September 2023
GES Reporter

SAURABH PANDEY
UPSC
FROM BASICS TO UPSC BRILLIANCE

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About Author

Saurabh Pandey established Saurabh Pandey UPSC 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 qualified for an MA in public administration. He did B.Tech in biotechnology.

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The Hindu

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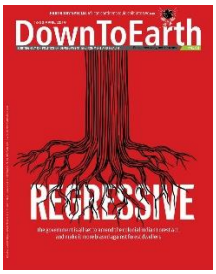
Down to Earth



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Contents

1. Adi *Shankaracharya*

NEWS
समाचार

Madhya Pradesh Chief Ministe unveild the 108- feet tall Ekatmata ki Pratima-Statue of Oneness od Adi Shankaracharya At Omkareshwar.

मध्य प्रदेश के मुख्यमंत्री ने ओंकारेश्वर में आदि शंकराचार्य की 108 फीट ऊंची एकात्मता की प्रतिमा-एकत्व की प्रतिमा का अनावरण किया

Adi Shankaracharya
आदि शंकराचार्य

- Adi Shankaracharya ,who is belived to have lived 788 and 820 AD ,was born inKerala's Kaladi,situated on the bank of Periyar river

आदि शंकराचार्य, जिनके बारे में माना जाता है कि वे 788 और 820 ई. में रहे थे, का जन्म पेरियार नदी के तट पर स्थित केरल कलाडी में हुआ था।

- He is Credited with Establishing the Advaita Vedanta,School of Hindu Philosophy

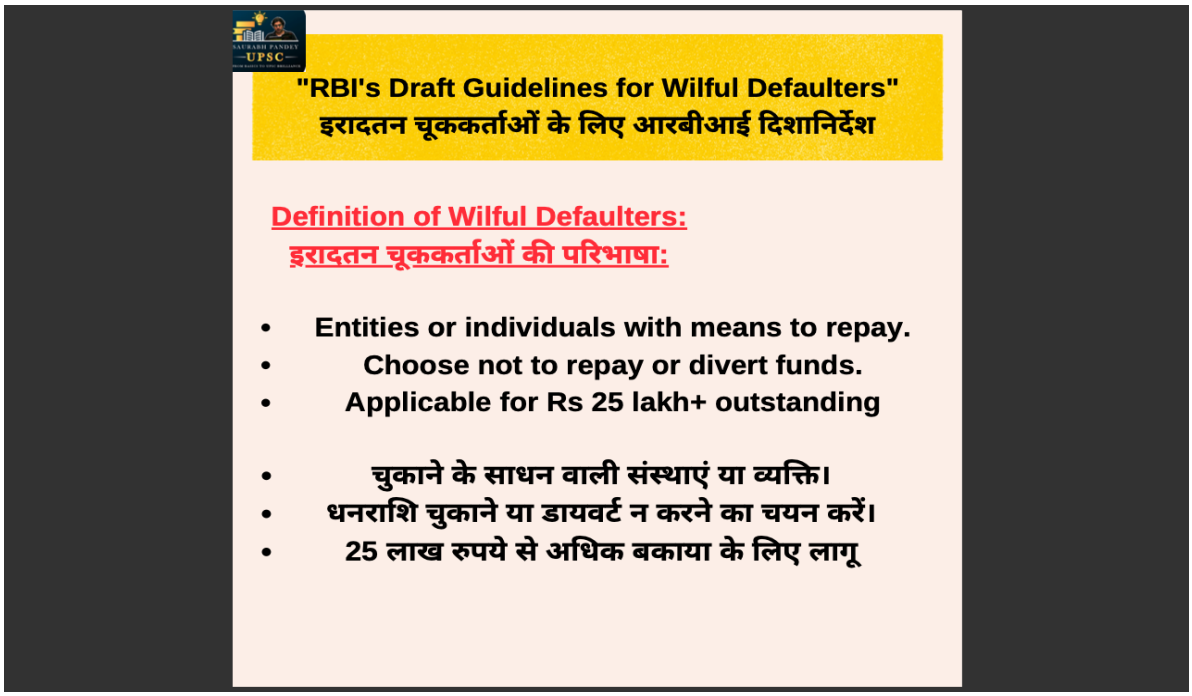
उन्हें हिंदू दर्शनशास्त्र के स्कूल, अद्वैत वेदांत की स्थापना का श्रेय दिया जाता है

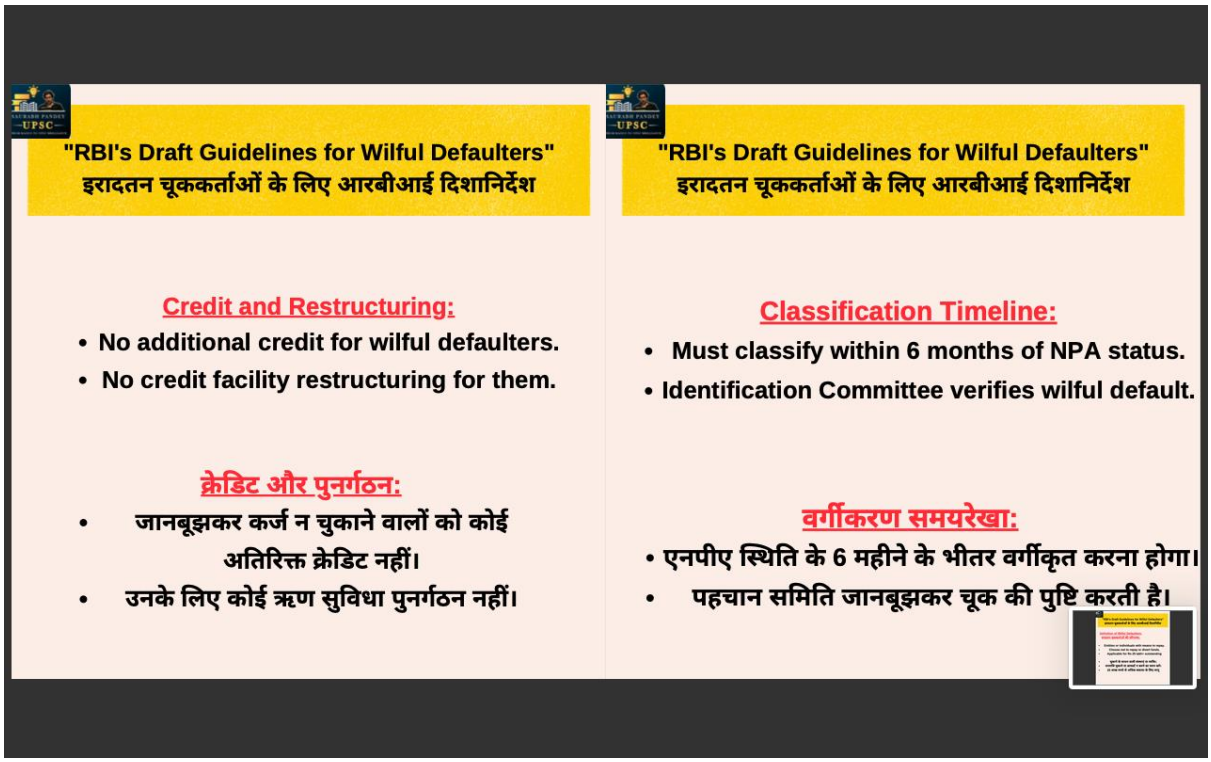
FEATURES
विशेषताएँ

- The Statue Depicts Shankaracharya as a 12 year old child when he is said to have visited Omkareshwar.
- The Multi-metal Adi Shankaracharya Statue is made up of Bronze that contains 88% copper,4% zinc and 8% tin

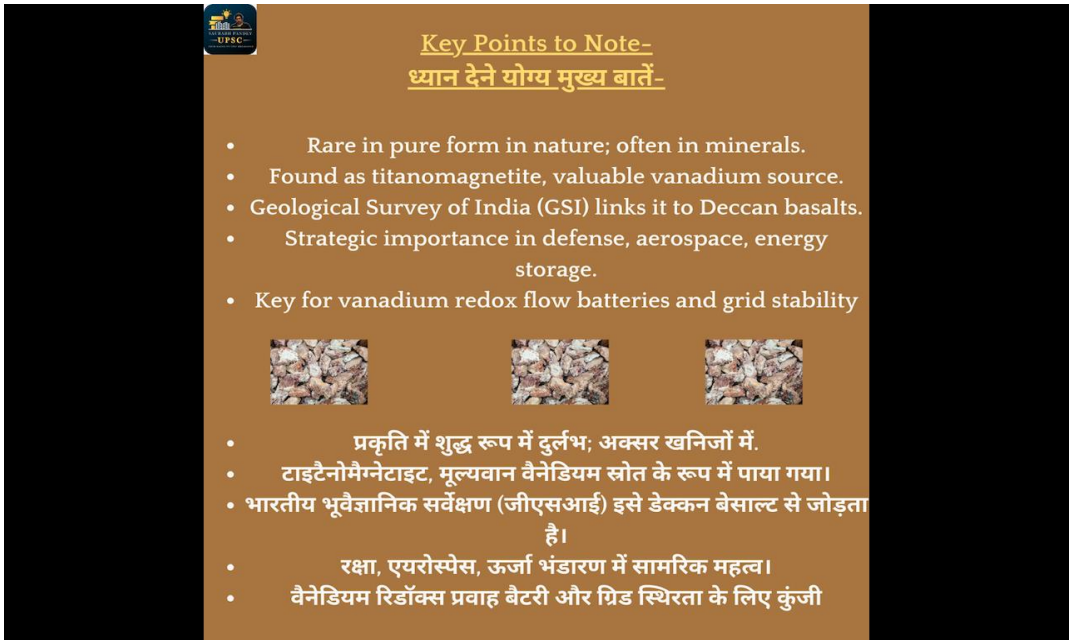
- प्रतिमा में शंकराचार्य को 12 साल के बच्चे के रूप में दर्शाया गया है, जब कहा जाता है कि उन्होंने ओंकारेश्वर का दौरा किया था।
- बहु-धातु आदि शंकराचार्य की मूर्ति कांस्य से बनी है जिसमें 88% तांबा, 4% जस्ता और 8% टिन है।

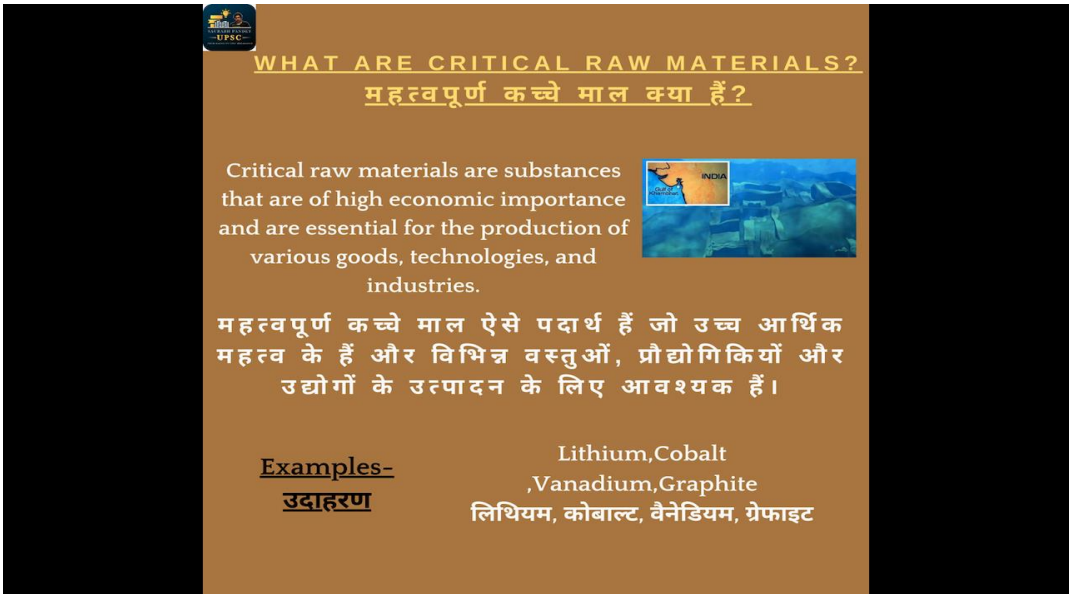
2. RBI Draft Guidelines for Willful Defaulters

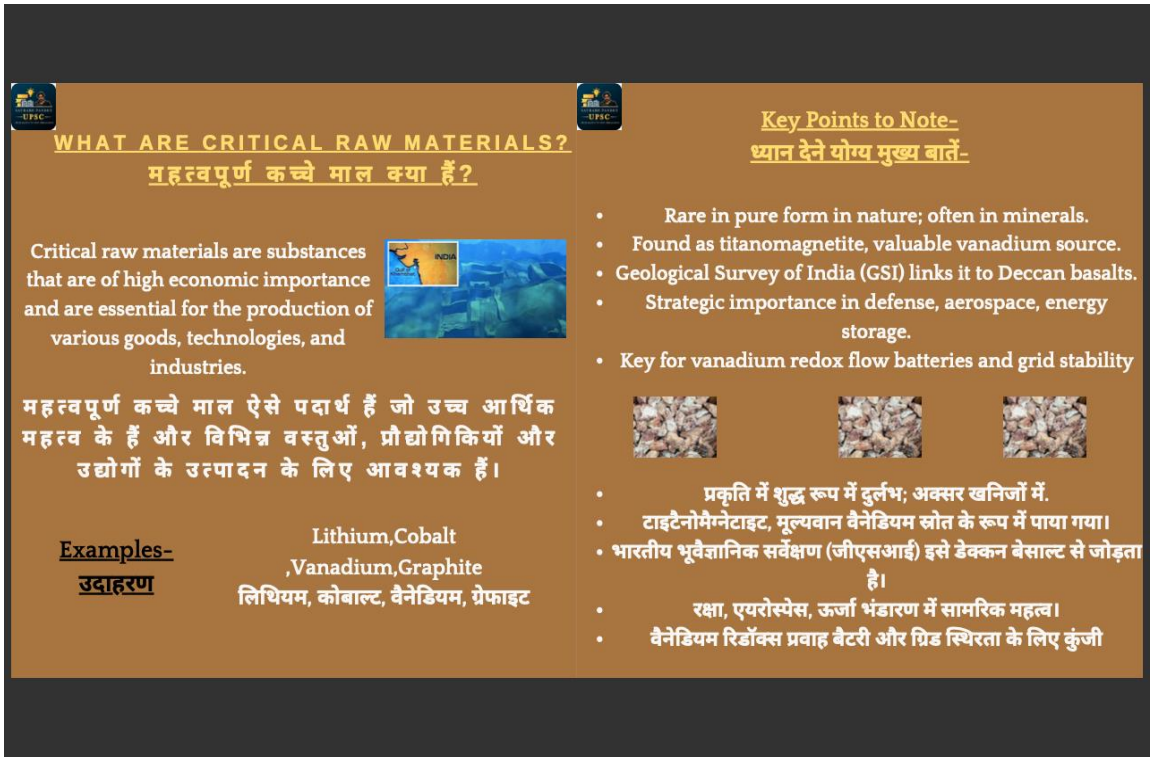




3. Critical Raw Materials







Less Rainfall in August

Rainfall in August has been the lowest in over a century, with India getting 36% less rainfall than it usually does in the month.

Of the four monsoon months, August usually sees the most amount of rainfall (25.4 cm) after July with 28 cm. El Nino refers to a warming of the central Pacific that usually translates to deficient monsoon rainfall over India.

The last time India recorded such severe deficits in August was in 2005, when the shortfall was about 25% of the normal, and in 2009, when India saw its biggest drought in half a century and August rainfall was 24% less than normal.

Mental Health

Mental health- related issues are rising in India according to the Standing Committee on Health and Family Welfare, which tabled its 148th report on

‘Mental Health Care and Its Management in Contemporary Times’, in Parliament, earlier this month, cautioning that the country lags with inadequate staff, medical infrastructure and budgetary allocation.

According to the panel mental health refers to a state of well-being that enables people to cope with the stress of life.

The Committee stated that India currently has 0.75 psychiatrists per lakh people, which is significantly low.

The Committee observed that if India targets having three psychiatrists per lakh people, it will need 27,000 more psychiatrists.

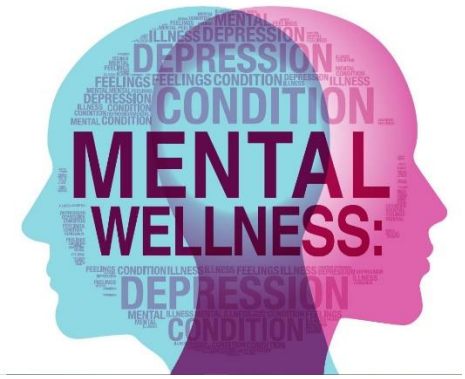
This scenario is similar for other professionals such as psychologists, psychiatric social workers, and nurses. There is considerable scope to improve the treatment gap.

Reasons for the gap include lack of mental health professionals, weak infrastructure and stigma,’’ said the report.

The total Budget Estimate (BE) for the Ministry of Health & Family Welfare (MoHFW) is ₹89,155 crores.

In 2010, global economic losses of around $2.5 trillion annually were attributed to poor mental health, stemming from diminished well-being and productivity. This will surge to $6 trillion by 2030.

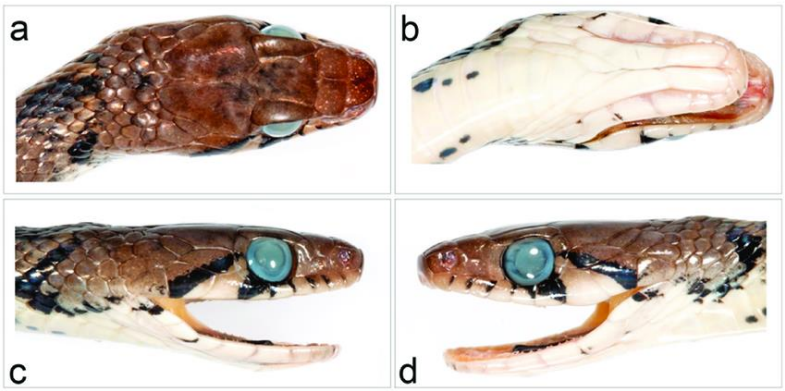
The latest report highlights inadequate funding for care and research. Addressing this requires not only increased financial support and expanded psychiatry residency programmers, but also establishment of positions for trained psychiatrists within institutions and district mental health programmers. Furthermore, ensuring an ample number of working psychologists is essential to effectively operate any mental health facility and reduce the treatment gap.



Sahyadriophis Uttaraghati

The new genus has been named Sahyadriophis, a combination of the Sanskrit word for the Western Ghats 'Sahyadri' and the Greek word for snakes 'Ophis'.

The snakes of this genus are mostly active during monsoons. They mostly feed on frogs and their eggs. "The snakes are extremely docile in nature and seldom bite when handled. The juveniles bear a big blotch or a collar mark on the nape, which distempers as the animal grows. The new species differs from its Southern counterpart, Sahyadriophis beddomei (beddome's Sahyadri keel back), in bearing a higher number of scales on the underside of the tail called subcaudals and a much longer tail.



Bidriware

Bidriware is a metal handicraft from the city of Bidar in Karnataka.

It was developed in the 14th century C.E. during the rule of the Bahmani Sultans.

The origin of bidriware is usually attributed to the Bahamani sultans who ruled Bidar in the 14th–15th centuries. Bidriware techniques and style are influenced by Persian art. It was first brought to India by noted Sufi Khwaja Moinuddin Hasan Chisti in the form of utensils. The art form developed in the kingdom was a mix of Turkish, Persian and Arabic influences which were intermingled with the local styles and thus a unique style of its own was born.

Gond painting

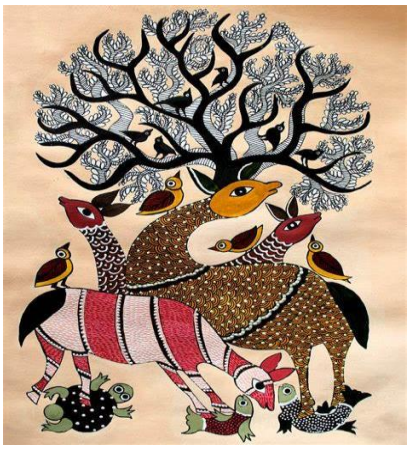
The famed Gond painting of Madhya Pradesh has recently received the prestigious Geographical Indication (GI) tag.

A geographical Indication (GI) tag is a sign used on products which have a specific geographical origin and possess qualities or a reputation that are due to that origin. It is used for industrial products, foodstuff, agriculture products, spirit drinks, and handicrafts. GI Tag ensures that no one other than the registered authorized user is allowed to use the name of the popular

product.

While Gond paintings are considered to be predominantly from Madhya Pradesh, it is also quite common in Andhra Pradesh, Maharashtra, Chhattisgarh and Odisha. Gond art has become so predominant that the Government of India has stepped in to preserve their art form for future generations to enjoy.

Gond paintings can best be described as 'on line work' that has an immediate effect on the viewer. Lines are used in such a way that it conveys a sense of movement to the still images. Dots and dashes are added to impart a greater sense of movement and increase the amount of detail. The artwork is finished in bright vivid colours.



