increasingly expected to complement, augment, and/or lead the way by identifying market opportunities and innovating rapidly.**
- **India started on this path in 2020 with state led reforms that opened its space sector to private companies, then releasing the 'Geospatial Guidelines' and later the 'Indian Space Policy', creating the Indian National Space Promotion and Authorisation Centre (IN-SPACe), and passing the**
- **Telecommunications Act 2023 that, among other departures from the Indian Telegraph Act, 1885, provided for satellite broadband services.**

On February 21, the government opened the door to 100% foreign direct investments (FDI) in the "manufacturing of components and systems/sub-systems for satellites, ground segment and user segment" — up to 74% in satellite manufacturing, operations, and data

products; and up to 49% in launch vehicles, space ports, and their corresponding systems.

As such, by stepping out of the way and allowing substantial FDI via the automatic route, the government has taken the logical next step in spurring the contributions of private space flight operators, technology-developers, and application designers to the national space economy, in line with ambitions outlined in the Space Policy.

- **According to IN-SPACe chairman Pawan K. Goenka, a "signicant" slice of the $37.1 billion that the space sector raised worldwide in 2021-23 went to space start-ups.**
- **new investments can add to India's space economy by improving start ups' access to talent and capital; effecting a better balance between upstream and downstream opportunities, versus the current skew in favour of the former; boosting local manufacturing; and improving investor confidence.**

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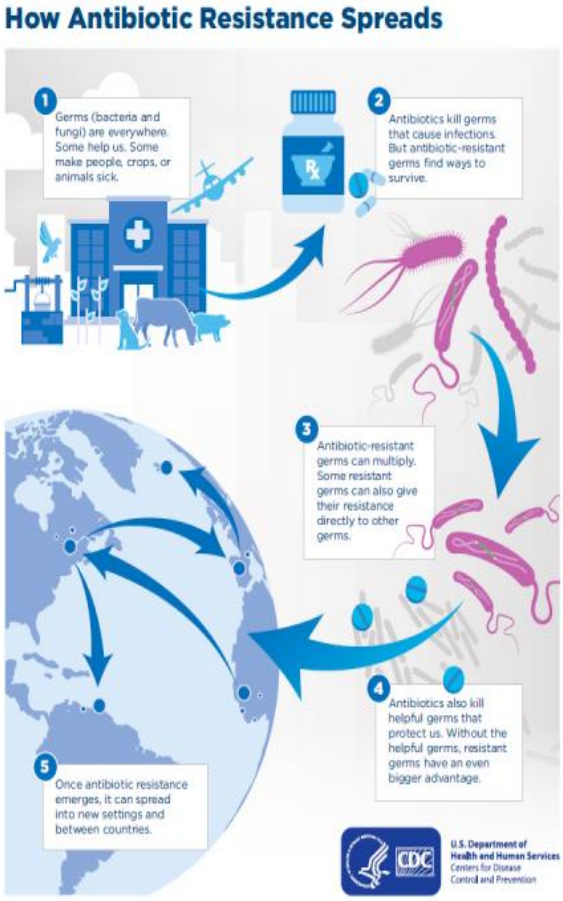
Edward syndrome

●Add Researchers have reported chromosomal disorders discovered from prehistoric skeletal remains, dating up to approximately 5,500 years old — including six cases of Down syndrome and one case of Edwards syndrome subheading Individuals with chromosomal trisomy carry three copies of a chromosome in their cells, instead of two. Trisomy of chromosomes number 21 or 18 results in Down syndrome and Edwards syndrome, respectively

Implements H1 Rule on Antimirobial resistance- Kerala

In 2011, the Indian government introduced the H1 rule to prohibit the over the-counter (OTC) sales of antibiotics without a prescription, responding to the growing concern over antimicrobial resistance (AMR)

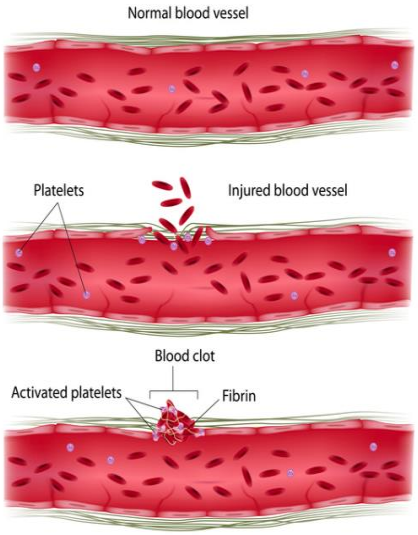


Nanotechnology to treat Haemophilia

- **A team of scientists has engineered nanoparticles that can treat haemophilia a disorder in which patients lack a coagulation factor and cannot properly form blood clots leading to spontaneous bleeding in animals by**
- **counteracting an enzyme that breaksdown blood clots and whose eects last longer compared with current drugs.**

Do you know?

