

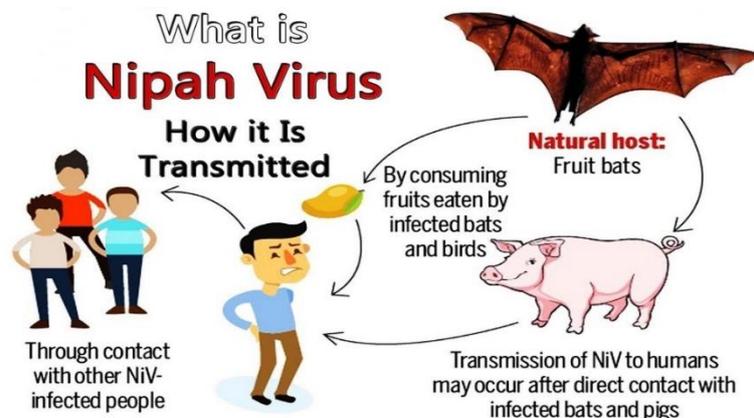
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Nipah Virus

- 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 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.



Potential pandemic

- There are now established protocols at the national level for the three key aspects of a potential pandemic: infection control, treatment and vaccination. When a contagion hits, the world now understands what can and cannot be controlled within each geographic region context.
- It is these lessons from the coronavirus pandemic that must inform future outbreaks
- India must be heartened that the potential of an outbreak evokes national concern and an anticipatory response unlike the earlier and purely reactive approach.
- A standardized treatment for Nipah continues to be elusive and a spike in cases could spell disaster given the high mortality rate. However, some studies suggest that vaccines developed for the coronavirus, if adequately tweaked, may prove effective against the Nipah virus too.
- Another potential candidate vaccine is in early human trials. Because vaccination continues to be the best bet against the disease, the very fact that global attention and capital no longer need to be coaxed to developing vaccines for tropical infections is itself a key difference in how the world approaches outbreaks in the coronavirus era.

Fragile X Syndrome

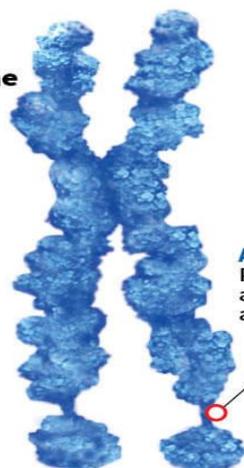
- Fragile X Syndrome (FXS) is caused by changes in a gene called FMR1 which makes an important protein (FMRP). This protein is required for brain development.
- In India, the lack of adequate screening and diagnostic facilities, the stigma attached to mental health, the absence of surveys in community settings, and

bare minimum hospital data based on clinical experience have all kept FXS largely undetected.

- According to the Centres for Disease Control and Prevention (CDC), one in 7,000 males and one in 11,000 females are affected with FXS.
- FXS is the leading inherited cause of autism in 4% of the population worldwide.
- The CDC estimates that one in 259 women and one in 800 men carry Fragile X.
- A mother who is a carrier has a 50% chance of passing the mutated gene to her children, who will either be carriers or have FXS. Men who are carriers do not pass the pre-mutation to their sons, but only daughters, who become carriers.
- The simplest tool for timely detection is a DNA test. Autism triggered by FXS is a behavioural condition. The symptoms are learning difficulty, speech delay, aggressive behaviour, hyperactivity, attention deficit, fear of the unfamiliar, sensory processing disorders and problems in motor skills. These cannot be cured, but early therapy can improve the individual's quality of life
- The National Policy for Rare Diseases Act calls for systematic epidemiological studies on incidence and prevalence of rare diseases.
- Without naming FXS directly, it recommends prenatal tests for lesser known single-gene and other genetic disorders.

An X chromosome affected by Fragile X Syndrome

CAUSE
Trinuoleotide repeat in the FMR-1 gene on the X chromosome



APPEARANCE
Portion of chromosome X appears fragile and about to break

Epic games vs APPLE

- Epic Games launched the case aiming to break Apple's grip on the App Store, accusing the iPhone maker of acting like a monopoly in its shop for digital goods or services. The US judge ordered Apple to loosen control of its App Store, but said Epic failed to prove any antitrust violations.
- Antitrust laws include prohibiting price fixing and restriction of trade by special interest groups. Antitrust laws also ban mergers that would reduce a market's competition, the creation of Monopolies to obtain control of market share and efforts to maintain a monopoly by dishonest practices.