National Mission for Clean Ganga (NMCG)

In the seven years since the government unveiled its ambitious ₹20,000-crore National Mission for Clean Ganga (NMCG), it has installed treatment plants capable of treating just 20% of the sewage estimated to be generated in the five major States that lie along the river

National Mission for Clean Ganga(NMCG) was registered as a society on 12th August 2011 under the Societies Registration Act 1860.

It acted as the implementation arm of National Ganga River Basin

Authority(NGRBA) which was constituted under the provisions of the Environment (Protection) Act (EPA),1986. NGRBA has since been dissolved with effect from the 7th October 2016,

The Act envisages five tier structure at national, state and district level to take measures for prevention, control and abatement of environmental pollution in river Ganga and to ensure continuous adequate flow of water so as to rejuvenate the river Ganga as below

1. National Ganga Council under chairmanship of Hon'ble Prime Minister of India.
2. Empowered Task Force (ETF) on river Ganga under chairmanship of Hon'ble Union Minister of Jal Shakti (Department of Water Resources, River Development and Ganga Rejuvenation).
3. National Mission for Clean Ganga(NMCG).
4. State Ganga Committees and
5. District Ganga Committees in every specified district abutting river Ganga and its tributaries in the states.

NMCG has a two tier management structure and comprises of Governing Council and Executive Committee.

Mitakshara coparcenary

Mitakshara coparcenary is one of the Hindu law schools that governs the succession of property in a Hindu family.

The Mitakshara school of thought holds that the son, grandson, and

grandson's son have a right to the family property through birth.

Whereas a combined Hindu family is an inescapable and basic idea in Hindu family law, which is today governed by the Hindu Succession Act of 1956. It is quite frequent in Hindu society.

For a Hindu, it is a never-ending process; if it is halted in one generation due to partition, it will re-emerge in the next.

This rule validates the premise that every Hindu family is a Joint Hindu family

Mitakshara Copercenery

The term 'Coparcenary' is used in Hindu succession law. It is a smaller division or organisation inside a Joint Hindu Family that only deals with property issues, specifically the coparcenary property of a Joint Hindu Family.

Mitakshara School

1. **Benaras School.**
2. **Mithila School.**
3. **Maharashtra School, and**
4. **Dravida School are some of the schools in Benaras.**

Fujiwhara effect

Identified by Sakuhei Fujiwhara, a Japanese meteorologist, this phenomenon first found mention in a paper published in 1921. Decades after the paper was published, it was observed for the first time over the western Pacific Ocean, when typhoons Marie and Kathy merged in 1964.

If one hurricane's intensity overpowers the other, then the smaller one will orbit it and eventually crash into its vortex to be absorbed. On the other hand, if two storms of similar strengths pass by each other, they may

gravitate towards each other until they reach a common center and merge, or merely spin each other around for a while before shooting off on their own paths. In rare instances, the two 'dancing' cyclones, if they are intense enough, may merge with one another, leading to the formation of a mega cyclone capable of wreaking havoc along coastlines.

Zika virus

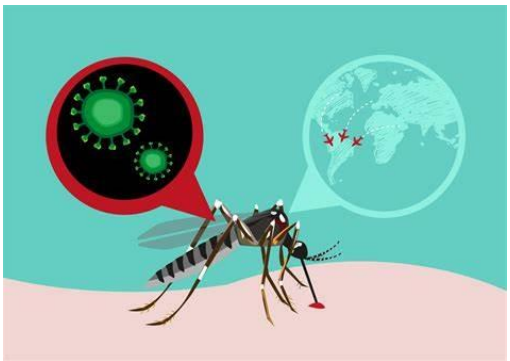
First detected in rhesus monkeys in the Zika forest in Uganda in 1947.

Zika virus is primarily a mosquito-borne illness, transmitted by the Aedes mosquitoes (which transmit chikungunya and dengue).

Most people do not develop any symptoms; however, a few may develop fever, rashes, redness in eye, muscle and joint pain, headache, and generalized fatigue.

The symptoms are very similar to other common viral illnesses.

There is no licensed vaccine to prevent disease and no specific treatment available. People are advised to take rest, eat well and drink plenty of fluids.



Svalbard Treaty

India's engagement with the Arctic can be traced to the signing of the Svalbard Treaty in February 1920 in Paris and India is undertaking several scientific studies and research in the Arctic region. This encompasses atmospheric, biological, marine, hydrological and glaciological studies. Apart from setting up a research station, Himadri, at Ny-Ålesund, Svalbard,

in 2008, the country launched its inaugural multi-sensor moored observatory and northernmost atmospheric laboratory in 2014 and 2016 respectively. Till last year, thirteen expeditions to the Arctic were successfully conducted. In May 2013, India became an observer-state of the Arctic Council along with five others including China.

The Northern Sea Route (NSR), the shortest shipping route for freight transportation between Europe and countries of the Asia-Pacific region, straddles four seas of the Arctic Ocean. Running to 5,600 km, the Route begins at the boundary between the Barents and the Kara seas (Kara Strait) and ends in the Bering Strait (Providential Bay).

A paper published on the website of the Arctic Institute in September 2011 states that "in theory, distance savings along the NSR can be as high as 50% compared to the currently used shipping lanes via Suez or Panama." The 2021 blockage of the Suez Canal, which forms part of the widely-used maritime route involving Europe and Asia, has led to greater attention on the NSR.

Old World monkey endemic

Also known as the wanderoo, is an Old World monkey endemic to the Western Ghats of South India.

They are named not for their mane, but for their tail, which is long, thin, and naked, with a lion-like, black tail tuft at the tip. The size of their tail is about 25 cm (9.8 in) in length.

Preeclampsia & biomarker

A liquid- biopsy approach that measures DNA-methylation levels in the blood may improve the detection of pregnancies at risk of developing preeclampsia at early stages.

Preeclampsia is a major cause of morbidities during gestation.

Early -onset preeclampsia occurring before 34 weeks of gestation is associated with a higher risk of severe disease and foetal mortality.

Preeclampsia is one high blood pressure (hypertension) disorder that can occur during pregnancy.

Among the few interventions available, low dose aspirin at early stages of the disease (before 16 weeks of gestation) can reduce the risk of developing preeclampsia, but early identification of the disease is needed to initiate this intervention.

Liquid biopsy is a promising emerging tool for non-invasive diagnostics, and it is increasingly being used to detect disease and monitor progression and treatment response

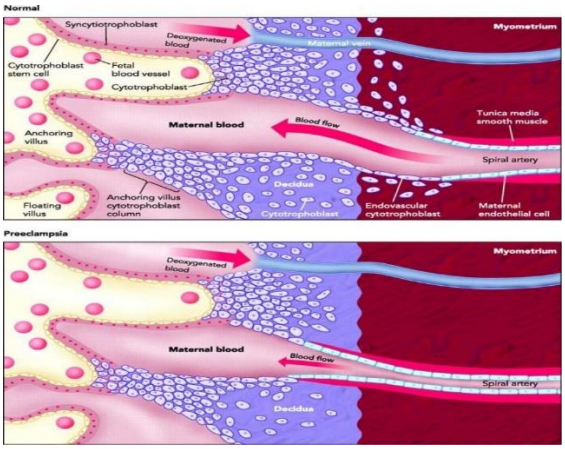
A liquid biopsy is a blood test that detects cancerous tumors. As a tumour grows, pieces can break off and circulate in your bloodstream.

What are biomarkers?

A biomarker is a biological characteristic of the body that can be objectively measured and quantified; essentially, any gene, molecule, or characteristic derived from tissues or bodily fluids, including blood. In oncology, biomarkers are abnormalities or mutations found in cancer cells.

What is biomarker testing?

A biomarker test is a biochemical measurement developed to measure one, or several, biomarkers for the screening, diagnosis and/ or prognosis of cancer patients. Testing patients for biomarkers is an essential pillar of precision medicine. In oncology, precision medicine is a treatment approach tailored specifically to certain biological features of different cancer tumours.



Genome Minimization

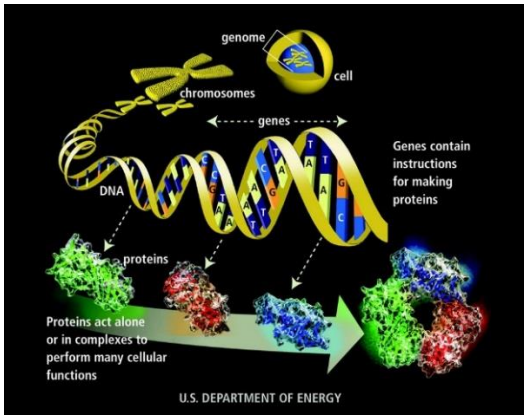
Round 5,000- 10,000 years ago, dairy farming changed some people's DNA. Drinking milk created an environment that favored the accumulation of beneficial mutations in a gene to help digest milk. Such mutations help an organism evolve. Complex organisms like humans contain thousands of genes, most of which are not essential for survival. Mutations in these genes are not lethal.

Evolutionary forces can act on these genes, and any beneficial mutation becomes more abundant over time.

Genome Minimization

The concept of a 'minimal genome' has appeared as an attempt to answer the question what the minimum number of genes or minimum amount of DNA to support life is.

Since bacteria are cells bearing the smallest genomes, it has been generally accepted that the minimal genome must belong to a bacterial species.

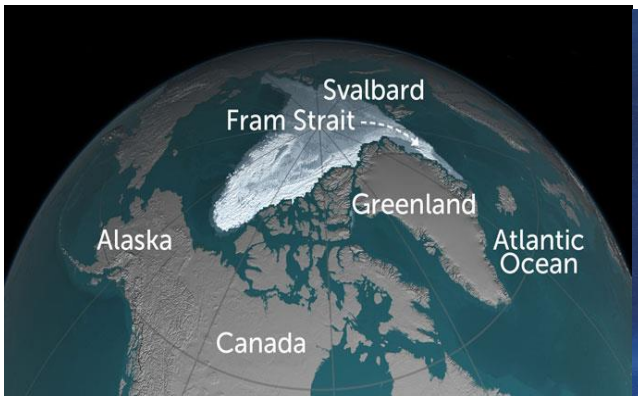


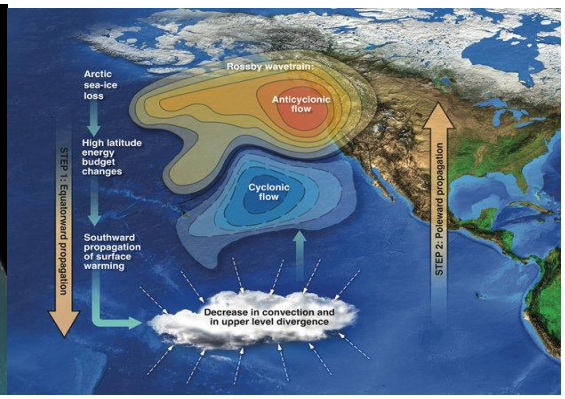
Atlantification

Warm waters from the Atlantic Ocean have been diverted into the Arctic Ocean in recent years, a phenomenon called "atlantification" that has disturbed ocean stratification in the Arctic and caused heat fluxes that help melt sea ice.

A study shows that the culprit is the Arctic Dipole.

This pattern, associated with anticyclonic winds over North America and cyclonic winds over Eurasia, affects the inflow of water from the North Atlantic through the Fram Strait.





The Arctic dipole anomaly is a pressure pattern characterized by high pressure on the arctic regions of North America and low pressure on those of Eurasia.

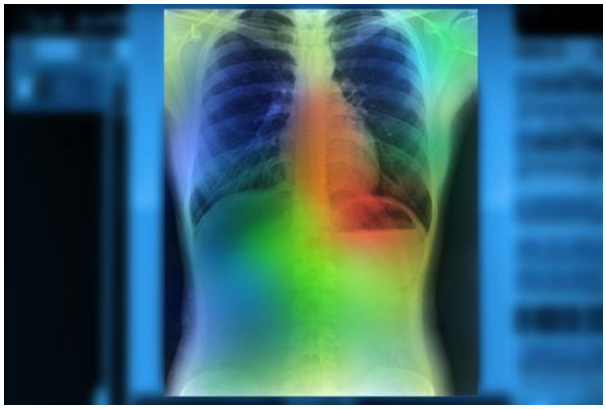
The Arctic dipole lets more southern winds into the Arctic Ocean resulting in more ice melting.

qXR

In AI -assisted chest X-rays, India has a powerful technology to screen for presumptive TB. The AI algorithm qXR, developed by Mumbai- based Qure.ai, can help detect people with presumptive TB early and in less than a minute.

The same neurons that help bats navigate through space may also help them navigate collective social environments (Nature).

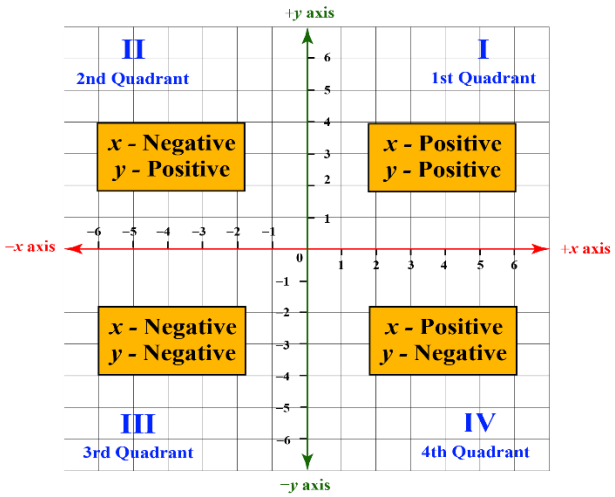
Many mammals, including bats and humans, are believed to navigate with the help of a brain structure called the hippocampus, which encodes a mental 'map' of familiar surroundings.



Cartesian coordinates

A coordinate system is a set of numbers that allows you to specify the location of a point in some space.

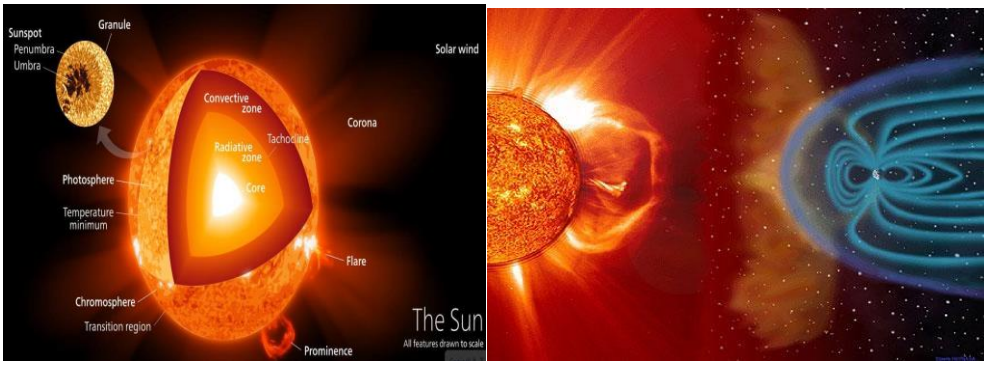
The Cartesian coordinates is one such system, which uses a set of three numbers to specify the distance of a point from three perpendicular planes. In general, this system uses N numbers if there are N perpendicular planes, including in higher dimensions.

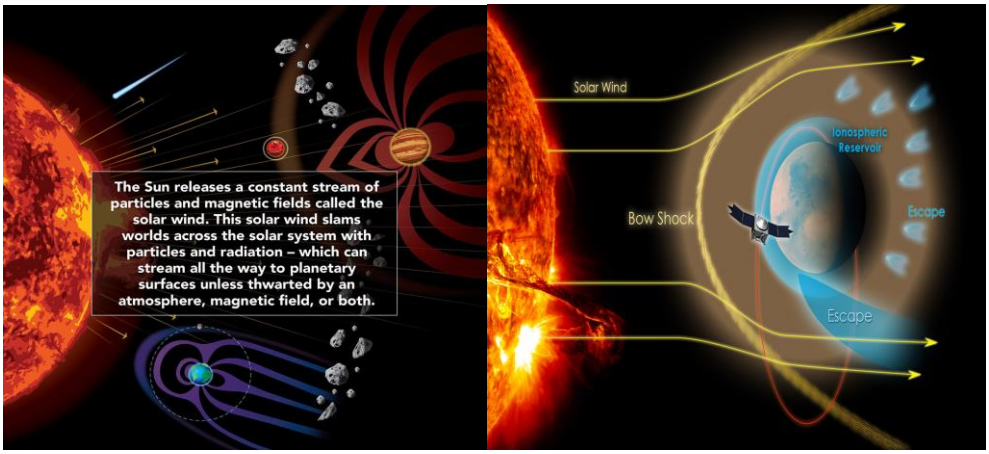


Alibey Dam

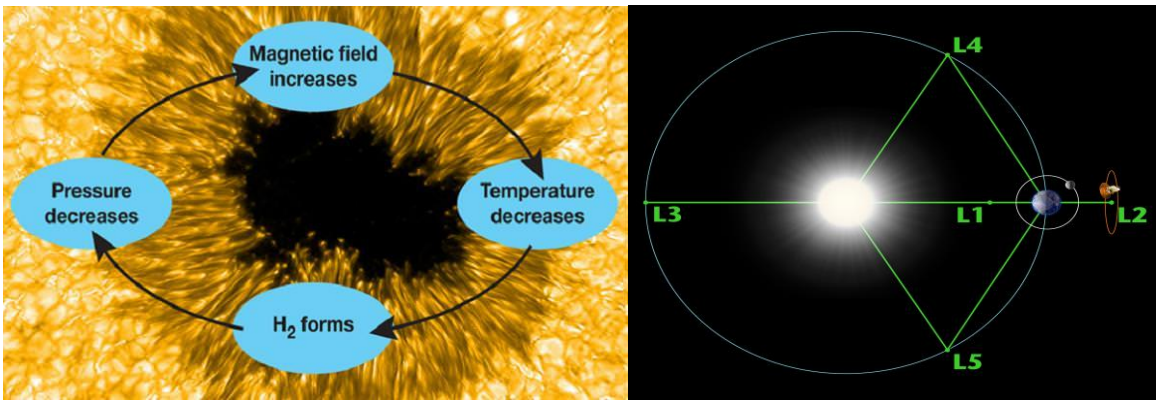
A dry reservoir behind the 16th century Guzelce aqueduct at the Alibey Dam in Istanbul on Saturday. Due to heatwaves and lack of rain this summer, drought conditions have set in. Istanbul's dams' occupancy rates have decreased by 28.65%. Increased temperatures have seen water consumption rise across the city

Aditya L1





A magnetic field is a vector field in the neighborhood of a magnet, electric current, or changing electric field in which magnetic forces are observable

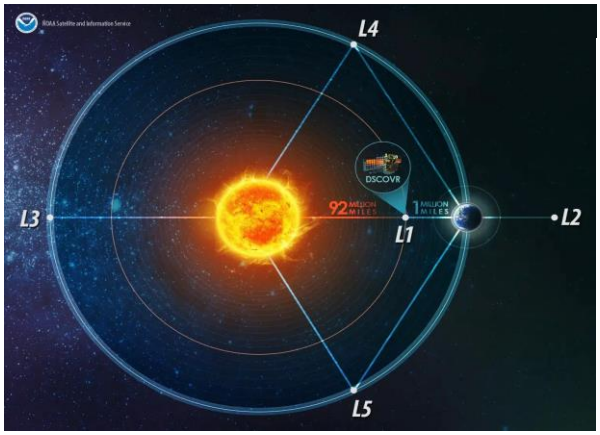


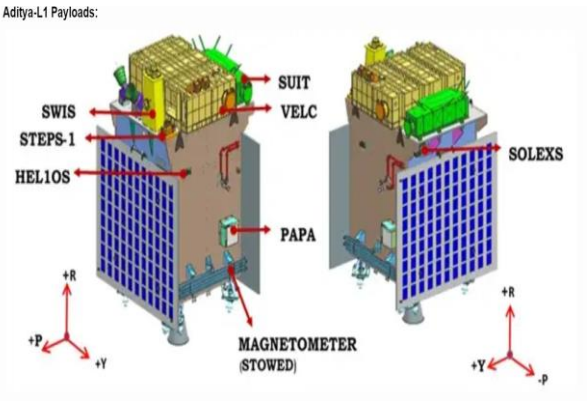
What is Lagrange points

Lagrange Points are positions in space where the gravitational forces of a two body system like the Sun and the Earth produce enhanced regions of attraction and repulsion.

These can be used by spacecraft to reduce fuel consumption needed to remain in position.

Lagrange points are named in honor of Italian-French mathematician Josephy-Louis Lagrange.





Aditya L1 will be ISRO's 2nd space-based astronomy mission after AstroSat, which was launched in 2015.

Aditya 1 was renamed as Aditya-L1. The Aditya 1 was meant to observe only the solar corona. Aditya L1 is the first space-based Indian mission to study the Sun from a halo orbit around the Lagrangian point 1 (L 1) of the Sun-Earth system. This mission with seven payloads on board to observe the photosphere, chromosphere and the outermost layers of the Sun (the corona) will provide greater advantage of observing the solar activities and its effect on space weather, according to officials of Indian Space Research Organisation (ISRO).