- **Haemophilia is a medical condition, mostly inherited, in which the ability of blood to clot is severely reduced, so that even a minor injury can cause severe bleeding.**
- **Haemophilia is caused by a mutation or change, in one of the genes, that provides instructions for making the clotting factor proteins needed to form a blood clot.**
- **This change or mutation can prevent the clotting protein from working properly or to be missing altogether. These genes are located on the X chromosome.**



Compound that kill Mycobacterium abscessus

- Scientists have isolated an antibacterial compound that can kill Mycobacterium abscessus, a relative of the bacteria that
- cause tuberculosis, without generating any signs of bacterial drug resistance in infected mice.
- The safety profile and efficacy suggest that it can be used for treating people infected with M. abscessus, which is very hardy and frequently shrugs of standard antibiotic protocols.

Interferon gamma linked to Long COVID patients

- **An analysis of blood samples from 55 patients diagnosed with Long COVID has revealed that they experienced prolonged elevated levels of an anti-viral protein interferon gamma, which persisted for 180 days post-infection.**
- **This effect was induced by CD8 "killer" T cells in response to antigens present in the patients' CD14 cells.**
- **The findings highlight an immune response to SARS-CoV-2 infection associated with long COVID's debilitating symptoms.**

Did neanderthals use glue to create stone tools?

- **Neanderthals created stone tools held together by a multi-component adhesive, a team of scientists has discovered.**
- **The well-preserved tools showcase a technical solution broadly similar to examples of tools made by early modern humans in Africa.**
- **Its findings, which are the earliest evidence of a complex adhesive in Europe, suggest these predecessors to modern humans had a higher level of cognition and cultural development.**
- **The researchers discovered traces of a mixture of ochre (over 50%) and bitumen on several stone tools. Using liquid bitumen with 55% ochre, researchers were able to produce a mixture that was sticky enough for a stone tool to remain together but without adhering to hands.**

SC on Forest conservation act

"dictionary meaning" of forest as upheld in a 1996 Supreme Court decision in the T.N. Godavarman Thirumulpad case till a final verdict is handed out on a petition challenging the amended Forest Conservation Act of 2023.

- **The Forest Conservation Act, which came into force in 1980, was conceived to stop the razing of forests.**
- **An estimated four million hectares of forest land had been diverted from 1951-75and once the Act came into force, the average annual rate of diversion dropped to about 22,000 hectares — or about a tenth — going by figures cited by the Centre to a parliamentary panel to demonstrate the effectiveness of the legislation.**

However, the provisions of this legislation predominantly applied to tracts of forest land

recognised as such by the Indian Forest Act, or by States in their records since 1980.

Illegal timber-felling at Gudalur in Tamil Nadu led the Supreme Court to deliver the landmark Godavarman Thirumulpad judgment in 1996. It decreed that forests had to be protected irrespective of how they were classiffied and who owned them.

This brought in the concept of 'deemed forests,' or forest-like tracts that weren't officially classified as such in government or revenue records but looked like them.

In the 28 years that have passed since the judgment, States — based on surveys and reports by expert committees — have interpreted 'forests' differently.

This is natural, given the wide variety of forests and constituent plants in India

The Centre's recent attempt to amend the Forest Conservation Act was ostensibly to bring "clarity" as there were large tracts of recorded forest land that had already been legally put to non-forestry uses, but conformed to a State's criteria of a 'deemed forest.'

This posed challenges to the use and ownership of such land.

Such ambiguity also bred a reluctance among private citizens to cultivate private plantations and orchards, despite their significant ecological benefits, for fear that they would be classified as 'forest' (and thus render their ownership void).

India's ambitions to create a carbon sink of 2.5- 3 billion tonnes, to meet its net-zero goals required forest laws to be "dynamic", and the rules sought to remove 'deemed forest,' not already recorded as such, from the ambit of protection

The amendments also put beyond the pale of protection forest land situated alongside a rail line or a road, necessary to provide access to a habitation, up to a maximum size of 0.10 hectare. Forest land situated within a distance of 100 kilometres along international borders or the Line of Control or Line of Actual Control, and which needed to be cleared to construct strategic linear projects of national importance would also be exempt from the Act.

Any ten hectares in a forest, regarded necessary for use in constructing security related infrastructure or ve hectares in forest land affected by 'left wing extremism' too would be

bereft of protection.

The government rationale is that these exemptions are necessary to facilitate basic infrastructure in tribal areas.