Booster shots and immunity

- An expert review published in medical journal The Lancet has recommended that booster doses for the general population are not appropriate at this stage of the COVID-19 pandemic, weighing in on the global debate that calls for caution in administering booster dose. Vaccine efficacy against severe COVID is so high at this stage that boosters would not be appropriate, and not required
- It goes on to explain: there could be risks if boosters are widely introduced too soon, or too frequently, especially with vaccines that can have immune-mediated side-effects.
- Even if antibody levels in vaccinated individuals wane, it did not necessarily mean reduction in the efficacy of vaccines against severe disease.
- This could be because protection against severe disease is mediated not only by antibody responses, but also by long-lived memory responses and cell-mediated immunity

Cell mediated immunity

- Cell mediated immunity (CMI) is that arm of the immune response that does not involve antibodies but rather incorporates the activation of macrophages and NK cells enabling them to destroy intracellular pathogens,
- The production of antigen-specific CD8 cytotoxic T-lymphocytes (CTLs), and the release of various cytokines that influence the function of other cells involved in both the adaptive and innate immune responses in response to a Cell-mediated immunity is directed primarily at removing virus-infected cells, but is also a very important player in defending against fungi, protozoa, intracellular bacteria, and cancers.
- It also plays a major role in transplant rejection. Non-self-antigen

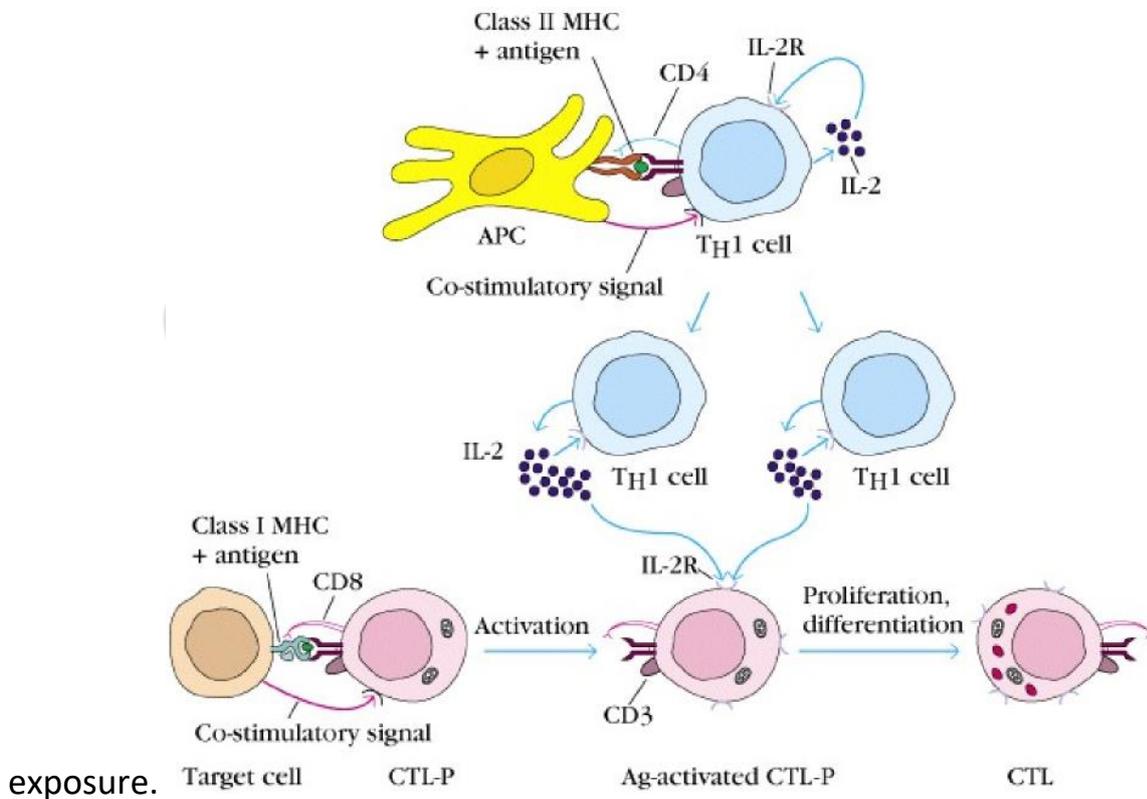
The innate immune system

- The innate immune system encompasses physical barriers and chemical and cellular defences. Physical barriers protect the body from invasion. These include things like the skin and eyelashes.
- Chemical barriers are defence mechanisms that can destroy harmful agents. Examples include tears, mucus, and stomach acid.
- Cellular defences of the innate immune response are non-specific. These cellular defences identify pathogens and substances that are potentially dangerous and take steps to neutralize or destroy them.