Type	Sl. No.	Payload	Capability
Remote Sensing Payloads	1	Visible Emission Line Coronagraph(VELC)	Corona/Imaging & Spectroscopy
	2	Solar Ultraviolet Imaging Telescope (SUIT)	Photosphere and Chromosphere Imaging- Narrow & Broadband
	3	Solar Low Energy X-ray Spectrometer (SoLEXS)	Soft X-ray spectrometer: Sun-as-a-star observation
	4	High Energy L1 Orbiting X-ray Spectrometer(HEL1OS)	Hard X-ray spectrometer: Sun-as-a-star observation
In-situ Payloads	5	Aditya Solar wind Particle Experiment(ASPEX)	Solar wind/Particle Analyzer Protons & Heavier Ions with directions
	6	Plasma Analyser Package For Aditya (PAPA)	Solar wind/Particle Analyzer Electrons & Heavier Ions with directions
	7	Advanced Tri-axial High Resolution Digital Magnetometers	In-situ magnetic field (Bx, By and Bz).

Big bang

The Big Bang Theory is the leading explanation for how the universe began.

Simply put, it says the universe as we know it started with an infinitely hot and dense single point that inflated and stretched first at unimaginable speeds, and then at a more measurable rate over the next 13.7 billion years to the still-expanding cosmos that we know today

Astronomers can, however, see the "echo" of the expansion through a phenomenon known as the cosmic microwave background.

What is CMB??

The cosmic microwave background (CMB) is leftover radiation from the Big Bang or the time when the universe began.

As the theory goes, when the universe was born it underwent rapid inflation, expansion and cooling.

(The universe is still expanding today, and the expansion rate appears different depending on where you look).

The CMB represents the heat leftover from the Big Bang.

What is the Hubble law??

Hubble's law, also known as the Hubble Lemaître law, is the observation in physical cosmology that galaxies are moving away from Earth at speeds proportional to their distance.

In other words, the farther they are, the faster they are moving away from Earth.

What is the Signal-to-noise ratio (SNR or S/N)?

Signal-to-noise ratio (SNR or S/N) is a measure used in science and engineering that compares the level of a desired signal to the level of background noise.

SNR is defined as the ratio of signal power to noise power, often expressed in decibels.

Vikram lander in sleep mode

After Chandrayaan 3's rover Pragyan, its lander, Vikram, has been put into sleep mode. The Indian Space Research Organisation (ISRO) on Monday said that it had put Vikram into sleep mode around 8 a.m.

Before sleep mode was activated, ChaSTE, RAMBHALP and ILSA payloads on the lander did in situ experiments at the new location

The ISRO had said that Vikram would fall asleep next to Pragyan once solar power was depleted and battery drained.

The agency was hoping that it would wake up Vikram and Pragyan on September 22.

The lander and the rover, with a mission life of one lunar day (14 earth days), have scientific payloads to carry out experiments on the lunar surface.

“The lander and the rover will stay on the moon for 14 days until they get sunlight,” ISRO Chairman S. Somanath had said earlier.

The solar panels on the lander and the rover have stored energy during the lunar day and will recharge their batteries.

Once the sun sets on the moon, temperature can plunge below minus-200 degrees Celsius.

Climate change and women

The effects of climate change vary according to location, socioeconomic status, and gender.

An International Labour Organization study (2019) said that “…in 2030, 2.2 percent of total working hours worldwide will be lost to high temperatures, a productivity loss equivalent to 80 million full- time jobs”.

The United Nations (2009) highlighted that across genders, women are considered to be highly vulnerable and disproportionately affected by climate change than men to the impact of climate change.

Women in developing and less developed countries (especially in low- income areas) are more vulnerable to climate change because of their dependence on natural resources and labour -intensive work for their livelihood.

Women are more likely to live in poverty than men,

Women from low-income households are more at risk because they are more responsible for food, water, and other homely unpaid work.

Due to the climate crisis, more time and effort are needed to obtain basic necessities.

Rural women often shoulder the burden of ensuring access to clean water, adequate cooking fuel, and nutritious food for their families. Women may be at increased risk for health and safety because they must travel long distances every day to collect water and fuel.

According to a UN study, most (80%) of those displaced by climate- related disasters are women and girls.

Women, especially those from vulnerable communities, face particular difficulties during and after natural disasters. When women are uprooted, they are more susceptible to prejudice and exploitation.

For instance, after the earthquake in Nepal in 2015, the United Nations Population Fund (UNFPA) found women were more exposed to trafficking and exploitation.

Women make up a disproportionately large portion of the agricultural workforce in emerging countries.

Climate change impacts agricultural productivity negatively and significantly. Heat stress affects workers a lot in this sector, especially in South Asia and Africa.

According to estimates, 130 million people could be pushed into poverty by 2050 due to climate change risks, natural disasters, and food inflation, impacting women’s inequality.

When it comes to adjusting to a changing climate, women have a lot to offer. Investments in women's education, training, and access to resources are essential if we are to be resilient to the impact of climate change.

Forest Act in north east

The Mizoram Assembly unanimously passed a resolution opposing the Forest (Conservation) Amendment Act, 2023, "to protect the rights and interest of the people of Mizoram".

The amendment allows the diversion of forest land for roads, railway lines or "strategic linear projects of national importance and concerning national security" within 100 km of India's international borders or lines of control, without a forest clearance under the Forest (Conservation) Act (FCA) 1980.
Most of India's Northeast falls in this 100 km range

Is FCA applicable to the Northeast?

Special constitutional protections, such as Article 371A for Nagaland and 371G for Mizoram, prohibit the application of any law enacted by Parliament that impinges on Naga and Mizo customary law and procedure, and ownership and transfer of land and its resources.
Such laws can be extended to these States only if their Legislative Assemblies decide thus in a resolution.
In 1986, Nagaland extended the application of the FCA "to government forests and such other forests and Wildlife Sanctuaries under the control of [the] State Government"
Mizoram in 1986, the Union Territory became a State with the 53rd amendment of the Constitution, adding Article 371G to the Constitution.
It stipulated that all Central Acts in force before 1986 are extended to the State, including the FCA.

What is RFA?

In 1996, the Supreme Court expanded the term "forest land" in the FCA in the Godavarman case to "not only include 'forest' as understood in the dictionary sense, but also any area recorded as forest in the Government **record irrespective** of the ownership", thus extending the FCA to unclassed forests.

These are recorded forests but not notified as forests. More than half of the Northeast is Recorded Forest Area (RFA). Of this, 53% are unclassed forests controlled by individuals, clans, village councils or communities, and governed by customary law and procedures. The remainder is notified forest controlled by State Forest Departments

What is the FRA Act?

In the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act (FRA) 2006, "forest land" includes unclassified forests, undemarcated forests, existing or deemed forests, protected forests, reserved forests, Sanctuaries and National Parks. This complied with the 1996 Supreme Court redefinition.

While this benefits most northeastern States, due to the sizeable unclassed forests, the FRA also included a specific provision in the list of rights: "rights which are recognized under any state law or laws of any autonomous district council or autonomous regional council or which are accepted as rights of tribal under any traditional or customary law of the concerned tribes of any State." Nothing prevents these States from taking suo motu cognizance of these existing rights and obtaining the concerned Gram Sabha approvals for issuing titles. The Ministry of Tribal Affairs can also issue legally enforceable directions under Section 12 of the FRA, paving the way for this. It would add another layer of legal security to traditional community tenurial rights over forests.

However, none of the Northeast States have implemented FRA except for Assam

and Tripura. The reasons include the FRA being ‘irrelevant’ as communities, clans, chiefs and individuals own most of the land, that their rights are already being enjoyed and a lack of forest -dwellers who are totally forest dependent.

How can forests then be protected?

The Environment Ministry mandated FRA implementation and prior informed consent of the Gram Sabha in 2009 to admit a forest diversion proposal.

The responsibility was delegated to the District Collector, who ironically also headed the District Committee that issues FRA titles.

The Collectors’ certificate of FRA compliance in the in principle Stage I forest clearance was shifted to Stage II final clearance.

But the Ministry’s 2022 Forest Conservation Rules eliminated compliance with the FRA before final approval altogether.

Instead, it said that State governments “shall issue order for diversion, assignment of lease or DE reservation as the case may be after fulfillment and compliance” with the FRA “including ensuring settlement of rights”. Taking this further, States can formulate and take legal measures to ensure mandatory fulfillment of the FRA before recommending a forest diversion proposal, and ensuring Gram Sabha consent before handing over forest land.

The Ministry of Tribal Affairs can also issue legally enforceable directions under the FRA, or even enact a separate law, to recognize and settle forest rights when forests are diverted for other purposes and forest -dwellers are relocated, as forest rights fall squarely within its Business Rules.

Vaccine diplomacy

Vaccine diplomacy, a form of medical diplomacy, is the use of vaccines to improve a country's diplomatic relationship and influence of other countries.

Meanwhile, vaccine diplomacy also "means a set of diplomatic measures taken

to ensure access to the best practices in the development of potential vaccines, to enhance bilateral and/or multilateral cooperation between countries in conducting joint R&D, and, in the case of the announcement of production, to ensure the signing of a contract for the purchase of the vaccine at the shortest term."

Ecocide

Ecocide thus: "Extensive loss, damage to or destruction of ecosystems such that the peaceful enjoyment by the inhabitants has been or will be severely diminished."

Here, "inhabitants" applies to all living creatures.

There is no accepted legal definition of ecocide, but a panel of lawyers in June 2021 for the Stop Ecocide Foundation prepared a 165-word articulation.

Schizostachyum andamanicum

The patent office of the Government of India has granted a patent to the Botanical Survey of India for 'reusable straw and its manufacturing'.

The straw is developed from a species of endemic bamboo plant which is found on the Andaman and Nicobar Islands.

The bamboo species Schizostachyum andamanicum was discovered on the island about three decades ago and now its economic potential has got a new boost with this patent.

A rare flesh-eating bacteria.

Those with underlying health conditions such as liver disease, diabetes and immunocompromising conditions are at higher risk of wound infection.

Vibrio Vulnificus eats away at the skin, muscles, nerves, fat and blood vessels around an infected wound. In severe cases, it can lead to septicemia, which is when the bacteria enter the bloodstream. It results in a septic shock, where blood pressure drops dangerously. Additionally, the bacteria can also cause sepsis, in which the body develops a strong immunity that results in shut down of organs like the heart or kidneys.

The bacteria have developed a resistance to microbes, and about 50% of infections do not respond to antibiotics anymore. For people with wound infections, there is a 25% fatality rate and if the infection moves into the bloodstream, the consequences are reported to be fatal.

Atom

Around 150 years ago, three scientists named Ernest Rutherford, Hans Geiger, and Ernest Marsden exposed a thin gold foil to radiation. Based on how the rays were deflected by atoms in the foil, they figured out that every atom has a dense center where its mass and positive charge are concentrated.

Seventy years ago, Robert Hofstadter led a team that bombarded electrons at thin foils.

The higher energy of the electrons allowed them to 'probe' the nucleus. Based on these interactions, the team understood how charges and magnetic fields were arranged inside a nucleus

The previous experiments used thin foils that were easy to hold. The new one is more sophisticated, using an apparatus to hold the nuclei of caesium-137 atoms as well as make sure electrons could interact with them, using a system called SCRIT

'Self- Confining Radioactive Isotope Ion Target.

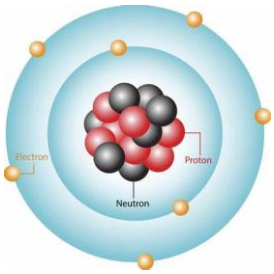
Physicists have encountered many properties of atoms that emerge from quirks in their nuclei. One example is the 'island of stability'. Usually, the heavier the nucleus of an unstable element, the faster it will decay via radioactivity.

But scientists have found some isotopes that decay slower than their 'heaviness' would suggest.

Atoms with the same number of protons but different numbers of neutrons are called isotopes. They share almost the same chemical properties, but differ in mass and therefore in physical properties.

When they plotted a graph with the number of protons on one axis and the number of neutrons on the other, they found that the nuclei of most isotopes lay along a straight line. But they also noticed some isotopes clustered around where the number of protons was 112.This cluster is called the island of

stability because these nuclei are unusually more stable. This proton number has become known as the 'magic number'



Fujianvenator prodigious

About 148 to 150 million years ago, a strange pheasant sized and bird-like dinosaur with elongated legs and arms built much like wings inhabited southeastern China, with a puzzling anatomy suggesting it either was a fast runner or lived a lifestyle like a modern wading bird.

Scientists said on Wednesday they have unearthed in Fujian Province the fossil of a Jurassic Period dinosaur they named Fujianvenator prodigious - a creature that sheds light on a critical evolutionary stage in the origin of birds.

Malnutrition

Mid- day -meals in their schools and people receive monthly rations through an ever improving Public Distribution System.

Ready -to -eat packets and hot meals are served to mothers and children at Anganwadi Centers (AWCs), under the Prime Minister's Overarching

Scheme for Holistic Nourishment (POSHAN) Abhiyaan.

Further, various add-ons such as egg, banana, protein powders, peanut chikki and jaggery are also being distributed under various special State Specific schemes, an example being the Mukhyamantri Suposhan Yojana in Chhattisgarh. But, nutrition security is still a distant dream.

It is important to note that "Jan Andolan", or social and behaviour change communication (SBCC), has been a facet of POSHAN Abhiyaan.

This includes bicycle rallies, plantation of Poshan Vatikas, celebration of Poshan Maah, Poshan Pakhwaras and Godh Bharaais.

Potth Laika Abhiyaan which means "Healthy Child Mission" (literal translation) in the Chhattisgarhi language is a nutrition counselling programme that is being implemented in 72 of the most affected AWCs in the Bemetara sub-division of Bemetara district.

It has the technical support of UNICEF, Chhattisgarh.

Global boiling

According to UN Secretary-general António Guterres, the earth has entered the era of global boiling. Scorching heat waves, devastating floods and erratic weather patterns are stark reminders for an urgent need to address the triple -planetary crisis of biodiversity loss, climate change and pollution. The world is not just grappling with climate change, but also with another silent killer air pollution.

Global health statistics reveal a disturbing scenario with lung cancer claiming 10 million deaths worldwide in 2020, as stated in the World Health Organization (WHO) factsheet published in 2023.

This could soar by another 3.2 million by 2050 according to a report.

UNESCO's initiatives to combat air pollution include implementing an internal carbon tax on all flight tickets, and investing in emission reduction measures. The World Air Quality Project allows residents to make informed

decisions by real time Air Quality data.

What is the heat index?

Heat index, also known as apparent temperature, is a measure of how the temperature feels to humans.

Relative humidity is an important factor that determines heat index, along with air temperature.

How is the heat index calculated?

A complex formula to calculate heat index was published by Dr. Robert Steadman, a professor in the textiles and clothing department of Colorado State University, in 1979

Dew point, which is the temperature at which gas is transformed into a liquid state, is an important factor in the calculation of heat index. In terms of atmospheric moisture, it's the temperature at which air cannot hold any more water vapour, and droplets of water begin to form.

Is it important to measure the heat index?

Hot air can hold more moisture than cold air. Therefore, when temperature rises, the air's capacity to hold moisture also increases, thus affecting the apparent temperature or heat index.

Humidity is typically higher during heat waves which is why the heat index at the time is usually higher than just the temperature because humid air can feel hotter to humans.

Armoured recovery vehicle (ARV)

The Army is seeking to procure 170 Armoured Recovery Vehicles on tracked platforms for both deserts and plains along the country's western borders as well as in high-altitude and mountainous terrains at eastern Ladakh or north Sikkim.

At present, the Army operates the BEML-built vehicles which are based on the Russian-made T-72 tank hulls. During operations under hostile conditions, these vehicles help the repair and recovery capabilities of its armoured fighting vehicles.

The first such center will be established in Delhi Cantonment soon.

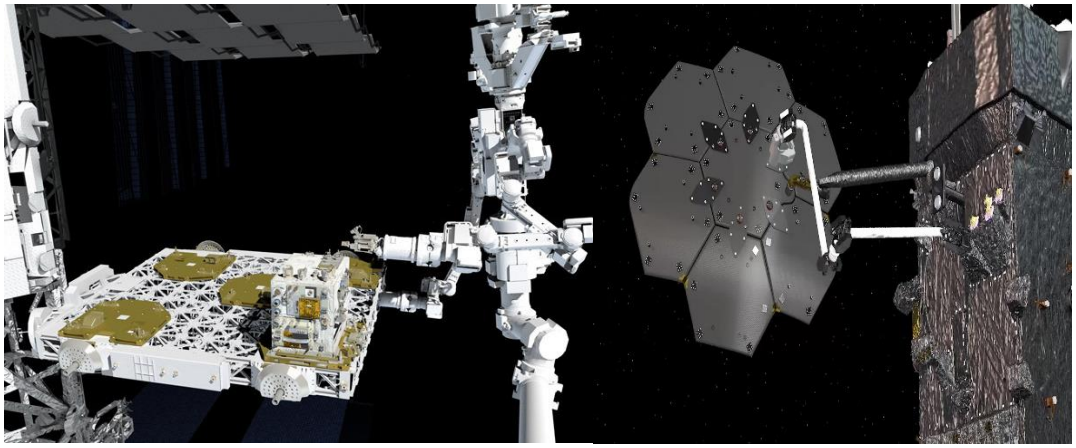
NAMAN

The Directorate of Indian Army Veterans (Adjutant General Branch) of the Indian Army signed an MoU with HDFC Bank Limited and CSE e-Governance India Limited for Project 'NAMAN'- an ode to the veterans.

NASA robotic spacecraft

It is a NASA robotic spacecraft currently orbiting the Moon in an eccentric polar mapping orbit. Data collected by LRO have been described as essential for planning NASA's future human and robotic missions to the Moon. Its detailed mapping program is identifying safe landing sites, locating potential resources on the Moon, characterizing the radiation environment, and demonstrating new technologies.

LRO and LCROSS were launched as part of the United States's Vision for Space Exploration program. In Phase II of the Project, 13 more centres will be established at various military stations across India.



Chandrayaan

There are four important phases before the touchdown on the moon the rough braking phase, the attitude- hold (orientation) phase, the fine braking phase, and the landing phase. During the rough braking phase, the velocity of the lander was successfully reduced to a maximum.

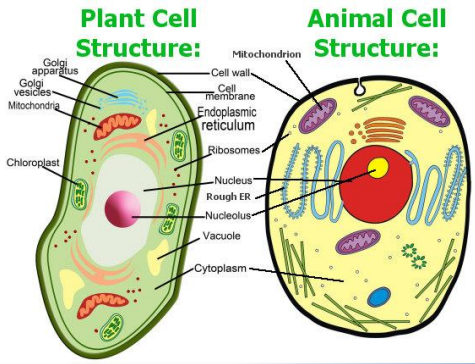
The problem with the touchdown began when the Vikram lander entered the second phase, the attitude -hold (orientation) phase. During this phase, the thrust had to be maintained at half the level. "But when the engines were commanded to provide half the thrust, the achieved thrust was more than half.

Hunga Tonga–Hunga Ha'apai volcano

In 2022, the eruption of the submerged Hunga Tonga–Hunga Ha'apai volcano triggered a fast- moving and destructive underwater debris flow that severed telecommunication cables. A new study shows that the rock and ash ejected during the Hunga eruption collapsed vertically and directly into the ocean and travelled as an extremely fast- moving and highly destructive underwater debris flow.

Plant and animal body size

A global analysis of plant and animal communities spanning six taxon groups reveals varied yet prevailing decreases in body size across the Anthropocene. Previous research has suggested that anthropogenic changes to the biosphere are driving many organismal communities to become smaller. The study analysed body size trends in diverse plant and animal communities using a large dataset and discovered that decreases in body size.



Orphan disease

The most common definition of a rare disease is a prevalence rate of one case in a population of 10,000 people. The term orphan disease is apt for many reasons.

Rarity made them difficult to diagnose, because young medical practitioners may not have seen even one case. A good example is DART, the Dystrophy Annihilation Research Trust, a body formed by parents of patients suffering from Duchenne's muscular dystrophy

With an incidence rate of 0.45 per 10,000 populations, leprosy is now considered a rare disease in India. But much remains to be done to restrict the spread of this disease. Leprosy is a good example of how research on orphan diseases can have societal benefits.

Sea level rise

The study predicted higher global temperatures will provoke sea level rises that will lead to instability and profound changes to coastal ecosystems.

Mangroves and tidal marshes act as a buffer between the ocean and the land and absorb the impact of wave action, prevent erosion and are crucial for biodiversity of fisheries and coastal plants. Under worst- case scenarios, these coastal habitats, buffeted by rising sea levels, will shrink and, in some cases, wash away, as they have in the distant past.

E waste

The Indian Cellular and Electronics Association (ICEA) on August 28 released a report on 'Pathways to Circular Economy in Indian Electronics Sector,' following a government effort with NITI Aayog to explore opportunities to harness e-waste.

The report talks about changing the outlook one waste management to build a system where discarded electronics can have a new life, either by themselves, or by reintroducing components and precious metals into new hardware. There could be an additional $7 billion market opportunity in harnessing e waste

Does India have e--waste management?