Moreover, the proper protection and conservation of forests by local communities, the Centre argued, requires creating livelihood opportunities through the promotion of ecotourism, zoos and safaris.

Jacaranda and climate change- Jacaranda mimosifolia is a sub tropical tree native to south central South America that has been widely planted elsewhere because of its attractive and long lasting violet-colored flowers. It is also known as the jacaranda, blue jacaranda, black poui, Nupur or fern tree

> **Local scientists have begun investigating how widespread the early-bloom phenomenon is, but they point to climate change as the first culprit. "They are starting to flower in January, February, which is winter, when it is not yet their time.**

Medicinal properties of canabis

- **The cannabis plant (Cannabis sativa) has long been of interest to psychiatrists for its perceived effects on mood and cognition.**
- **There is currently significant research interest in using cannabis-based compounds to manage and/or treat schizophrenia and cannabis use and heroin-use disorders.**
- **The major psychotomimetic agent in C. sativa is a compound called delta-9-tetrahydrocannabinol (THC).**
- **There is growing interest in**
- **another cannabinoid, cannabidiol (CBD), which may have**
- **antipsychotic, anti-inflammatory, and neuroprotective properties. The plant's flowering parts are more potent than its leaves**

- The cannabinoid system The human cannabinoid system has two cannabinoid receptors, called CB1 and CB2.
- The naturally occurring substrate of the CB1 receptor is anandamide, a compound whose name comes from the Sanskrit word ‘ananda’, meaning bliss. CB2 is found in the spleen and testes and to a lesser extent in the central nervous system (CNS).
- CB1 is found diusely throughout the CNS.
- The CNS is involved in the release of various neurotransmitters, including dopamine, noradrenaline, and serotonin. CB1 is like a trac cop: it controls the level

Endocannabinoid system (ECS)

- The endocannabinoid system (ECS) comprises a dense network of chemical signals and cellular receptors.
- The cannabis plant works its effect by hijacking this machinery.
- The cannabinoid system
- modulates a host of bodily functions, including pain, memory, psychomotor control, sleep, and appetie

Rare diseases

- According to the World Health Organization, rare diseases afflict 1 or less per 1,000 populations.
- Barely 5% of the over 7,000 known diseases worldwide are treatable.
- India accounts for one-third of the global rare disease
- incidence, with over 450 identified diseases

- Rare diseases are broadly defined as diseases that infrequently occur in a population, and three markers are used the total number of people with the disease, its prevalence, and the availability/non-availability of treatment options.

- **WHO defines rare disease as having a frequency of less than 6.5-10 per 10,000 people**

According to the Organization for Rare Diseases India, these include inherited cancers, autoimmune disorders, congenital

malformations, Hirschsprung's disease, Gaucher disease, cystic fibrosis, muscular dystrophies, and Lysosomal Storage Disorders (LSDs)

- **There are fundamental challenges in the research and development for the majority of rare diseases as relatively little is known about the pathophysiology or the natural history of these diseases**
- **particularly in the Indian context. Rare diseases are also difficult to research upon as the patient's pool is very small and it often results in inadequate clinical experience. Availability and accessibility to medicines are also important to reduce morbidity and mortality associated with rare disease.**

Quantum- computers/singlet

- fission qubit is a physical system with two quantum states, and it is the fundamental physical component of
- a quantum computer.
- A qubit can exist in one of the two states or — unlike classical computers— a superposed state with contributions from both states. Superposed states, also known as coherent superpositions, are

Important in quantum information-

- processing protocols- Many qubits, one problem A collection of qubits is required to make a quantum device.
- For this, any group of qubits needs to satisfy a few basic requirements.
- One: the qubits should be identical.
- The qubits can't be guaranteed to be identical since they need to be manufactured, and some 'imperfections' will creep in.
- Two: it should be relatively easy to integrate several qubits that can be operated controllably.
- Here, controllability refers to both the manipulation of individual qubits (a.k.a. "addressability") and qubit-qubit

  Interaction.

  The 'colour molecules' In the system studied by the Japanese team, zirconium is the metal component and an organic molecule containing the chromophore pentacene bridges the metal atoms.
- A chromophore is an organic molecule or a part of a larger molecule that absorbs light of some specic colour.
- An object containing such molecules thus appears to have some dominant colour.
- For example, the leaves of many plants appear green since the chromophore chlorophyll predominantly absorbs red and blue colours

from sunlight.