Adaptive immunity

- Adaptive immunity is an organism's acquired immunity to a specific pathogen.
- As such, it's also referred to as acquired immunity. Adaptive immunity is not immediate, nor does it always last throughout an organism's entire lifespan, although it can.

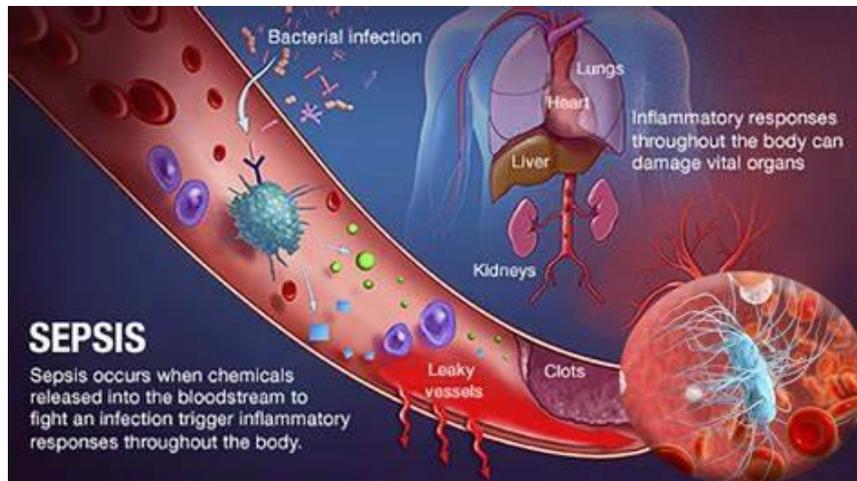
- The adaptive immune response is marked by clonal expansion of T and B lymphocytes, releasing many antibody copies to neutralize or destroy their target antigen.
- The first time the body encounters a novel disease agent its response is known as the primary immune response. When B lymphocytes, or B cells, encounter a novel antigen, they create antibodies specific to the antigen designed to destroy or neutralize it.
- Simultaneously, B cells create memory cells, which are a type of B cell that survives for decades and can detect the pathogen during subsequent



Sepsis

- Sepsis is defined as organ dysfunction resulting from the host's deleterious response to infection.

- One of the most common organs affected is the kidneys, resulting in sepsis associated acute kidney injury (SA-AKI) that contributes to the morbidity and mortality of sepsis.



LCA mk2

- The configuration for the Light Combat Aircraft (LCA)-Mk2 has been frozen and steel cutting is expected to begin soon while configuration for the fifth-generation Advanced Medium Combat Aircraft (AMCA) has been frozen.
- The HAL Tejas Mark 2, or Medium Weight Fighter (MWF), is an Indian single-engine, canard delta wing, Multirole combat aircraft designed by the Aeronautical Development Agency (ADA) in collaboration with Aircraft Research and Design Centre (ARDC) of Hindustan Aeronautics Limited (HAL) for the Indian Air Force (IAF).

Hydraulic jump

- New research published in Science reveals that 'hydraulic jumps' can be behind the cloudy ice plumes preceding deadly tornadoes.
- This is like what happens when streams of water smoothly run down a dam slopes but suddenly burst into froth when joining slower water below

- What is hydraulic jump?
- A hydraulic jump is a phenomenon in the science of hydraulics which is frequently observed in open channel flow such as rivers and spillways.
- When liquid at high velocity discharges into a zone of lower velocity, a rather abrupt rise occurs in the liquid surface.
- The rapidly flowing liquid is abruptly slowed and increases in height, converting some of the flow's initial kinetic energy into an increase in potential energy, with some energy irreversibly lost through turbulence to heat.



Yukawa force

- A novel experiment, described in a paper in Science, sets stringent bounds on what is called the fifth force or the Yukawa force – a component that plays a role in some extensions of the standard model beyond the four known fundamental forces weak, strong, electromagnetic and gravitational.
- Yukawa force : The strong, short-range force between nucleons, as calculated on the assumption that this force is due to the exchange of a particle of finite mass (Yukawa meson)
- Nucleon is the collective term for protons and neutrons. Nucleons are the particles found in the nucleus of atoms.