E--waste management is largely informal in India, as in the case of recycling.

"Roughly 90% of collection and 70% of the recycling are managed by a very competitive informal sector," the ICEA report says. The informal sector is good at salvaging older devices for parts and profiting from repairs with them.

Then there are almost industrial hubs like Moradabad, where printed circuit boards (PCBs) arrive in the tonnes to have gold and silver melted out of them and sold. The Union Government notified the E- Waste (Management) Rules, 2022 last November in order to digitize the process and provide more visibility to the movement of e -waste in the economy.

The level of e--waste may grow, too, as phones get cheaper and people use them more on the back of cheaper data plans.

The report's authors speak of 'cannibalization,' a euphemism for repair shops buying whole devices and breaking them down to serve as spare parts for repair.

How can e--waste be recycled?

The ICEA report suggests public- private partnerships to distribute the costs of setting up a sprawling "reverse supply chain," an expensive prospect that envisages collecting devices from users, wiping them clean of personal data,

and passing them along for further processing and recycling.

It also suggests launching an auditable database of materials collected through this process, and creating geographical clusters where these devices come together and are broken apart.

A key recommendation is to incentivize so--called 'high yield' recycling centres.

What are the challenges?

Beyond the large informal sector that is hard to track or hold to environmental norms, there are basic challenges. Building recycling plants on a large scale also requires more than the initial capital costs.

Making a circular economy out of e--waste is tempting, especially given the unpredictable supply chains for electronics components.

G20

With all eyes on the New Delhi declaration issued at the end of the summit.

While India took presidency of the G-20 with what seemed to be insurmountable odds, a global economic crisis spurred by the COVID-19 pandemic,

The Ukraine conflict in its second year with more entrenched positions between the Western alliance and the Russia China combine, as well as growing geo-political tensions in the Indo-Pacific,

Its biggest challenge has been ensuring a moment of truce that would allow for a joint communique to be agreed upon at the summit.

What are the takeaways from the summit?

The final 83-paragraph declaration, with eight paragraphs on "geopolitical

issues", on which consensus was reached included language on everything from climate action, financing, and fossil fuel phase-out, to debt restructuring, the biofuel alliance, health, digital infrastructure, regulating crypto currency and other issues.

Bringing the African Union into the G-20 fold will be credited to India, and future summits in Brazil and South Africa are likely to take India's Global South initiative forward.

On the sidelines of the summit, all eyes are on the possibility of reviving the Black Sea Grain Initiative for Russia and Ukraine, which found a mention in the G-20 declaration, as also the multi-billion mega infrastructure project from Saudi Arabia and the UAE to Europe, quarter backed by the U.S. and India.

What does the G-20 mean for India?

The G-20 in Delhi has also made its mark in terms of the Indian initiative to bring on board the "Voice of the Global South", ensuring that more than 125 countries of the developing world raised their concerns at a "feeder conference" in January 2023, that were included in the declaration.

Inducting the African Union at the summit, a proposal by the grouping of 55 African countries, endorsed by Mr. Modi, is also a feather in India's cap.

The move helps tilt the balance within the G-20 away from the Power-11 of geopolitical powers, the G-7 (Canada, France, Germany, Italy, Japan, the U.K. and the U.S.), U.S. allies Australia and South Korea, the European Union and the Russia and China combine to the Developing -10 (Argentina, Brazil, India, Indonesia, South Korea, Mexico, Saudi Arabia, South Africa, Turkey and the African Union), who make up the rest of the members.,

Finally, the moment is significant for India because of the government's push to

popularize and “democratize” the G-20 within India, inviting about 1,00,000 delegates from over 125 countries to about 200 meetings in more than 60 Indian cities to partake in the event.

Storm-0558

In July, Microsoft said that a China- based hacking group breached U.S. government -linked email accounts.

The company said the group identified as Storm-0558, gained access to email accounts of 25 organizations, including Western European government agencies, email accounts from top American officials such as Commerce Secretary Gina Raimondo, U.S. Ambassador to China Nicholas Burns, and Assistant Secretary of State for East Asia Daniel Kritenbrink

What is Storm-0558?

Microsoft Threat Intelligence “with moderate confidence” assessed that Storm-0558 is a China-based threat actor with activities and methods consistent with espionage objectives.

The group is thought to operate as its own distinct group and its core working hours are consistent with working hours in China, Microsoft said in a blog post.

Legalise cannabis (hemp) cultivation

With the Himachal Pradesh government taking steps to legalise cannabis (hemp) cultivation in the State, growers are upbeat and optimistic about getting an economic boost

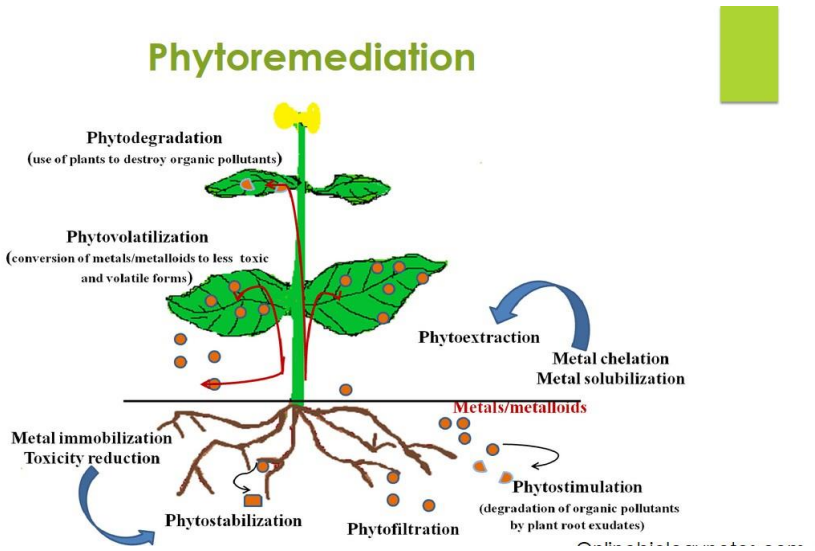
Hemp is a botanical class of Cannabis sativa cultivars grown specifically for industrial or medicinal use.

It is produced in parts of Himachal Pradesh, though it is illegal under the Narcotic Drugs and Psychotropic Substances (NDPS) Act, 1985.

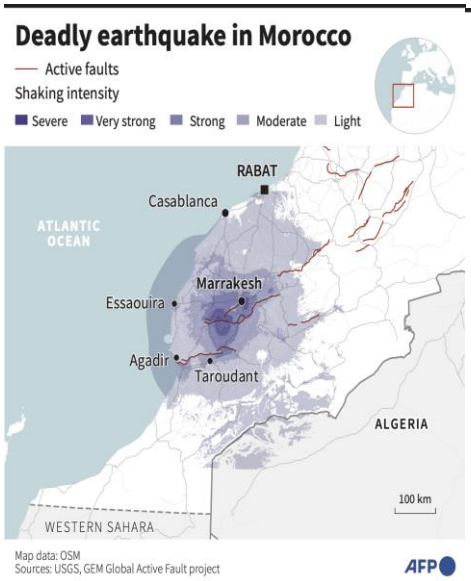
Section 10 (a) (iii) of the Act empowers the States to make rules regarding the cultivation of any cannabis plant, production, possession, transport, consumption, use and purchase and sale, and consumption of cannabis (except charas).

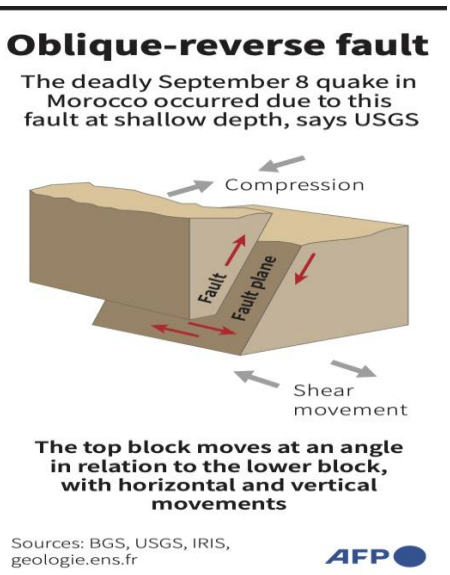
The States are empowered to permit, by general or special order, the cultivation of hemp only for obtaining fiber or seeds or for horticultural purposes.

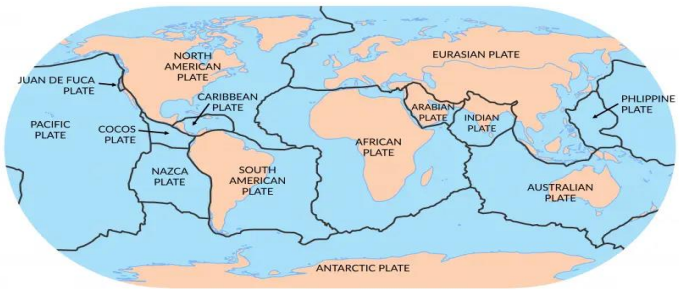
Cannabis has been growing in Himachal Pradesh for decades, and those in favour of its cultivation point out that hemp has multiple uses ranging from phytoremediation, fiber cloth manufacturing, medicinal use, and use in the pulp and paper industry.



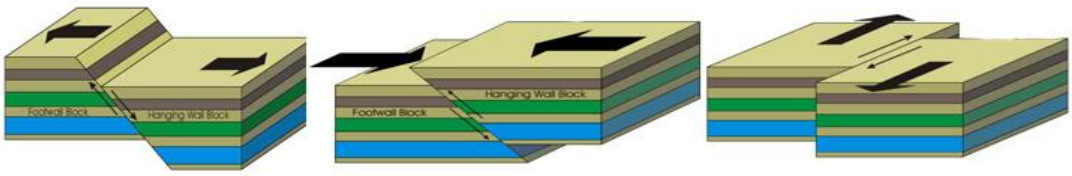
Deadly Earthquake in Morocco





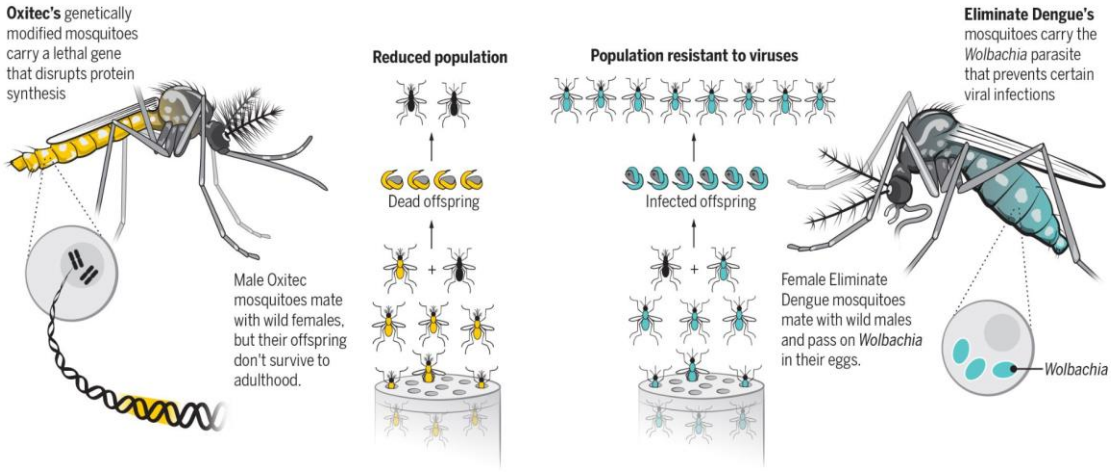


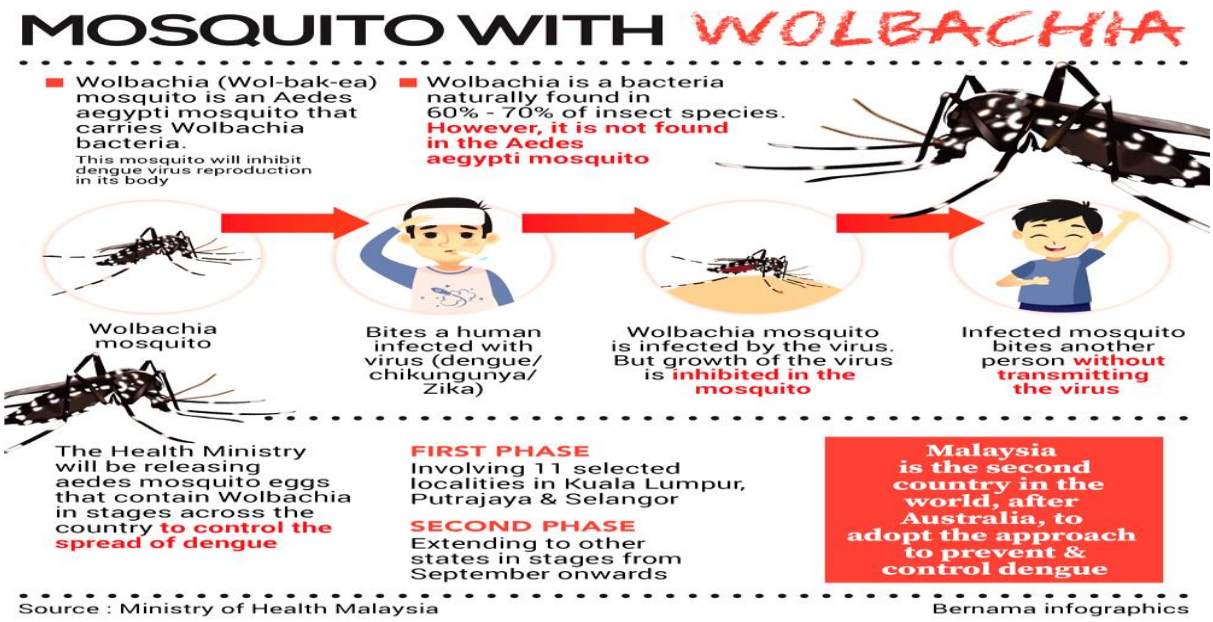
What are the three main types of faults?



Normal fault Reverse fault Strike-slip fault

Genetic Engineered Mosquitoes





The rapid urbanization of the world's populations has led to annual surges in mosquito- borne illnesses like dengue.

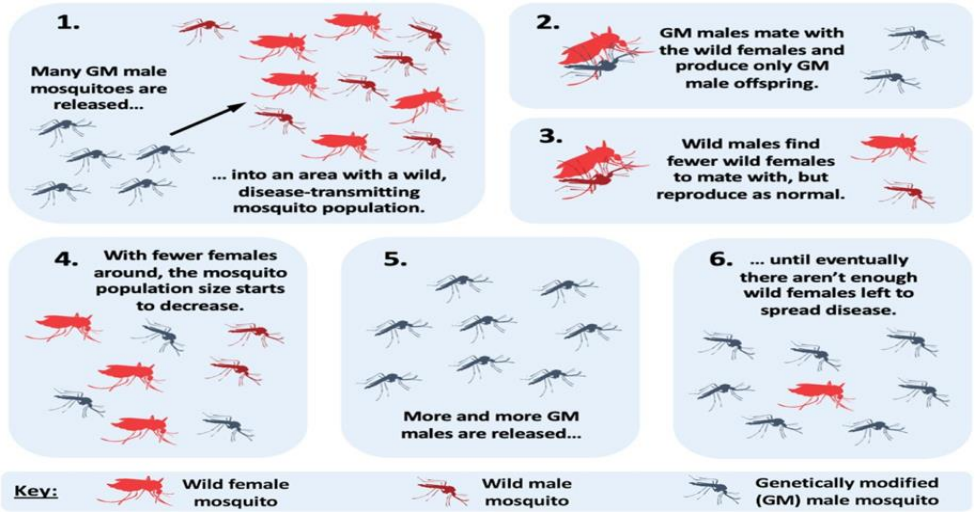
These have expanded into new territories. A notable example is the indigenous cases of dengue in France in recent years Gene drive technology was conceived by Austin Burt, professor at Imperial College London, in a 2003 paper published in Royal Society Proceedings.

A protein cuts the mosquito's DNA at a part that doesn't encode a particular sequence in the genome.

This triggers a natural mechanism in the cell containing the DNA to repair it and forces the cell to incorporate a sequence, called the drive sequence, into the damaged portion

In 2020 a genetically modified mosquito called OX5034 was released in counties in Florida and Texas.

Genetically modified male OX5034 mosquitoes mated with female mosquitoes but the self-limiting gene prevented female off spring from surviving. Male mosquitoes would then disappear from the environment after around a dozen generations



Crown shyness

Sometimes, the canopy of trees in a forest suggests that the treetops are locked together in a mosaic of leaves separated by thin grooves of sky.

This slender separation is called crown shyness a phenomenon common in temperate deciduous forests, where the trees vary in age and species.

Crown shyness is also primarily observed in certain species, including eucalyptus, pine, and oak.

This natural phenomenon intrigued scientists for a long time; its precise

cause remains a mystery.

There are several hypotheses

One is that crown shyness is an adaptive mechanism to reduce trees' competition for sunlight, water, and nutrients.

Another is that the physical gap could be a way to stop the spread of disease.

Yet another is that the rubbing of leaves and branches against each other on windy days prevents growth and stops the treetops from overlapping.

Shanti Swarup Bhatnagar (SSB) awards

After nearly a year's delay, the Council of Scientific and Industrial Research (CSIR) has published the list of winners of the Shanti Swarup Bhatnagar (SSB) awards for 2022, considered among the prestigious prizes for science in India.

The Shanti Swarup Bhatnagar (SSB) Prize, instituted in the memory of the first Director- General (D-G) of the Council of Scientific and Industrial Research (CSIR), is usually announced on the foundation day of the institution on September 26.

Reciprocity

What is reciprocity?

Simply put, the principle asserts that if a signal can be transmitted from Point A (the source) to Point B (the destination), the same signal can also be transmitted from Point B to Point A, simply by exchanging the positions of the source and the destination

A variety of applications Scientists and engineers have discovered more exciting applications of this principle.

Consider antennas, like the dish shaped ones used to receive signals for your television, or those erected on Wi-Fi routers and radio sets, or discreetly packed into the body of a smartphone.

Antennas can both send and pick up signals in the form of electromagnetic energy.

Pico flare

Researchers studying the findings of the Solar Orbiter Aircraft, a joint mission by the European Space Agency and the U.S. space agency NASA, recently announced that they had detected small jets of charged particles that were being expelled in intermittent fashion from the outer regions of the sun's outer atmosphere.

According to the researchers, these 'Pico flare jets' could be a source of the solar wind, which have important effects on the solar system at large as well as on the earth's magnetic field. A solar wind is a high-speed stream of charged particles from the sun, but their exact origin remains unclear.

Scientists only know that coronal holes are source regions for the solar wind. Coronal holes are transient parts of the sun's corona, or the outermost portion of

its atmosphere, where the atmosphere is relative less dense and cooler, and from where the sun's magnetic field extends into space

The researchers observed the relatively small Pico flare jets within emissions from the coronal hole that they were observing.

While they lasted only a few dozen seconds, the researchers calculated that they contained enough energy to power a nontrivial fraction of the solar wind. 'Pico' is an order of magnitude that denotes 10^-12, or one trillionth of a unit

The researchers named these jets from the sun thus because they carried approximately one- trillionth as much energy as the largest flares that the sun is believed to be able to produce, according to the researchers.

The discovery is notable because while strong gusts of the solar wind produce beautiful aurorae over the high latitudes of different planets, they also set off a cascade of effects that disrupt the earth's magnetic field and damaging electronics in satellites in space and in circuits on the ground.

Food insecurity

The 'State of Food Security and Nutrition in the World' of the Food and Agriculture Organization (FAO) estimates the proportion of the population across countries unable to afford a healthy diet (reported in this newspaper on August 31, 2023, under a data point).

The figure for India in 2021 is devastating to note an estimated 74% of the population cannot afford a healthy diet.

Given a population of 1,400 million, this makes for approximately one billion Indians.

A shrinking ability of households to finance their food requirement is evident also in studies undertaken in India itself.

To have engineered the Green Revolution in India at a time when it was a desperately poor country challenged by having to ensure food security to a staggeringly large number is perhaps more significant.

With hindsight, we can see that mistakes were made, among them the rampant use of chemical fertilizer, fuelled by subsidy, which degraded the soil.

There was also the reliance on procurement prices rather than productivity increase to ensure farm incomes, which fuelled inflation.

We also see that the policy was almost exclusively focused on cereals rather than pulses, the main source of protein for most Indians.

The first Green Revolution had a specific agenda of making India self-sufficient in food.

Yield increasing interventions on the farm are needed to at least contain the cost of production, if not to actually lower it.

Agricultural yield is lower in India than in East Asia, pointing to the potential for an increase.

It has been pointed out for some time that increased public expenditure on irrigation is not reflected in an increase in irrigated area whether due to waste or the diversion of funds has not been established.

The ongoing fragmentation of already small land holdings lowers the capacity for productivity -enhancing capital investment, for which leasing is a solution.

India’s network of public agricultural research institutes needs to be energized to resume the sterling role they had played in the 1960s.

Finally, extension has now more or less vanished from where once the gram sevak was a familiar figure in the village, playing a crucial role in the dissemination of best practices. It must be revived.