- Since the presence of chromophores is responsible for the colouration, they are also called “colour molecules”.
- When it absorbs light, the chromophore molecule jumps to a higher energy level (i.e. an excited state).
- In its lowest energy state, or ground state, a chromophore molecule has a pair of electrons in a special conguration called a singlet.
- Every electron possesses a property called spin that is inherent to it.
- The spin of an electron can point in two opposite directions, each corresponding to a distinct quantum state.
  In a singlet, the spins of the two electrons are pointing in opposite directions.
- If we say ‘pointing up’ is +1 and ‘pointing down’ is -1, we can say the spins in a singlet add up to zero.
- When the chromophore molecule absorbs some light, one of the electrons moves to a higher energy level while their respective spins still point in opposite directions

  Role of singlet fission

  - An excited molecular system has a small but non-zero chance of releasing its extra energy in a process called deexcitation.
  - The higher energy singlet excited state can deexcite to a lower energy triplet excited state.
  - The energy released in the process will excite a neighbouring chromophore molecule in a singlet ground state to jump to a triplet excited state.
    This process of generating two triplet excited chromophores from a singlet excited state chromophore is called singlet fission.
  - This energy transfer happens as the two chromophores interact.
  - It is one of the earth’s most haunting sounds, the “singing” of baleen whales like the humpback, heard over vast distances in the watery realm.

- Now scientists have finally figured out how these filter-feeding marine mammals do it.

- Baleen whales — a group that includes the blue whale, the largest animal — use a larynx, or voice box, anatomically modied to enable underwater vocalisation, researchers said.
- They have evolved a novel structure: a cushion consisting of fat and muscle that
- sits inside the larynx, the researchers said.

Ballen whales

That means baleen whales make their sounds with their larynx, as do humans, while toothed whales — including dolphins, porpoises, killer whales and

- sperm whales — evolved a dierent mechanism employing a special organ in their nasal passages
- the annual losses of ecosystem services due to land degradation has been estimated at $6 trillion.
- The United Nations Convention to Combat Desertification (COP14) in New Delhi in 2019 specifically discussed the problem of land degradation experienced by dierent countries and
- the need to find ways of achieving land degradation neutrality.
- The Intergovernmental Panel on Climate Change's special report on 'Climate Change and Land' (2019) suggested country-level stocktaking of land management practices

Focus on Land management

- The challenges in India, India with only 2.4% of world's geographical area and more than 17% of the world population experiences several land management challenges.
- Arable land in India is around 55% of total geographical area and forest cover accounts for another 22%.
- The rest is desert, mountains, etc , Around 30% of total geographical area is degraded land.
- Access to agricultural land continues to be an important livelihood issue as a significant share of the population depends on agriculture for their sustenance.
- Development targets and the demand for land to accommodate the growing population, infrastructure, rapid urbanisation, and social,
- cultural, and environmental aspects are placing unprecedented pressure on land.
- This is resulting in more competition among farmers and between agriculture and other land resource-based sectors, as well as land use conflicts, escalation of land prices, and changing land rights.
- Across the country, natural areas are being squeezed and ecological functions being lost.
- Not only does this adversely affect the livelihood opportunities of the people who directly depend on environmental resources, but also the buffering effects of natural ecosystems in the face of disasters such as foods and droughts, temperature rise, and environmental pollution are severely compromised.
- Climate change has brought with it another set of challenges

STEPS

- In India, current land management practices are sectoral with each
- department following its own approach.
- Land management falls under the purview of State governments.
- Further, cultural land is privately owned and land-use decisions are

constitutionally vested with the owner.

- Apart from this administrative complexity, the challenges to adopt and implement appropriate land management practices in the country include knowledge gaps, a short-term planning bias, a fragmented approach, lack of action for unforeseen events, and
- regulatory barriers.
- As a critical mechanism to achieving sectoral integration and addressing these challenges, it is imperative to set up a multi-stakeholder platform at the district and sub-district levels to bring together farmers, other land managers, policymakers, civil society organisations, business leaders, and investors under a

Article-243

- Article 243ZD (1) of the Constitution provides for district planning committees to consolidate plans from panchayats and municipalities Tanzania has switched on the first turbine of a new hydroelectric plant set to double power generation capacity.
- conservationists warned that building a dam on a major river that runs through the Selous Game Reserve could affect wildlife and their habitats downstream.
- The reserve is among the largest protected areas in Africa, harbouring one of the most significant concentrations of animals, including elephant, black rhino and cheetah and a large variety of habitats, according to United Nations agency UNESCO.
- The Selous Game Reserve, now renamed as Nyerere National Park (in part), is a protected area in southern Tanzania.
- It covers a total area of 50,000 km2 (19,000 sq mi) and has additional buffer zones.
- It was designated a UNESCO World Heritage Site in 1982 due to its wildlife diversity and undisturbed nature