Nechiphu tunnel

Defense Minister Rajnath Singh on Tuesday virtually laid the foundation stone for the Nyoma airfield in eastern Ladakh near the Line of Actual Control (LAC)

and also inaugurated the crucial Nechiphu tunnel on the axis to Tawang in Arunachal Pradesh

This is a 500-metre-long tunnel that is "D-shaped" and will have a single tube double lane on the Balipara-Chariduar-Tawang (BCT) Road, West Kameng District, Arunachal Pradesh. This tunnel is being built by BRO under Project Vartak

Nipah virus

Nipah virus (NiV) is a zoonotic virus (it is transmitted from animals to humans) and can also be transmitted through contaminated food or directly between people.

In infected people, it causes a range of illnesses from asymptomatic (subclinical) infection to acute respiratory illness and fatal encephalitis.

The virus can also cause severe disease in animals such as pigs, resulting in significant economic losses for farmers.

Nipah virus was first recognized in 1999 during an outbreak among pig farmers in Malaysia.

Fruit bats of the family *Pteropodidae, particularly* species belonging to the *Pteropus* genus are the natural hosts for Nipah virus. There is no apparent disease in fruit bats.

It is assumed that the geographic distribution of Pteropus bats is from Australia, Bangladesh, Cambodia, China, India, Indonesia, Madagascar, Malaysia, Papua New Guinea, Thailand and Timor-Leste.

Outbreaks of the Nipah virus in pigs and other domestic animals such as horses, goats, sheep, cats and dogs were first reported during the initial Malaysian outbreak in 1999.

Oil Sardines

Oil sardines are a great source of the fatty acids, which play a crucial role in maintaining human health.

Indian oil sardine is a vital fisheries resource in the Indian subcontinent, contributing substantially, approximately 10%, to the total marine fisheries industry in India. One of the findings of the study is that Indian oil sardines exist in two highly distinct stocks, one in the Indian waters and another in the Gulf of Oman.

The Indian oil sardine (Sardinella longiceps) is a species of ray-finned fish in the genus Sardinella. It is one of the two most important commercial fishes in India (with the mackerel). The Indian oil sardine is one of the more regionally limited species of Sardinella and can be found in the northern regions of the Indian Ocean. These fish feed on phytoplankton (diatoms) and zooplankton (copepods).

Aditya L1

On September 2 this year, the Indian Space Research Organisation (ISRO) launched the Aditya-L1 satellite, its first space mission to explore the activities of the sun.

After swinging by the earth a few times in increasingly distant orbits, the

spacecraft will be boosted towards Lagrange point L1, a strategic location in space about 1.5 million km from the earth.

From here, a spacecraft can continuously observe the sun and monitor the changing local environment, or space weather, just before the earth experiences it giving us critical tens of minutes of advance warning.

The sun is a massive ball of fiery plasma. Energy is generated by nuclear fusion at its core, where temperatures are as high as 15 million degrees Celsius and the density more than 20-times that of iron.

From the center to the surface of the sun, the temperature drops and energy flows outwards.

Inside the sun, the temperature is high enough that atoms are broken up into negatively charged electrons and positively charged ions the state of matter called plasma

Below the sun's surface lies the convection zone, where heated plasma rises and radiates its energy as sunlight upon reaching the surface. The light from the sun that reaches us sustains life and drives atmospheric processes that govern the earth's climate.

After the solar plasma radiates its energy away from the surface, it cools and sinks back down, much like cyclonic convection in the earth's atmosphere.

This twisting, churning motion of plasma within the sun creates vast electric currents and, as a by-product, powerful magnetic fields.

This process, known as the solar dynamo, generates dark, earth -sized blotches on the sun's surface known as sunspots, and magnetic loops that rise up like giant arches threading the star's outer atmosphere, the corona.

While the sun's visible surface, or photosphere, is only about 6,000 degrees Celsius hot, the temperature in the sun's corona rises to a million degrees.

How does it get so hot in apparent contradiction to the laws of thermodynamics, which state that heat energy can only flow from a region of higher to lower temperature. Superhot plasma jets rising from the surface to coronal layers, and a process known as magnetic reconnection, are at the heart of coronal heating.

The hot magnetic corona of the sun is also responsible for the supersonic outflow of plasma wind that bathes all planets in the solar system and forms the background space weather

The energy released in such a solar storm heats the solar atmosphere even further, generating intense X Ray radiation and accelerating charged particles to a nontrivial fraction of the speed of light.

The most energetic events can hurl magnetized coronal plasma material into outer space at speeds exceeding a few million kilometers an hour, giving rise to a coronal mass ejection, a space storm that, when directed at the earth, severely perturbs our own space environment.

Impact

Severe space weather can give rise to geomagnetic storms that create beautiful aurorae on the one hand and cause power -grid failures in high- latitude regions, disrupt communications and GPS navigational networks, affect air -traffic over polar routes, and jam radar signals on the other.

They can fry sensitive electronics of satellites and sometimes precipitate catastrophic orbital decays, as in the loss of the Star link satellites in 2022

ISRO's Aditya-L1 mission will explore how magnetic fields result in variations in the sun's ultraviolet radiation, which plays a critical role in governing the

earth’s atmosphere and climate dynamics.

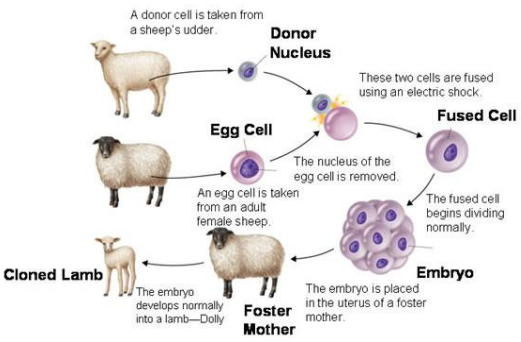
It will observe the flow of energy in the sun’s outer atmosphere to test competing theories for the heating of the sun’s corona. By analyzing X Ray radiation, it will seek to understand how violent solar storms are born.

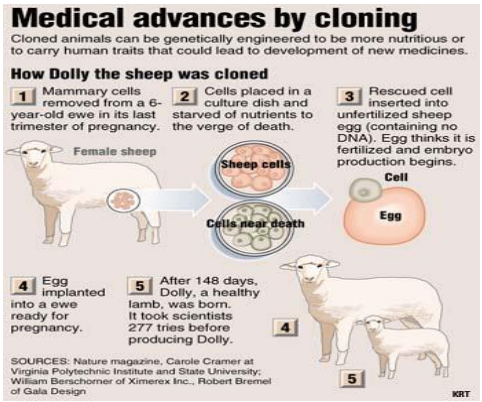
Dolly

Ian Wilmut, the cloning pioneer whose work was critical to the creation of Dolly the Sheep in 1996, has died, the University of Edinburgh in Scotland said on September 11.

He was 79. Wilmut set off a global discussion about the ethics of cloning when he announced that his team at the university's Roslin Institute for animal biosciences had cloned a lamb using the nucleus of a cell from an adult sheep.

Initially referred to as “6LL3” in the academic paper describing the work, the lamb was later named Dolly, after the singer Dolly Parton





Biofuel sustainability

In India, biofuel is synonymous with first- generation (1G) ethanol, which is primarily sourced from food crops.

The policy target in India of achieving 20% ethanol blending with petrol (E20) by 2025-26 is expected to be met almost entirely by 1G ethanol made from sugar

cane and food grains.

Second- generation (2G) ethanol, which is made from crop wastes and residues, is unlikely to contribute much to achieving this target due to several challenges related to feedstock supply chain and scaling up.

The groundwater depletion implications of growing sugar cane are well known, but the food security implications of groundwater depletion and of using food grains for ethanol production are harder to imagine because India is currently a surplus food producer.

But there are several reasons why diverting the surplus produce towards energy or specifically growing a crop for energy may not be a sustainable strategy.

First, India's crop yields have already stagnated, and global warming is expected to reduce yields, which means that the same area under cultivation (arable land) will produce less with time but will need to suffice for a growing population.

So, our strategy to meet blending targets cannot depend on surplus crop production. Second, a recent study led by the University of Michigan projected that the rates of groundwater depletion could triple during 2040-81 compared with the current rate. This is again attributable to temperature rise and the resultant increase in crop water requirement

Third, the agriculture sector is one of the hardest -to- abate in terms of direct greenhouse gas (GHG) emissions.

So, increasing GHG emissions from this sector for motor fuel production in order to decrease GHG emissions from the transport sector is an unnecessary balancing loop that would achieve little net benefit

'Sustainable' biofuels are produced from crop residues and other wastes, with low water and GHG footprint.

The Global Biofuels Alliance that was formed at the G-20 Summit in New Delhi last week is expected to strengthen the development of sustainable biofuels, in addition to promoting ethanol uptake

The Energy Transitions Commission, in its report on 'Bio resources within a

Net-Zero Emissions Economy', recommended that biomass should be prioritized for use in sectors where there are limited low carbon alternatives

According to the International Energy Agency, to achieve NetZero emissions by 2050 globally, sustainable biofuel production needs to triple by 2030 to fuel modes that have few other mitigation options.

Although 1G ethanol is unlikely to fit the bill, 2G ethanol could be counted as a sustainable fuel, especially if the production is decentralized, i.e., crop residues do not have to be transported large distances to a central manufacturing plant.

Floodplain

As the World Health Organization stated, "Floods are increasing in frequency and intensity, and the frequency and intensity of extreme precipitation is expected to continue to increase due to climate change

As per the Geological Survey of India, over 40 million hectares, which is nearly 12% of the total land area of India, is prone to floods.

The severity and frequency of floods has especially affected our cities, where there is little effort made in maintaining natural topography.

Cities expand fast and mostly in a haphazard manner, which makes them vulnerable to disasters.

Flooding affects the economy too. Indian cities are projected to contribute to 75% of the GDP by 2030. India primarily relies on the Disaster Management Act, 2005, and the rules made in pursuance of the Act, to deal with flood management While the protection strategy includes technical measures such as the laying of dikes, temporary flood defense walls, and polders, the key elements of the management strategy are retention of water and restoration of floodplains.

A 2018 report of the Comptroller and Auditor General of India attributed encroachments in the floodplains of the rivers of Tamil Nadu and the failure to act on them as the prime reason for the Chennai floods of 2015.Uttarakhand has

been neglecting eco-sensitive floodplains by allowing the construction of guest houses and hotels on the riverfront to promote tourism and boost its economy.
In the wake of the massive floods in 2013, the National Green Tribunal virtually barred construction of buildings 200 m along the banks of the Ganga, in a 2015 directive.

Global stock take report

Ahead of the just concluded G-20 summit, that saw several world leaders converge in New Delhi, the United Nations climate secretariat made public a 'synthesis report' on the results of three meetings held so far to discuss progress achieved by countries in achieving the goals of the Paris Agreement of 2015.

What does the report say?

The 45-page report lays out 17 'key findings' that overall suggests that the world is not on track to achieve Paris Agreement targets, though there was still a "rapidly narrowing" window for countries to get their act together
The United Nations Emissions Gap Report, also released last year, reported that 23 billion tonnes of CO2 were required to be cut to keep emissions in line with Paris agreements, whereas current pledges by countries even if fully implemented would only cut 2-3 billion tonnes, leaving an emissions gap of around 20 billion tonnes.
This too has been highlighted in the latest synthesis report.

What are the 'key findings'?

These 17 headline statements say that the Paris Agreement has galvanized countries into setting goals and signalling the urgency of the climate crisis.
Governments need to support ways to transition their economies away from fossil fuel businesses and that states and communities must strengthen efforts. While

rapid change could be “disruptive,” countries should work on ensuring that the economic transition be equitable and inclusive.

It stated that much more ambition was needed to reduce global greenhouse gas emissions by 43% by 2030 and further by 60% in 2035 and reach net zero CO2 emissions by 2050 globally.

Renewable energy has to be scaled up and all ‘unabated fossil fuels’ (for example, coal plants without carbon capture and storage mechanisms) were to be rapidly eliminated.

Deforestation and land degradation have to be halted and reversed and agricultural practices critical to reducing emissions and conserving and enhancing carbon sinks have to be encouraged.

While the world, as a whole, has committed to scale up steps to help adapt to the unfolding and future impacts of climate change, most efforts were “fragmented, incremental, sector specific and unequally distributed across regions.”

Averting, minimizing and addressing ‘loss and damage,’ requires urgent action across climate and development policies to manage risks comprehensively and provide support to impacted communities

Access to climate finance in developing countries needed to be enhanced.

It was “essential” to unlock and redeploy trillions of dollars to meet global investment needs, including by rapidly shifting finance flows globally to support a pathway towards low GHG emissions and climate- resilient development.

Renewable energy

The presidency of the 28th Conference of Parties (COP28) of the United Nations Framework Convention on Climate Change (UNFCCC), to be held in Dubai (November 30-December 12), has called for agreement on a global target of tripling renewable energy capacity from current levels by 2030.

In 2021, the global installed capacity of renewable energy sources (RES) for electricity generation was 3026 Gigawatts (GW), or 39% of the total capacity from all sources. In total electricity generation however, the contribution by RES was only 28%.

More than half the RE generation was from hydropower, while solar (13%) and wind (23%) accounted for about 36% of RE generation, that is 10% of generation from all sources.

Tripling RE capacity by 2030 implies a target of about 9000 GW, which is more than the total installed capacity from all sources in 2021, adding about 6000 GW of RE capacity between 2022 and 2030.

Most of this capacity is expected to come from solar and wind, as the time for construction and operationalization of any hydro plants, will typically exceed the timeline of 2030 being considered

Electricity consumption between 2010 and 2019 in China and India grew annually at 6.6% and 6.3%, respectively. Currently, only 21% of the electricity in the U.S., and 37% in the EU comes from RES (including hydro and biomass).

Developing countries at COP28, especially India, should consider the tripling global RE capacity target only if the North commits to absolute targets domestically, that are equitable and commensurate with their responsibility, in an update of their Nationally Determined Contributions under the Paris Agreement.

Libya flood

WHAT CAUSED THE FLOOD?

After pummeling other Mediterranean countries, the powerful Storm Daniel swept into Libya at the weekend, unleashing record amounts of rain as it made

landfall. The rain dumped by the storm filled a normally dry riverbed, or wadi, in the hills south of Derna. The pressure was too much for two dams built to protect the city from floods. They collapsed, unleashing a torrent that ran through the city.

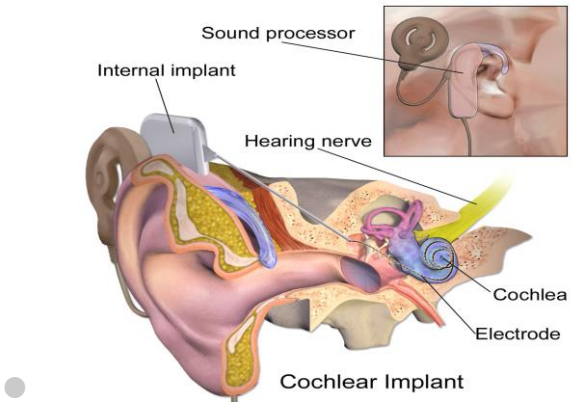
Cochlear implants (CI)

The World Health Organisation reports that severe to profound hearing loss affects nearly 2 - 3 per 1000 live births, making it the most common congenital abnormality to affect newborns the world over.

Cochlear implants (CI) can help deafened individuals living in a world of silence enter the world of sound. CIs help augment or restore hearing by integrating an external circuitry with the peripheral hearing apparatus and the central circuitry of the brain.

Gene therapy for hearing impairment may become available. A novel imaging technique synchrotron radiation phase- contrast imaging to look into the interior of the cochlea in unprecedented detail will result in an improved understanding of the microanatomy of the ear and improve management of hearing loss.

Artificial intelligence is also playing an important role in improving patient outcomes.

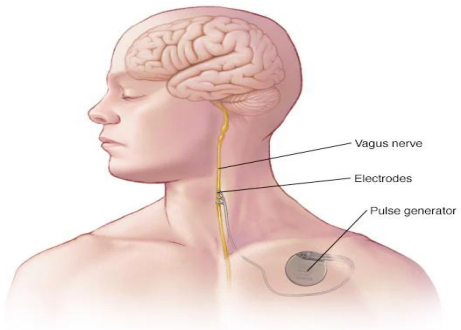


Vagus nerve

Vagus nerve: ways to stimulate it and possible benefits of this stimulation to help with health problems from anxiety to obesity

What is the vagus nerve?

They’re actually a pair of nerves, one on each side, that run from your brainstem, through the neck, to your chest and stomach.



They form a key part of the parasympathetic nervous system, the system that is responsible for relaxing and resting your body after a bout of activity and for a number of vital functions including your heart rate, blood pressure and digestion; it also plays a role in the immune system.

Nipah virus

Nipah virus (NiV) is a zoonotic virus, meaning that it can spread between animals and people.

Fruit bats, also called flying foxes, are the animal reservoir for NiV in nature. Nipah virus is also known to cause illness in pigs and people. Infection with NiV is associated with encephalitis (swelling of the brain) and can cause mild to severe illness and even death. Outbreaks occur almost annually in parts of Asia, primarily Bangladesh and India.

Nipah virus infection can be prevented by avoiding exposure to sick pigs and bats in areas where the virus is present, and not drinking raw date palm sap which can be contaminated by an infected bat.
Nipah virus (NiV) was first discovered in 1999 following an outbreak of disease in pigs and people in Malaysia and Singapore.

NiV is a member of the family *Paramyxoviridae*, genus *Henipavirus*. It is a zoonotic virus, meaning that it initially spreads between animals and people.

The animal host reservoir for NiV is the fruit bat (genus *Pteropus*), also known as the flying fox. Given that NiV is genetically related to Hendra virus, another henipavirus known to be carried by bats,

Currently there are no licensed treatments available for Nipah virus (NiV) infection. Treatment is limited to supportive care, including rest, hydration, and treatment of symptoms as they occur.

GM CROPS

In order to increase food production and become self-- reliant, we require superior crop varieties and hybrids that provide enhanced yields and wide adaptability across environments, and require fewer inputs of natural resource

Genetic modification of crops using the available and vast genetic diversity in conjunction with traditional farming has been well documented for increased productivity, contributing to global food, feed, and fibre security.

According to a report by the International Service for the Acquisition of Agri-biotech Applications (ISAAA) 2020, a total of 72 countries have adopted GM crops either as human food or animal feed, as well as for commercial cultivation (56% of the global GM crop area is in developing countries compared to 44% in industrial countries).

GM crops have benefited more than 1.95 billion people in five countries (Argentina, Brazil, Canada, India and the United States) or 26% of the current world population of 7.6 billion

Globally, genetic modification has expanded its reach, beyond the major four crops, maize, soybean, cotton and canola, to other economically important food crops for various traits such as insect and herbicide resistance, climate resilience and nutritional quality improvement

In the edible oil deficit, a focus on mustard India faces a major deficit in edible oils, with 60% of its demand being met by imports.

Mustard is one of the most important edible oil crops in India; however, its per hectare yield is very low when compared to the global average.

Thus, increasing the productivity of mustard in the country is vital for the economic well-being of farmers and self--sufficiency in edible oil production.

Using genetic engineering, extensive research has been carried out at the Centre for Genetic Manipulation of Crop Plants (CGMCP), University of Delhi South Campus, to create a GM mustard hybrid, DMH-11 with higher vigour and yield this will facilitate an increase in domestic production of edible oils as well as enhanced farm incomes

The GM mustard hybrid is based on the barnase/barstar system, which works on the principle of removing male fertility in one parent and restoring it in the

offspring. The herbicide tolerance gene has been deployed as a selection marker for developing the GM mustard.

While the use of herbicides in herbicide tolerant (HT) crops has an advantage in terms of saving soil moisture and nutrients, besides effective weed control, the herbicide tolerance gene in GM mustard is primarily used for selecting genetically transformed lines, and for hybrid seed production.

On October 25, 2022, the Genetic Engineering Appraisal Committee (GEAC) of the Ministry of Environment, Forest and Climate Change Government of India, made a landmark decision of approving the release of DMH-11 and its parental line for cultivation.

This will help boost the vibrant genetic engineering research sector in the country and enable the generation of new crop varieties with improved traits.

Bumblebee

More than 75% of European bumblebee species may be threatened in the next 40-60 years according to worst- case -scenario projections of bumblebee populations, according to a paper published in Nature.

Degradation of habitats and alterations of climate due to human activity are identified as key drivers of these estimated population declines

Around 38--76% of European bumblebee species currently considered as non-threatened are projected to see their ecologically suitable territory shrink by at least 30% by 2061--2080

A bumblebee (or bumble bee, bumble-bee, or humble-bee) is any of over 250 species in the genus *Bombus*, part of Apidae, one of the bee families.

This genus is the only extant group in the tribe Bombini, though a few extinct

related genera are known from fossils.

They are found primarily in higher altitudes or latitudes in the Northern Hemisphere, although they are also found in South America, where a few lowland tropical species have been identified. European bumblebees have also been introduced to New Zealand and Tasmania.

Female bumblebees can sting repeatedly, but generally ignore humans and other animals.

Songbird species

Vocal learning complexity, or the ability to imitate sounds, is associated with better problem -solving abilities and larger brains in songbird species, a study found.

Whether vocal learning complexity was linked with such cognitive phenotypes was previously unknown.

Complex vocal learning is a crucial component of human spoken language and has been assumed to be associated with advanced cognitive abilities

Some evidence suggests that songbirds evolved 50 million years ago in the part of Gondwana that later became India, Sri Lanka, Australia, New Zealand, New Guinea and Antarctica, before spreading around the world

Neural network

A new neural network system enabled autonomous drones to race at velocities of up to 108 km per hour, beating counterparts piloted by competitive human drone racers on the same aerial racetrack

The work emphasises the value of reinforcement learning as a training method over other optimal control methods, which researchers considered just as useful for agile autonomous flight.

What is a neural network?

A neural network is a method in artificial intelligence that teaches computers to process data in a way that is inspired by the human brain.

It is a type of machine learning process, called deep learning, that uses interconnected nodes or neurons in a layered structure that resembles the human brain.

What is reinforcement learning?

Reinforcement learning is a machine learning training method based on rewarding desired behaviours and punishing undesired ones.

In general, a reinforcement learning agent, the entity being trained, is able to perceive and interpret its environment, take actions and learn through trial and error.

Micro flier

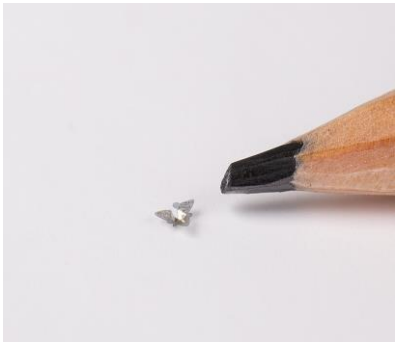
A new design for solar- powered, origami- based micro fliers robotic designs that float like seeds supports more effective collection and transmission of environmental data.

In outdoor tests, these micro fliers dynamically changed shape after dropping from drones, gliding and gathering details about air pressure and temperature during their descent.

THE MICROFLIER IS ABOUT THE SIZE OF A GRAIN OF SAND

Researchers at Northwestern university have developed a winged microchip which is the smallest-ever human-made flying structure. comparable in size to a grain of sand, the new flying microchip or *microflier* doesn't use a motor or engine to fly, instead it references a maple tree's propeller seed and catches flight on the wind by spinning like a helicopter.

The microflier's aerodynamics ensure that once the chip has been dropped at a high elevation, it will fall at a slow velocity in a controlled manner.



Nutrition and B

A 2022 study noted that 45% of people in India are undernourished, accounting for nearly 1.2 million TB cases each year.

Yet, nutrition support became a part of the national TB programme only in April 2018 when Nikshay Poshan Yojana, a direct benefit transfer (DBT) scheme for nutritional support to TB patients was launched. Under this programme, ₹500 per month is credited into the account of a person with TB for the duration of treatment.

In September 2022, India launched another nutrition support programme called Nikshay Mitra to consented TB patients. And in 2022, Tamil Nadu became the first and only State to launch the Differentiated TB Care programme to reduce the mortality rate among TB patients. Severe undernutrition is one of the three parameters used for triaging TB patients at the time of diagnosis.

Biofuel alliance

The grouping, called the Global Biofuels Alliance (GBA) would attempt to bring countries together to co-develop, accelerate technological advances in production processes, and advocate for the use of biofuels particularly in the transport sector.

The three founding members, India, the U.S. and Brazil, were joined by Argentina, Canada, Italy and South Africa, who are also G-20 member countries.

What are biofuels?

The International Energy Agency (IEA) defines biofuels as "liquid fuels derived from biomass and used as an alternative to fossil fuel based liquid transportation fuels such as gasoline, diesel and aviation fuels."

Derived from crops grown specifically to produce biofuels such as sugarcane, corn, or soybean, and the latter is from agricultural waste, used cooking oil and processed animal residues like fats.

The former is colloquially referred to as 1G ethanol, or first -generation biofuel, and the latter as 2G, that is second -generation.

Why is there a renewed focus on biofuels?

With severe disruptions to global crude oil supplies following the Ukraine

war, several countries have been scrambling to find alternatives to the import dependence on petrol and diesel.

India, for instance, imports 87% of its crude oil, and it is the main reserve currency expenditure for the country.

With transport accounting for about one--quarter of global carbon emissions, there have been renewed attempts to accelerate the decarbonizing of this sector, with several countries announcing battery production and electric vehicle (EV) policies and legacy automakers entering the now thriving EV sector.

But some modes of transport like aviation, shipping and long- haul trucking will find it harder to reduce carbon emissions than, say, self-driving cars or motorbikes.

It is here that some experts feel that 2G ethanol could be a valuable substitute.

Do biofuels aid energy transition?

2G ethanol would soften the impending disruption.

It would do so by allowing to reduce greenhouse gas (GHG) emissions even while stretching the life of internal combustion engines, giving time for automakers to develop robust alternatives, while increasing farmers' incomes and providing jobs.

In line with the renewed push to enhance biofuel use and production, the U.S. announced its latest amended "Renewable Fuel Standard" to substantially increase the production of biofuels and substitute about 1,40,000 barrels per day of crude oil imports by 2025.

Similarly, India had announced the setting up of 12 new refineries as early as 2018 with the aim to meet 20% ethanol blending by 2025.

This becomes even more significant following India's announcement to become net zero (removing as much carbon from the atmosphere as human

activity emits) by 2070.

The IEA predicts that about two- thirds of the global biofuel demand will come from three emerging economies India, Brazil and Indonesia, and that they have "ample domestic feed stocks, additional production capacity, relatively low production costs and a package of policies they can leverage to increase demand.

Cheetah

Why have African cheetahs been introduced in India?

The goal of the introduction of African cheetahs is to "establish viable cheetah metapopulational in India that allows the cheetah to perform its functional role as a top predator and provides space for the expansion of the cheetah within its historical range thereby contributing to its global conservation efforts

Why did the cheetahs die?

The first cheetah which died is said to have perished due to a renal condition.

Three of the four cubs born in India are reported to have died due to heatwave condition**.** What has been the impact of the project on the conservation of other endangered species?

Unfortunately, the very high-profile cheetah project has definitely distracted attention and probably also diverted financial resources from much needed conservation projects like the ones for the Great Indian Bustard and the translocation of Asiatic lions, to mention a few. Project Cheetah has also been called upon as a means to save grasslands and other open natural ecosystems.

Cat and birds

Pet cats hunt birds the most, followed by reptiles, insects, rodents, and amphibians. While dogs also harm wildlife, cats have retained the instinct to hunt through many years of domestication, even if they don't need the skill anymore Dealing with the cat problem has spiralled into a vicious debate in the West. Animal welfare groups usually advocate the 'trap-neuter- return' policy. This is considered humane because it could improve the quality of a cat's life as well The 'State of Indian Birds 2023' is unambiguous in concluding that India's bird diversity is in peril and ecologists have called for more attempts to quantify risks posed by various threats, including cats.

OTT and TSPs

The Telecom Regulatory Authority of India (TRAI) invited responses to a consultation paper it released on a regulatory mechanism for over-the-top (OTT) communication services.

What is the conflct between TSPs and OTTs?

Telecom Service Providers are of the opinion that OTTs should be regulated and

charged because they use and thrive on the infrastructure built by operators over the years. Currently, they aren't.

"OTT communications services have led to erosion of revenues for the telcos. These platforms offer users an array of services, sending of Multimedia Messaging Services (MMS), instant messaging to voice and video calls, delivered over the internet.

This circumvents the need for traditional telecom services, particularly voice calls and text messages, leading to a significant reduction in the revenue streams of telecom companies.

OTT communication service providers neither contribute to the exchequer nor make investments like the TSPs in the spread of network infrastructure in the country.

The OTT communication service providers take a free ride on TSP funded networks without contributing to the setting up and maintaining digital infrastructure for access networks."

What is the demand?

"There should be a policy framework to enable fair share contribution from large OTT service providers to telecommunication network operators based on assessable criteria like number of subscribers or data usage. To ensure fairness and compensate for the increased data demands, it is justifiable for OTTs to pay a fair and reasonable fair share charge to TSPs.

Santiniketan

Santiniketan, a town established by Nobel laureate Rabindranath Tagore, made it to the UNESCO's World Heritage List on Sunday.

Located in West Bengal's Birbhum district, Santiniketan, which means "abode of peace", started taking shape in 1901 and is the place where Tagore laid the foundations of Visva-Bharati University.

Island of Lampedusa

European Commission President Ursu- la von der Leyen visited the Italian island of Lampedusa, which is struggling with a surge in migrant arrivals, and promised a 10-point EU action plan to help Italy deal with the situation.

Lampedusa is one of the Pelagie Islands, in the Mediterranean Sea, southern Italy. It’s known for its beaches, including the Spiaggia dei Conigli, with shallow waters and colorful marine life.

Environmental humanities

The Environmental Humanities is a multidisciplinary field where we study the History, Literature, Philosophy, and Anthropology of environmental problems, such as climate change.

The environmental humanities (also ecological humanities) is an interdisciplinary area of research, drawing on the many environmental sub-disciplines that have emerged in the humanities over the past several decades, in particular environmental literature, environmental philosophy, environmental history, science and technology studies, environmental anthropology, and environmental communication.

Environmental humanities employ humanistic questions about meaning, culture, values, ethics, and responsibilities to address pressing environmental problems

The Hard Sciences

Sciences that explore the workings of the natural world are usually called hard sciences, or natural sciences. They include

Physics, Chemistry, Biology

The Soft Sciences

In general, the soft sciences deal with intangibles and relate to the study of human and animal behaviours, interactions, thoughts, and feelings.

- Psychology
- Sociology

Science awards

The Union government is set to institute the Rashtriya Vigyan Puraskar 56 prizes

to felicitate scientists, technologists and innovators.

Akin to the prestigious Padma awards, these awards will not include any cash component; instead, they will likely bestow a certificate and a medallion on the awardee,

These prizes will be awarded annually for physics, chemistry, biological sciences, mathematics and computer science, earth science, medicine, engineering science, agricultural science, environmental science, technology and innovation, atomic energy, space science and technology, and a 13th category, simply called “others”

Green nudge

What are green nudges?

Green nudges are gentle persuasions to influence environment- friendly behaviour in people.

In behavioral economics, nudges are interventions that influence people’s choices to make certain decisions without restricting the choices available to them.

The purpose of green nudges

The green nudges were a result of Chinese regulations that prohibited online food delivery platforms from including SUCs (single use cutlery) (SUC) tin orders unless explicitly requested.

WHO report

Approximately four of every five people with hypertension are not adequately treated, but if countries can scale up coverage, 76 million deaths could be averted between 2023 and 2050, the World Health Organization (WHO) said in its first-ever report on the global impact of high blood pressure on Tuesday.

Hypertension is the most important risk factor for death and disability in India, according to a paper in The Lancet, regional health (Southeast Asia), published late last year.

It adds that less than one fourth of hypertensive patients in India had their blood pressure under control during 2016-2020.

Though this rate has improved from the previous years' figures, substantial differences exist across regions. The WHO report states that hypertension affects one in three adults worldwide.

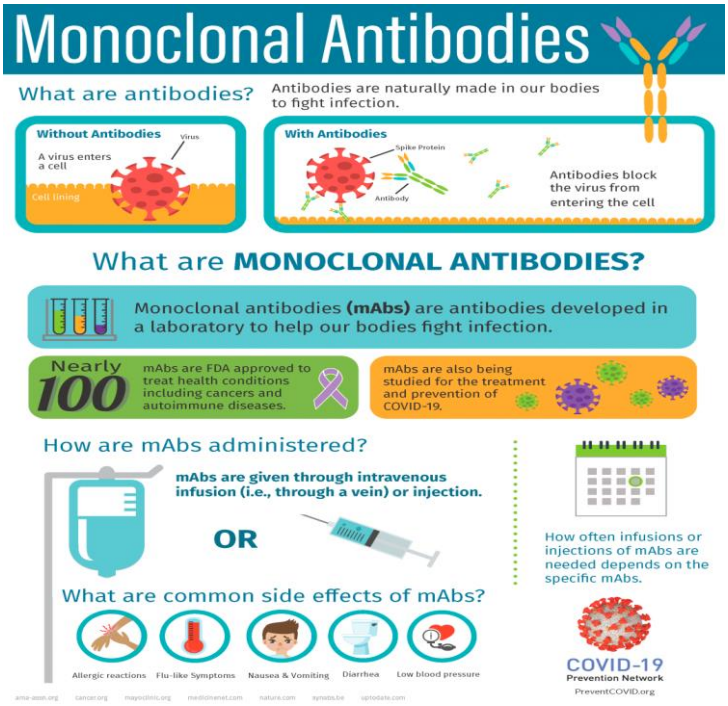
The number of people living with hypertension (blood pressure of 140/90 mmHg or higher or taking medication for hypertension) doubled between 1990 and 2019, from 650 million to 1.3 billion.

Pneumococcal vaccines

Vaccines help prevent pneumococcal disease, which is any type of illness caused by *Streptococcus pneumonia* bacteria. There are two kinds of pneumococcal vaccines

Pneumococcal conjugate vaccines (PCVs, specifically PCV15 and PCV20)
Pneumococcal polysaccharide vaccine (PPSV23)
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.

Nipah Virus



Last week, India reached out to Australia to procure monoclonal antibody doses to combat the Nipah virus outbreak in Kerala.

What is a monoclonal antibody?

Monoclonal antibodies are laboratory- made proteins that mimic the behaviour of antibodies produced by the immune system to protect against diseases and foreign substances.

An antibody attaches itself to an antigen a foreign substance, usually a disease- causing molecule and helps the immune system eliminate it from the body.

Monoclonal antibodies are specifically designed to target certain antigens.

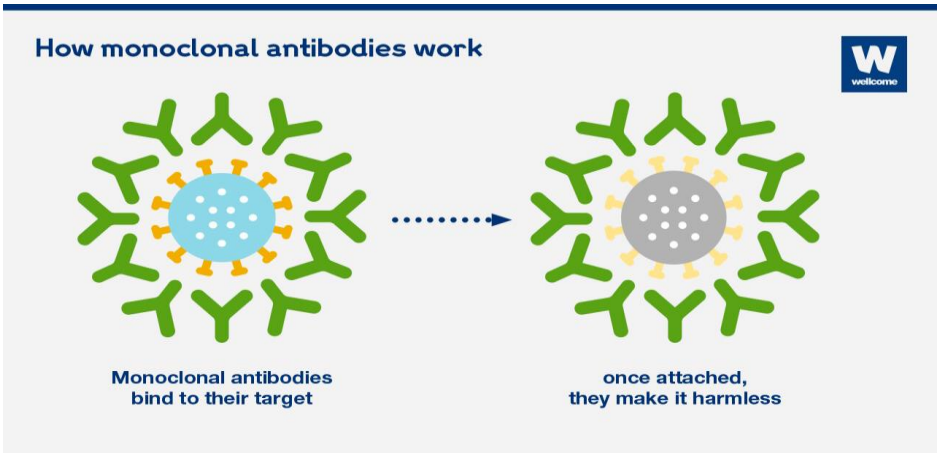
Niels K. Jerne, Georges J.F. Köhler and César Milstein were awarded the medicine Nobel Prize in 1984 for their work on the "the principle for production of monoclonal antibodies".

What is m102.4?

m102.4 is a "potent, fully human" monoclonal antibody that neutralizes Hendra and Nipah viruses, both outside and inside of living organisms.

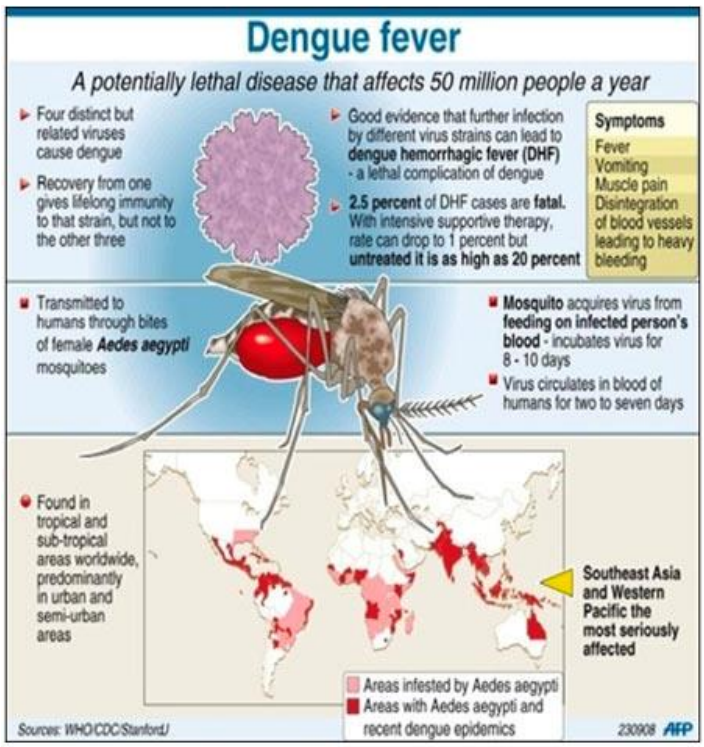
The antibody has passed phase- one clinical trials which means that researchers tested it with a relatively small number of people to estimate the right dose of treatment that also doesn't cause side effects.

As of now, the drug is used on a 'compassionate use' basis a treatment option that allows the use of an unauthorized medicine under strict conditions among people where no other alternative and/or satisfactory authorized treatment is known to be possible and where patients cannot enter clinical trials for various reasons.



Both Hendra and Nipah viruses are bat-borne Paramyxoviridae a family of viruses that contain a single- strand RNA of negative- sense genome, similar to the ones that cause diseases like measles, influenza etc., and replicate within infected cells.

Dengue Fever



Safe Harbour Agreement

What is a Safe Harbor Agreement?

A Safe Harbor Agreement (SHA) is a voluntary agreement involving private or other non-federal property owners whose actions contribute to the recovery of species listed as endangered or threatened under the Endangered Species Act (ESA).

The agreement is between cooperating non-federal property owners and the U.S. Fish and Wildlife Service (FWS) or the National Oceanic and Atmospheric Administration, which is responsible for most listed marine and anadromous fish species.

In exchange for actions that contribute to the recovery of listed species on non-federal lands, participating property owners receive formal assurances from the FWS that if they ful-fill the conditions of the SHA, the FWS will not require any

additional or different management activities by the participants without their consent.

P-hard problems

P-hard problems called quantum supremacy, will establish quantum computers as superior machines.

Quantum computers use quantum bits, or qubits, whereas classical computers use binary bits (0 and 1). Qubits are fundamentally different from classical bits as they can have the value 0 or 1, as a classical bit can, or a value that's a combination of 0 and 1, called a superposition.

Superposition states allow qubits to carry more information.

This capacity for parallelism gives quantum computers their archetypal advantage over classical computers, allowing them to perform a disproportionately greater number of operations.

Qubits also exhibit entanglement, meaning that two qubits can be intrinsically linked regardless of their physical separation.

#P-hard problems

Quantum circuits are at the heart of quantum computing. These circuits consist of qubits and quantum gates, analogous to the logic gates of classical computers. For example, an AND gate in a classical setup has output 1 if both its inputs are 0 or 1 – i.e. (0,0) or (1,1).

Similarly, a quantum circuit can have qubits and quantum gates wired to combine input values in a certain way. In such a circuit, a quantum gate could manipulate the qubits to perform specific functions, leading to an output.

These outputs can be combined to solve complex mathematical problems. Classical computers struggle with #P-hard problems a set of problems that

includes estimating the probability that random quantum circuits will yield a certain output.

#P-hard problems are a subset of #P problem, which are all counting problems

The #P-complete problems (pronounced "sharp P complete" or "number P complete") form a complexity class in computational complexity theory. The problems in this complexity class are defined by having the following two properties:

The problem is in #P, the class of problems that can be defined as counting the number of accepting paths of a polynomial-time non-deterministic Turing machine.

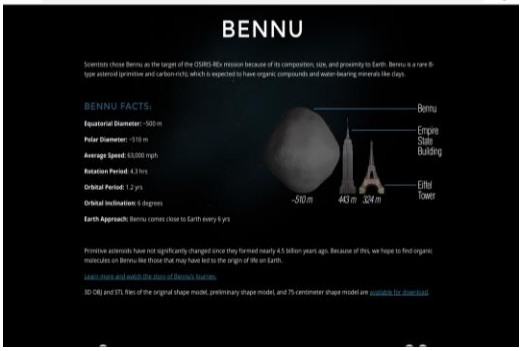
The problem is #P-hard, meaning that every other problem in #P has a Turing reduction or polynomial-time counting reduction to it.

In computational complexity theory, the complexity class #P (pronounced "sharp P" or, sometimes "number P" or "hash P") is the set of the counting problems associated with the decision problems in the set NP.

The Cayley path is like a bridge that helps the travelling salesman move smoothly between two different situations in the study like one random route and one significantly complicated route.

This ‘bridge’ allows us to reframe the most challenging quantum circuit in terms of the average circuit, like seeing how tough it might be to handle the worst traffic jam compared to your regular commute.

Bennu & Hayabusa missions

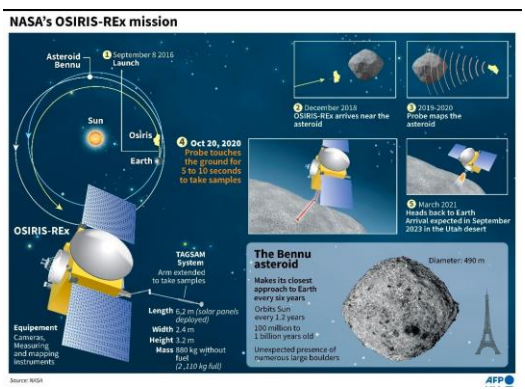


Alongside Japan's two Hayabusa missions, which have collected and returned samples of 25143 Itokawa and 162173 Ryugu, to expand our knowledge of the solar system's history.

OSIRIS is NASA's third element of its 'New Frontiers' programme, after New

Horizons (to explore the Kuiper Belt) and Juno (to study the planet exerting the largest gravitational influence in the solar system).

While studies of Bennu include significant commercial components such as



opportunities for space -mining and impact mitigation technologies they also participate in a more timeless quest: to find out where life came from and what its fate could be.

Society

Recent research from the Ministry of Statistics and Programme Implementation's Time Use Survey (2019) shows that for 97 minutes spent daily by men on unpaid domestic services for household members, women spend 299 minutes.

Women spend 134 minutes on average daily on unpaid care-giving services for household members as compared to the 76 minutes spent by men.

It is clear that women bear a disproportionate burden of household responsibilities. This is a result of a patriarchal societal mindset, which will need to change if women are to fully and effectively participate in the labour force, let alone hold the highest elected representative positions.

Mukurthi National park

A total of 10 tigers (six cubs and four adults) have died in the Nilgiris since the middle of August.

In February this year, the forest department arrested four poachers from Rajasthan who had allegedly poached a tiger.

To allay fears that poachers could be targeting tigers, the forest department plans to set up anti--poaching camps in six forest ranges surrounding the Mukurthi National Park

Mukurthi National park

Mukurthi National Park is a 78.46 km² protected area located in the western

corner of the Nilgiris Plateau west of Ootacamund hill station in the northwest corner of Tamil Nadu state in the Western Ghats mountain range of South India. The park was created to protect its keystone species, the Nilgiri tahr.

Cauvery dispute

On September 21, the Supreme Court asked Karnataka to continue releasing 5,000 cubic feet per second (cusecs) of water from the Cauvery river to Tamil Nadu for 15 days.

Karnataka told the Supreme Court that the daily flow of 5,000 cusecs of water to Tamil Nadu was “against [its] interest.” The State, especially in urban areas like Bengaluru, was on “the brink of a drinking water crisis”.

Tamil Nadu is in need of water for at least three lakh acres over which a short-term crop (kuruvai) has been raised. Already, there are reports of the crop being at risk of withering in many places.

How is the Cauvery water being shared?

The Cauvery Water Disputes Tribunal (CWDT)’s final award of 2007 and the Supreme Court’s judgement of February 2018 spell out the system for sharing the river water.

Pointing out that 740 thousand million cubic feet (tmc ft) of water would be available in the Cauvery basin in a normal year, the Court, which broadly adhered

to the CWDT's award, made the allocation for constituents of the basin as follows:

Karnataka (284.75 tmc ft); Tamil Nadu (404.25 tmc ft); Kerala (30 tmc ft) and Puducherry (7 tmc ft). Ten tmc ft and four tmc ft have been set apart for environmental protection and inevitable escapages into the sea.

Why are Karnataka's farmers upset?

This year's southwest monsoon has played truant, especially in south interior Karnataka, the region where the Cauvery river originates.

Between June 1 and September 23, the region suffered a deficit rainfall of 27%, according to the India Meteorological Department.

Kodagu of Karnataka and Wayanad of Kerala, which form part of the catchment of the Cauvery and its tributary, Kabini, registered a deficit rainfall of 43% and 56% respectively.

Karnataka, in its application before Court, had stated that "...at the reservoir level, which covers a part of the catchment, the shortfall is 53.42%," given the fact that the State has four reservoirs in the Cauvery basin.

How serious is the situation in T.N.?

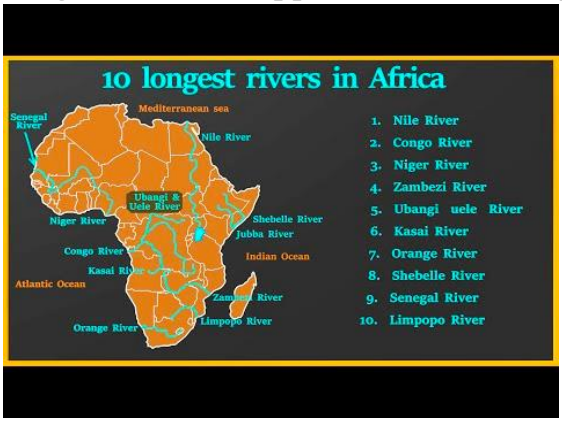
Being the lower- riparian State in the Cauvery basin, Tamil Nadu is mainly dependent on releases by Karnataka, particularly during the southwest monsoon, as it falls under the rain shadow region in the season.

Kalambo river

Along the banks of the Kalambo River in Zambia near Africa's second- highest waterfall, archaeologists have excavated two logs of the large- fruited bush willow tree that were notched, shaped and joined nearly half a million years ago.

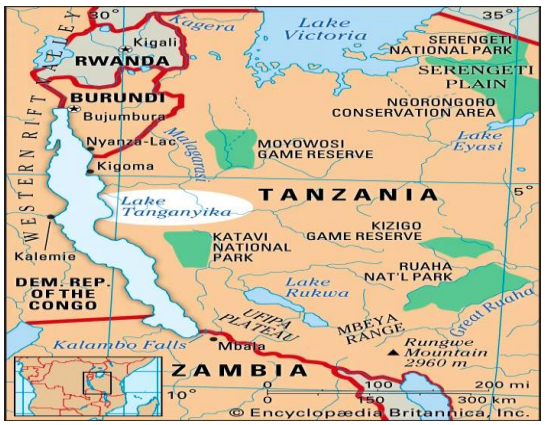
These artefacts, researchers said on Wednesday, represent the oldest- known example of humans - in this case a species that preceded our own - building wooden structures, a milestone in technological achievement that indicates that our forerunners displayed more ingenuity than previously thought.

The logs, modified using stone tools, appear to have been part of a framework for



a structure, a conclusion that contradicts the notion humans at that time simply roamed the landscape hunting and gathering resources. The Kalambo River forms part of the border between Zambia and Songwe Region, Tanzania. It is a comparatively small stream which rises on the Ufipa Plateau

The Ufipa Plateau is a highland in southwestern Tanzania.



Phosphorus and climate change

Handful of countries control most of the world's reserves of phosphorus.

This is a major geopolitical concern.

The world's largest reserves are in Morocco and the Western Sahara region.

But here, phosphorus coexists with cadmium, a heavy metal that can accumulate in animal and human kidneys when ingested. Removing cadmium is also an expensive process.

As a result, cadmium- laden fertilisers are often applied to the soil, absorbed by crops, and consumed, bio accumulating in our bodies.

Only six countries have substantial cadmium free phosphorous reserves. Of them, China restricted exports in 2020 and many EU countries no longer buy from Russia. So the market for safe phosphorus has suddenly exploded.

This is one reason why Sri Lanka banned the import of synthetic fertilisers and went organic in 2021, later experiencing a sudden drop in crop yield that precipitated a political crisis.

Today, India is the world's largest importer of phosphorus, most of it from the cadmium- laden deposits of West Africa.

Not all crops absorb cadmium at the same rate, but paddy, a staple crop in India, is particularly susceptible.

Indian farmers also apply a lot of fertilisers to paddy. Other grains, such as wheat, barley, and maize also absorb cadmium, just less

(The uptake of cadmium by crops varies based on soil quality, climatic conditions, and the type and variety of crops grown.

Social and cultural factors further affect the intake of cadmium into human bodies and the severity of health effects.)

The phosphorus disposal problem

First, only about a fifth of the phosphorus mined is actually consumed through food. Much of it is lost directly to water bodies as agricultural run-off, due to the excessive application of fertilisers.

Second, most of the phosphorus that people consume ends up in the sewage

It is then absorbed by the algal blooms that grow in response to the high nutrient supply, and when they decompose, the bacteria that feed on them consume the dissolved oxygen. The result: water bodies become oxygen-starved, leading to fish deaths.

The algal blooms are also toxic, causing respiratory issues, nausea, and other ailments to people exposed to them.

Finding phosphorus elsewhere Since much of the phosphorus is not actually taken up by crops, one way to ameliorate the phosphorus paucity is to reduce the use of chemical fertilisers through precision agriculture.

There is increasing interest in closing the phosphorous loop by mining urban sewage to produce high quality phosphorus. Interest in 'circular water economies' has in fact prompted the European Union which has almost no phosphorus reserves of its own to rethink the urban water cycle.

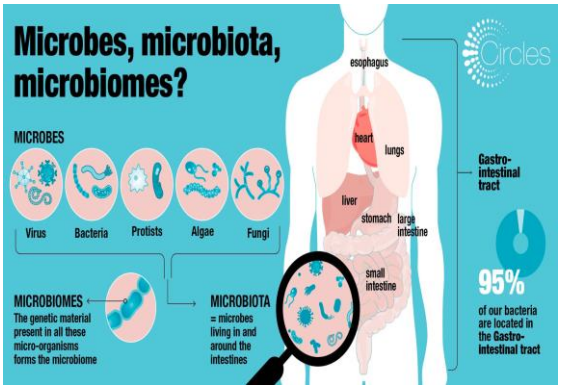
First, source separating toilets almost two thirds of the phosphorus we consume leaves in our urine and the rest in faeces Second, recycling wastewater and sludge.

WHO on Salt intake

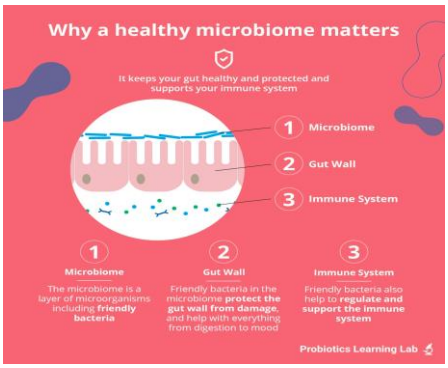
The estimated mean daily salt intake in India stands at 8 g (8.9 g a day for men and 7.1 g a day for women) against the World Health Organization (WHO) recommendation of up to 5 g daily, a study has found.

The salt intake was significantly higher among men, those in rural areas and overweight and obese respondents.

Micro biome



A microbiome is the community of microorganisms that can usually be found living together in any given habitat.



It was defined more precisely in 1988 by Whipps et al. as "a characteristic microbial community occupying a reasonably well-defined habitat which has distinct physio-chemical properties. Most humans carry a species of bacteria called Clostridium difficile without any disease for life. It causes problems only in the elderly or in people with compromised immune system

The authors acknowledged that diseases have been correlated with changes in the composition of the microbiome and that such changes could exacerbate some diseases (like inflammatory bowel disease)

Two phyla of bacteria firmicutes and bacteroidetes.

The problem with this myth is that the level of phyla is too broad to comment on effects with confidence.

A phylum is a group within a kingdom. In the descending order of classifying organisms, a **kingdom** comprises different phyla; a phylum comprises classes; then there are orders, families, genuses, and, finally, species. Even within a bacterial species, several strains behave differently, causing the host to manifest different clinical symptoms.

Quiet diplomacy

Indian and Canadian leaders and diplomats have never really engaged; rather, they have talked passed each other. This is occurring today too.

For decades, India has felt that Canada has shown scant respect for its interests, especially on the Khalistan issue. On the other hand, Canada believes that India displays little understanding of its laws and governance system, which prevents it from taking actions that India wants.

These differing perceptions have been accumulating over the years and a trigger was needed to publicly bring them out.

What is Quite diplomacy??

Quite diplomacy means a back door or secret diplomacy in which all sorts of contacts between two players kept secret as the matter is very sensitive and complex

Quiet diplomacy uses back channels and personal contacts established by: Ministers, Department Heads, Corporate Movers and Shakers, major NGOs etc to further the country or organizations goals, this may result in a TV news segment on a topic in a target country, zone or city,

It may result in an invite to a forum or a fund raising dinner etc and at these charity events etc the opinions and goals of the nation or organisation using soft diplomacy gets its views filtered upwards towards the target group.

Disease X and climate change

In its latest report released this March, the Intergovernmental Panel on Climate Change (IPCC) delivers a stark warning: climate change heightens the global risk of infectious diseases.

The close relationship between climate and disease is being demonstrated every year.

For instance, the periodicity of mosquito- borne disease outbreaks no longer follows expected patterns. Dengue manifests in two to three peaks throughout the year.

Variability in temperature, precipitation, and humidity disrupt disease transmission cycles.

These also alter the distribution of the vectors and animal reservoirs that host the parasite.

Heat has been proven to interfere with the genomic structure of pathogens, changing their infectivity and virulence.

Globally, there is an obsession with the enigmatic “disease X,” but it is the familiar annual cycles of known agents such as influenza, measles, Japanese encephalitis, dengue, diarrhoea among others that will continue to test the public health system. Climate change is not limited to infectious diseases.

It also exacerbates injuries and deaths from extreme weather events, respiratory and cardiovascular diseases, and mental health issues.

The re-emergence of Nipah in Kerala is a wake-up call, that mere biomedical response to diseases is inadequate.

In the face of a changing climate and the growing threat of infectious diseases, protecting ecosystems, fostering collaboration, and embracing the One Health paradigm are our best defences.

The road ahead demands concerted efforts, not just to adapt but also to proactively safeguard our planet and its inhabitants.

The WHO declared “Disease X represents the knowledge that a serious international epidemic could be caused by a pathogen currently unknown.

Advanced Liquid Processing System (ALPS)

On April 13, 2021, Japan’s government announced plans to release over one million tonnes of contaminated water from the Fukushima nuclear plant into the sea over the next 30 years. Since 2011, TEPCO has been in charge of decommissioning the Fukushima Daiichi power plant, and managing the waste.

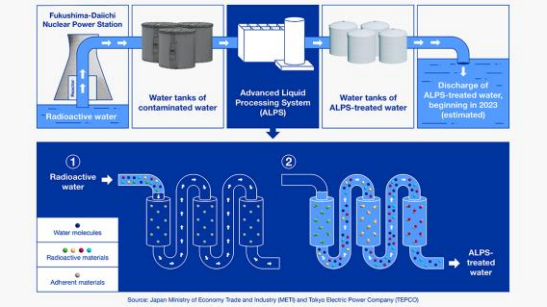
The water has been treated with multiple techniques, notably the Advanced Liquid Processing System (ALPS), which removes 62 types of radioactive materials.

A key factor for Japan in maintaining relations with South Korea in particular, has been transparency over the treatment and release process.

South Korea’s government, following repeated consolation by the IAEA, has told people that the water and the seafood is safe.

ALPS is a pumping and filtration system, which uses a series of chemical reactions to remove 62 radionuclides from contaminated water.

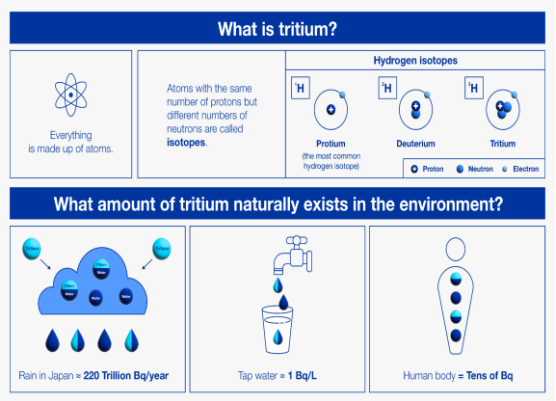
However, ALPS is not able to remove tritium from the contaminated water.



What is Tritium

Tritium is a naturally occurring radioactive form of hydrogen that is produced in the atmosphere when cosmic rays collide with air molecules and has the lowest radiological impact of all naturally occurring radionuclides in seawater.

Tritium is also a by-product of operating nuclear power plants to produce electricity.



Why Tritium is not removed from water??

It is technically very difficult to remove tritiated water from water.

Tritium is an isotope of hydrogen, and water containing tritium has chemical features almost identical to water with ordinary hydrogen.

Diaspora and foreign policy

The ethnic Indian community, including the Sikhs, plays an important role in

Canada's public life. There are currently some ethnic Indians in Prime Minister Justin Trudeau's cabinet.

Ethnic Indians provide an occasion to consider the Indian political class's approaches towards the diaspora which has gained political, financial and professional success in many countries.

The harsh reality of the current Canadian political situation is that Mr. Trudeau is critically dependent on the New Democratic Party (NDP) for his government's survival and Jagmeet Singh, the NDP leader, is a committed Khalistani sympathizer.

Founder effect

With evidence such as fossils, researchers have been able to piece together parts of human evolution and history in astonishing detail.

However, ancient DNA can offer only recent insights into human evolution; DNA older than that is seldom preserved intact

In a March 2018 paper, researchers concluded by studying genome sequences from present- day populations that sickle cell anemia arose around 7,300 years ago

Ashkenazi Jews are one of the most well- studied founder populations, with a bottleneck event suggesting that a small group of around a thousand- odd individuals gave rise to the modern population.

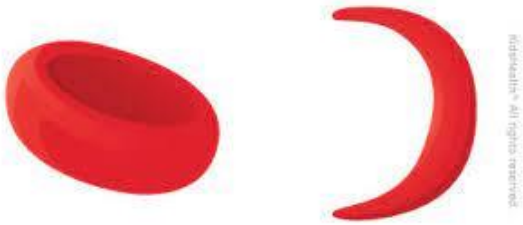
So these individuals have a greater frequency of some genetic diseases due to the founder effect.

What is founder effect??

In population genetics, the founder effect is the loss of genetic variation that

occurs when a new population is established by a very small number of individuals from a larger population.

It was first fully outlined by Ernst Mayr in 1942, using existing theoretical work by those such as Sewall Wright.



Normal Red Blood Cell Sickle Cell

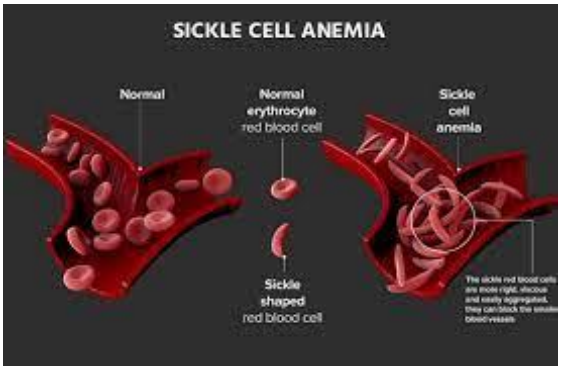
What is sickle cell anaemia?

Haemoglobin, which is tasked with carrying oxygen to all parts of the body, has four protein subunits, two alpha and two beta.

In some people, mutations in the gene that creates the beta subunits impact the shape of the blood cell and distorts it to look like a sickle.

A round red blood cell can move easily through blood vessels because of its shape but sickle red blood cells end up slowing, and even blocking, the blood flow.

Moreover, sickle cells die early, resulting in a shortage of red blood cells that deprive the body of oxygen.



These obstructions and shortages may cause chronic anaemia, pain, fatigue, acute chest syndrome, stroke, and a host of other serious health complications.

Without treatment, quality of life is compromised and severe cases can become

fatal in the initial years of life.

Galactic tide

A galactic tide is a tidal force experienced by objects subject to the gravitational field of a galaxy such as the Milky Way.

Particular areas of interest concerning galactic tides include galactic collisions, the disruption of dwarf or satellite galaxies, and the Milky Way's tidal effect on the Oort cloud of the Solar System.

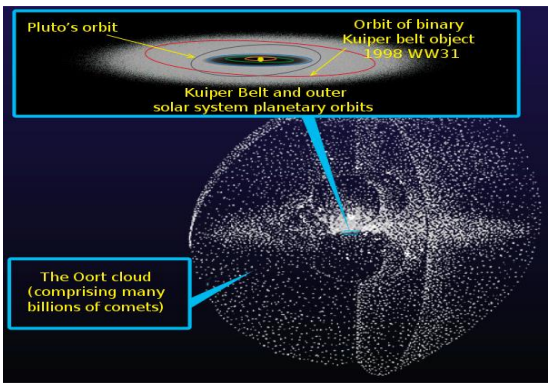
The tidal force or tide-generating force is a gravitational effect that stretches a body along the line towards and away from the center of mass of another body due to spatial variations in strength in gravitational field from the other Body.

Oort cloud theorized to be a vast cloud of icy planetesimals surrounding the Sun at distances ranging from 2,000 to 200,000 AU

Osiris- Rex

NASA’s first asteroid samples fetched from deep space parachuted into the Utah desert to cap a seven- year journey.

In a flyby of earth, the Osiris- Rex spacecraft released the sample capsule from one lakh kilometers out. Scientists estimate the capsule holds at least a cup of



rubble from the carbon rich asteroid known as Bennu, Japan, the only other country to bring back asteroid samples

NASA's OSIRIS-REx

NASA's OSIRIS-REx, the first U.S. mission to collect a sample from an asteroid, will return to Earth on Sept. 24, 2023, with material from asteroid Bennu.

When it arrives, the OSIRIS-REx spacecraft will release the sample capsule for a safe landing in the Utah desert.

The pristine material from Bennu rocks and dust collected from the asteroid's surface in 2020 will offer generations of scientists a window into the time when the Sun and planets were forming about 4.5 billion years ago.

About UTAH Desert

The Great Salt Lake Desert is a large dry lake in northern Utah, United States, between the Great Salt Lake and the Nevada border. NASA's first asteroid samples fetched from deep space parachuted into the Utah desert to cap a seven-year journey. In a flyby of earth, the Osiris- Rex spacecraft released the sample capsule from one lakh kilometers out. Scientists estimate the capsule holds at least a cup of rubble from the carbon rich asteroid known as Bennu.

Armenian refugees

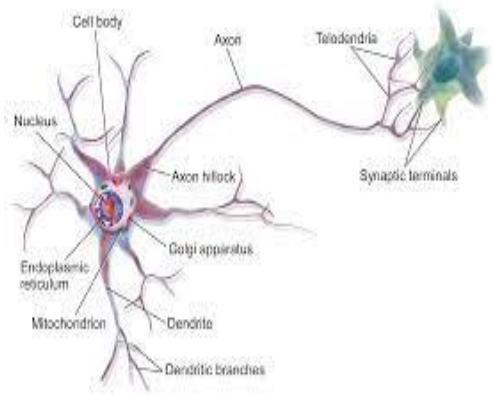
Ethnic Armenian refugees began to leave Nagorno- Karabakh for the first time since Azerbaijan launched an offensive designed to seize control of the breakaway territory and perhaps end a three decade -old conflict.

Neural circuit

A neural circuit (also known as a *biological neural network BNNs*) is a population of neurons interconnected by synapses to carry out a specific function when activated.

Multiple neural circuits interconnect with one another to form large scale brain networks. Neural circuits have inspired the design of artificial neural networks, though there are significant differences.

In the nervous system, a synapse s a structure that permits a neuron (or nerve cell) to pass an electrical or chemical signal to another neuron or to the target effector cell.



James web Telescope

A pair of independent studies, using recent James Webb Space Telescope observations of carbon dioxide ice on Jupiter's moon Europa, indicate the carbon dioxide originates from a source within the icy body's subsurface ocean.

The findings from both research groups provide new insights into the poorly known composition of Europa’s internal ocean.

James Webb Space Telescope (JWST)

The James Webb Space Telescope (JWST) is a space telescope designed primarily to conduct infrared astronomy.

The U.S. National Aeronautics and Space Administration (NASA) led development of the telescope] in collaboration with the European Space Agency (ESA), and the Canadian Space Agency (CSA).

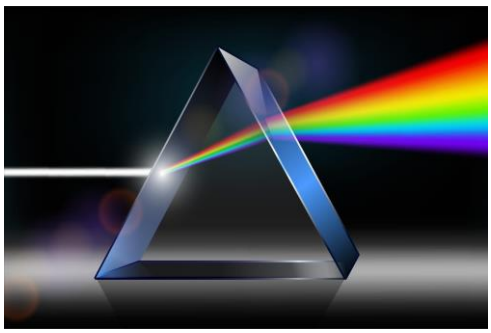
The JWST was launched 25 December 2021 on an ESA Ariane 5 rocket from Kourou, French Guianaand is intended to succeed the Hubble Space Telescope as NASA's flagship mission in astrophysics.

The telescope is named after James E. Webb, who was the administrator of NASA from 1961 to 1968 during the Mercury, Gemini, and much of the Apollo programs.

It provides improved infrared resolution and sensitivity over Hubble, viewing objects up to 100 times fainter than the faintest detectable by Hubble.

Spectroscopy is the study of the absorption and emission of light and other radiation by matter.

It involves the splitting of light (or more precisely electromagnetic radiation) into its constituent wavelengths (a spectrum), which is done in much the same way as a prism splits light into a rainbow of colours.



ORAI1

In preclinical experiments, researchers have established a connection between a calcium channel and the growth of oral cancer cells, as well as the debilitating chronic pain that tumours formed by the cells can cause.

ORAI1 is a calcium release- activated channel, and the researchers found that it triggered the expression of genes that encode markers of oral cancer and indirectly raised the excitability of groups of neurons involved in oral pain.

The data opens the door for therapeutic treatment of oral cancers.

Isothermal amplification

A new platform using nucleic acids- based diagnostics showcases a way to detect pathogens more quickly in the field.

Through loop- mediated isothermal amplification technology, the approach creates nanoballs out of pathogens' DNA that can then be identified through electrical signalling.

Isothermal amplification of nucleic acids is a simple process that rapidly and efficiently accumulates nucleic acid sequences at constant temperature.

Myo-inositol

Myo-inositol, a cyclic sugar alcohol. The levels of myo-inositol are high over the first two weeks of lactation and gradually taper off over a period of a few months.

In the early stages, the brain of the newborn is a site of rapid 'wiring', as synapses (or connections between nerve cells) are formed in profusion. Proper synapse formation during early development lays the foundation for cognitive development; inadequate synapse formation leads to development difficulties in the brain.

The group of Thomas Biederer at Yale (PNAS) also matched their findings on myo-inositol induced synapse abundance in cultured rat neurons in test tubes.

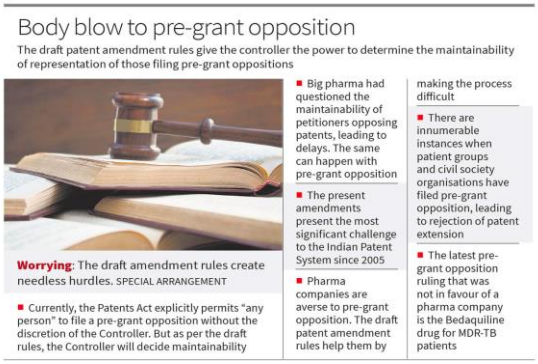
Here too, myo-inositol promoted the formation of synapses between neurons. Myo-inositol is a cyclic sugar alcohol, about half as sweet as sugar. It is abundant in the brain, where it mediates the response to several hormones.

Our body needs inositol to form cell membranes. Our body makes myo-inositol from glucose, mostly in the kidneys.

However, our body's requirements go up along with the intake of coffee and sugar, and in conditions such as diabetes.

The bran of grains and seeds contains a precursor of inositol, phytic acid. Almonds, peas and cantaloupes are also rich sources.

Draft patent amendment rule



Body blow to pre-grant opposition

The draft patent amendment rules give the controller the power to determine the maintainability of representation of those filing pre-grant oppositions

Worrying: The draft amendment rules create needless hurdles. SPECIAL ARRANGEMENT

- Currently, the Patents Act explicitly permits "any person" to file a pre-grant opposition without the discretion of the Controller. But as per the draft rules, the Controller will decide maintainability
- Big pharma had questioned the maintainability of petitioners opposing patents, leading to delays. The same can happen with pre-grant opposition
- The present amendments present the most significant challenge to the Indian Patent System since 2005
- Pharma companies are averse to pre-grant opposition. The draft patent amendment rules help them by making the process difficult
- There are innumerable instances when patient groups and civil society organisations have filed pre-grant opposition, leading to rejection of patent extension
- The latest pre-grant opposition ruling that was not in favour of a pharma company is the Bedaquiline drug for MDR-TB patients

Currently, the Patents Act explicitly permits "any person" to file a pre-grant opposition without the discretion of the Controller.

But as per the draft patent amendment rules, the maintainability of the petitioners who file a pre-grant opposition will not be automatic but will be determined by the Controller.

Women reservation bill

What are the main issues regarding the Bill?

The Opposition has questioned the linking of the implementation of women's reservation with the periodical delimitation exercise as this would mean a prolonged delay in the quota coming into force.

Delimitation, or the readjustment of territorial limits of the Lok Sabha and Assembly constituencies, as well as the number of seats in the Assembly and the Lok Sabha in each State, is a periodical exercise done based on the figures available in the latest Census.

The last delimitation order of the Delimitation Commission was issued in 2008, fixing the boundaries of all constituencies.

However, there is currently a freeze on the readjustment of the number of seats in the State Assemblies and the Lok Sabha.

In 2002, Article 82 was amended to the effect that it shall not be necessary to readjust the allocation of Lok Sabha constituencies State- wise and the division of each State into constituencies until the figures of the first Census held after 2026 were available.

Another issue raised by the Opposition concerns the question of having a sub quota for women from Other Backward Classes (OBCs).

Most big blasts cool

The majority of volcanoes will have a cooling effect.

As the world swelters through record temperatures, scientists say an unusual culprit may be partly to blame: an underwater volcanic eruption off Tonga in the South Pacific last year.

While most big blasts cool the planet with a sun-dimming haze, the eruption of Hunga Tonga-Hunga Ha'apai in January 2022 blew the equivalent of 60,000 Olympic swimming pools of water into the stratosphere, high above the planet. Water vapour is a natural greenhouse gas, trapping heat as it swirls around the globe. By contrast, major land eruptions - such as Pinatubo in the Philippines in 1991 - temporarily dim sunshine with an ashen sunshade before falling back to Earth.

Blood pressure

According to medical standards, the reading on a doctor’s BP monitor going above 140/90 accounts for hypertension. The WHO report reveals that hypertension affects one in three adults worldwide, making it a significant global health concern.

The number of people living with hypertension has doubled from 650 million in 1990 to a staggering 1.3 billion in 2019, with nearly half of these unaware of their condition.

According to the WHO report, nearly four out of five people with hypertension are inadequately treated. Scaling up coverage could avert 76 million deaths between 2023 and 2050.

The report reveals a doubling of hypertension cases from 1990 to 2019, with over three- quarters of affected adults in low- and middle- income countries.

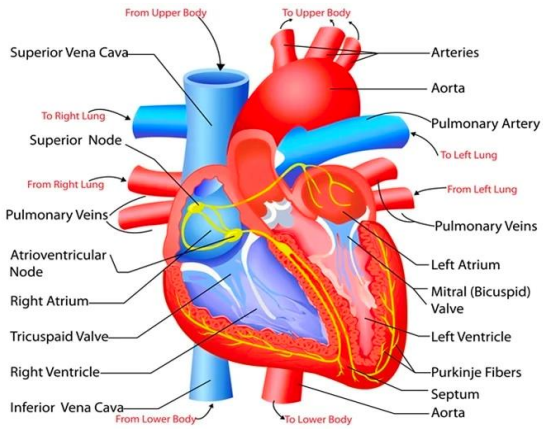
The research papers emphasise that a significant portion of hypertensive individuals in India remain undiagnosed.

Lack of awareness about the condition and limited access to healthcare services are critical factors

The Cureus study showed that the number of people with high blood pressure in India increased from 20.4% to 22.8%, especially among those aged 15-49.Unhealthy lifestyle choices, such as a high salt diet, lack of physical activity, and excessive alcohol consumption, increase hypertension risk. Science of Blood pressure blood pressure is made up of two numbers: systolic and diastolic. Systolic pressure is the pressure when the ventricles pump blood out of the heart. Diastolic pressure is the pressure between heartbeats when the heart is filling with blood.

UN Climate ambition summit

The Climate Ambition Summit (CAS) in New York, as part of the United Nations General Assembly, that concluded on Thursday, was marked by the absence of major economies whose actions significantly influence the future of global emissions.



China, the U.S. and India which collectively account for about 42% of global greenhouse gas emissions and are the top three emitters in that order were all absent from the summit that was designed, according to the U.N.,

The criteria for countries to be considered for a speaking slot at the summit were that they would be expected to present updated pre-2030 Nationally Determined Contributions (as agreed in Glasgow); updated NetZero targets; energy transition plans with commitments to no new coal, oil and gas; fossil fuel phase-out plans;

more ambitious renewable energy targets;

Green Climate Fund pledges; and economy- wide plans on adaptation and resilience.

India last updated its climate pledges in 2022 of reducing emissions intensity or the volume of emissions per unit of gross domestic product (GDP) by 45% from 2005 levels by 2030, a 10% increase from what it agreed to in 2015.

The government committed to meet 50% of its electric power needs from renewable, non- fossil fuel energy sources up from 40% committed at the Paris agreement.

It promised to create an additional carbon sink of 2.5 to 3 billion tonnes of Co2-equivalent [GtCO2e] through additional forest and tree cover by 2030

About CLIMATE AMBITION SUMMIT

To accelerate action by governments, business, finance, local authorities and civil society, and hear from "first movers and doers," the United Nations Secretary-General is convening a Climate Ambition Summit at United Nations Headquarters in New York on 20 September 2023.

Description

Opening Plenary Session: Showcasing "first mover and doer" leaders. [With UN Secretary-General António Guterres].

The design and outcomes of the Summit will be delivered on three distinct but interrelated acceleration tracks ambition, credibility and implementation.

Ambition

Government leaders (especially major emitters) will be expected to present updated pre-2030 Nationally Determined Contributions (as agreed in Glasgow);

updated net-zero targets; energy transition plans with commitments to no new coal, oil and gas; fossil fuel phase-out plans;

Credibility

Leaders of businesses, cities, regions and financial institutions will be expected to present transition plans aligned with the UN-backed credibility standard presented in the "Integrity Matters" report commissioned by the UN Secretary-General.

Implementation

Leaders of governments, international and regional organizations and financial institutions, the private sector and civil society will present existing or emerging implementation partnerships addressing challenges and opportunities related to accelerating the decarbonization of high-emitting sectors (energy, shipping, aviation, steel, cement) or on delivering climate justice (reform of the international financial system, early warning systems, adaptation, loss and damage)

Vikram and pragyan sleeping

The long lunar night at the South Pole region of the Moon, where India's Vikram lander and Pragyan rover touched down last month, is about the come to an end.

The lander-rover duo was strategically put to sleep earlier this month after an impressive mission lasting 12 Earth days (lunar nights and days generally last 14 Earth days).

If Isro is able to wake Vikram and Pragyan up from their slumber, it will be a remarkable engineering feat and will offer the space agency more opportunities to carry out experiments on the lunar surface.

The decision to conclude Vikram-Pragyan's mission two days earlier than the

initially planned 14 Earth days was driven by the position of the Sun

Since the Moon lacks an atmosphere, temperatures on the lunar surface can reach minus 180 degrees Celsius during the night.

Conventional power sources like traditional solar panels and small batteries fall short, while radioisotope systems have regulatory constraints and high costs. Large batteries, though capable, are too heavy due to the extended duration of the night.

Recent research, however, reveals a promising solution: lithium-ion (Li-ion) batteries that can be safely frozen and thawed without any discernible loss in performance.

If Isro has taken this approach with Vikram and Pragyan, it would hinge on three key components, each addressing the challenges of lunar nights:

Firstly, the integration of cryo-tolerant lithium-ion batteries, which exhibit exceptional resilience in the extreme cold of the lunar environment without compromising their performance. This would ensure a stable power source throughout the mission.

Complementing this innovation would be cryo-tolerant electronics, engineered to seamlessly resume operations once sunlight returns to the lunar surface.

NENA vs Nuna

Nena, an acronym for Northern Europe North America, was the Early Proterozoic amalgamation of Baltica and Laurentia into a single "cratonic landmass", a name first proposed in 1990.

Since then several similar Proterozoic supercontinents have been proposed, including Nuna and Arctica, that include other Archaean cratons, such as Siberia and East Antarctica

Although Nena and Nuna share many similarities, Nena accounted for a larger

landmass than Nuna. This extended landmass included the Angara, Antarctica, Baltica, Laurentia, and Siberia bodies.

Sauropod dinosaur

In a paper published recently in Scientific Reports, scientists from IIT Roorkee have characterized dinosaur fossils from the Middle Jurassic period, found in the Thar desert near the Jaisalmer Basin by the Geological Survey of India.

They discovered that they had uncovered remains of a sauropod dinosaur, which is the same clade as the long- necked herbivores in Jurassic Park; only these happened to be the oldest known fossils of this particular kind of sauropod.

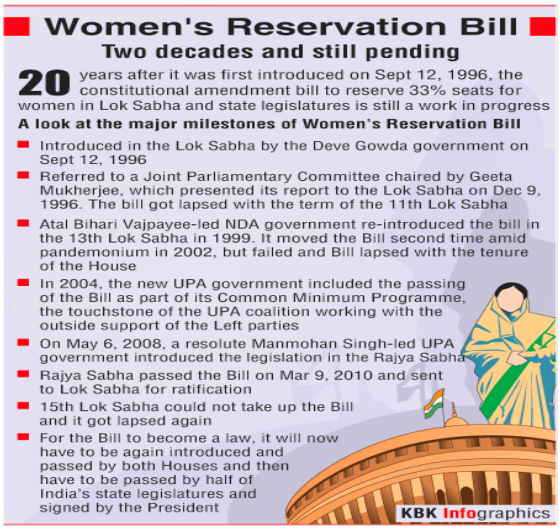
Belonging to the family Dicraeosauridae and from the superfamily Diplodocoidea, these fossils are the first dicraeosaurid sauropods to have been found in India.

And at 167 million years old, they are the oldest known diplodocoid fossils in the world. The scientists named the dinosaur Tharosaurus indicus, with Tharo deriving from the Thar desert; saurus from the Greek ‘sauros’, or lizard; and indicus from its Indian origin.

Women reservation family

The 128th Constitution Amendment Bill, or the Nari Shakti Vandan Adhiniyam, seeks to amend this by reserving a third of the seats in the Lok Sabha and legislative Assemblies for women. It has a 15-year sunset clause for the quota, that can be extended

But its implementation will be delayed as it has been tied to two factors, delimitation and the Census, a



(Article 82 of the Constitution, as amended in 2002, says the delimitation process can be carried out based on the first Census taken after 2026.

Originally, the first Census after 2026 was to be carried out in 2031, which would be followed by delimitation

The quota will not apply to Rajya Sabha or state Legislative Councils. Women only make up 14 percent of parliament and legislatures in India, which is far lower than the world average.

Abraham accord

Abraham Accords, series of agreements to normalize relations between Israel and several Arab states.

The accords, all of which were signed in the latter half of 2020, consist of a general declaration alongside bilateral agreements between Israel and the United Arab Emirates, Bahrain, and Morocco.

The name of the accords was given in reference to the supposed common ancestor of the Jews and the Arabs, the biblical Abraham, and as an expression of brotherhood

On the pretext of stopping Israel's plan to annex parts of the West Bank in July

2020, the United Arab Emirates engaged in negotiations to normalize relations.

Sweetened with an offer from the United States to sell 50 F-35 combat jets to the United Arab Emirates, a deal was announced in August.

The agreements have ushered in a new era of normalization and peace that not only connects governments but also brings people together, despite the differences in their language, religious beliefs, cultures and more.

The Abraham Accords have also opened up exciting opportunities for India and its thriving business community, which maintains strong relations and active engagement with our nations.

The scope of trade between Israel and other West Asian countries increased 74% between 2021 and 2022.

Another example is tourism, mostly non-existent in the past, which has skyrocketed. In 2021, visits from Israel to the UAE increased by 172%.

Meanwhile, the number of Israelis flying to Bahrain since the establishment of direct flights has increased exponentially

The vibrant Indian diaspora in the Gulf now has the convenience of direct flights

between the UAE and Israel, as well as between Israel and Bahrain. Indian students are enjoying increased ease of travel, gaining improved access to our universities and the opportunity to explore international study programmes.

The Accords have also had a significant influence on reinforcing Israel's relations with neighboring countries.

For example, the Prosperity Green & Blue agreement between Israel, the UAE, and Jordan determined that a solar field to supply 600 megawatts of electricity to Israel would be established in Jordan, while in return, a desalination plant in Israel would deliver 200 million cubic meters of water to Jordan.

We have witnessed substantial commercial collaborations between companies from the UAE, Israel, Bahrain, and the U.S., partnering with the Indian private sector.

A concrete illustration of this high level economic cooperation between our governments is the establishment of the I2U2 Group, formed by Israel, India, the UAE, and the U.S.

The Abraham Accords made the I2U2 Group possible, and its primary focus will be on joint investments in critical areas such as water, energy, transportation, space, health, and food security

The Abraham Accords encourage collaboration and education.

India holds a significant position among our partners, and the scope of our collaboration underscores our shared interests, including championing a sustainable recovery from the COVID-19 pandemic, expanding trade, addressing climate change, and countering threats to international security.

International Organisation of Legal Metrology (OIML)

Headquartered in Paris.

The OIML stands for International Organisation of Legal Metrology. Established in 1955 and headquartered in Paris, the OIML is an international standard-setting body. It develops model regulations, standards and related documents for use by legal metrology authorities and industry.

India became a member of the OIML in 1956. In the same year, India signed the metric convention.

The OIML-CS is a system for issuing, registering and using OIML certificates, and their associated OIML type evaluation/test reports, for instruments like digital balance, clinical thermometers, etc. With the addition of India, the number of countries authorized to issue OIML certificates has increased to 13.