Orca

- Orca, the largest direct-air carbon capture facility, started operations in Iceland.
- It will pull CO₂ from the air and trap it in the ground.
- It will do this at the rate of 4,000 tonnes of carbon dioxide per year, which is the amount the world would release in four second

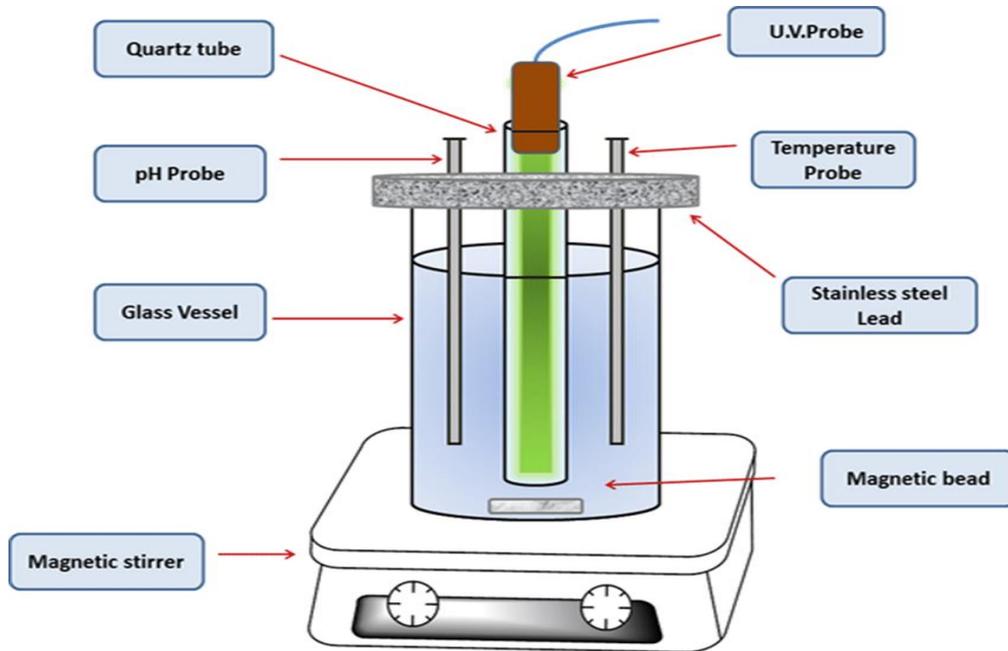
AOP Technique

- Indian researchers have developed an improved water management system that can completely reuse dye wastewater from textile industries, eliminating its toxicity and making it suitable for domestic and industrial usage.
- It can reduce water treatment costs and facilitate reuse of water in dry regions, it added.
- The current three-stage treatment process for wastewater consisting of primary, secondary, and tertiary treatment is unable to treat toxic industrial wastewater.

AOP Technique

- The standalone advanced oxidation process (AOP) treatment technique for colour and odour properties in industrial effluents (dye based) may be insufficient to meet the set government standards and is also limited due to the high cost of AOPs involving continuous supply of chemical reagents.
- It cannot remove the synthetic industrial dyes and the effervescent colour and odour, which have a long lasting carcinogenic and toxic effect on the ecological balance, especially aquatic life

- AOP technology targeting zero discharge water management system is being utilised for complete reuse of industrial dye wastewater for domestic and industrial usage.



Shape shifting

- Climate change affects not only humans but also animals.
- In adapting to a warming planet, some warm-blooded animals are shape shifting and getting larger beaks, legs and ears to better regulate their body temperatures (Trends in Ecology and Evolution). Strong shape shifting has particularly been reported in birds
- “Shape shifting does not mean that animals are coping with climate change and that all is fine.
- It just means they are evolving to survive it but we're not sure what the other ecological consequences of these changes are, or indeed that all species are capable of changing and surviving,”
- Age Appropriate Design Code or the Children’s Code

- The U.K. government brought into effect the Age Appropriate Design Code or the Children’s Code, as an amendment to the Data Protection Act, 2018, operationalizing a set of regulations that will make using the digital space safer for children.
- While the Code is officially in place only in the U.K., tech majors such as TikTok, Instagram and YouTube have tightened safety rules for children
- The Children’s Code is a data protection code of practice for online services likely to be accessed by children.
- The Code, applies to “information society services likely to be accessed by children”.
- The definition of an ISS is “any service normally provided for remuneration, at a distance, by electronic means and at the individual request of a recipient of services”.
- This includes apps; programs; search engines; social media platforms; online messaging or internet-based voice telephony services; online marketplaces; content streaming services (like video, music or gaming services); online games; news or educational websites; and any websites offering other goods or services to users on the internet

Corona variant

- Neither of the two coronavirus variants recently identified by the World Health Organization (WHO) that may pose a global threat has been found in India, As per the Indian SARS-CoV-2 Genomics Consortium (INSACOG)
- The INSACOG is a consortium of laboratories tasked with analysing emerging coronavirus variants.
- The WHO added B.1.621 (including B.1.621.1) to its list of variants of interest (VoI) and named it “Mu”.

- Vol is a step lower than VoC, or variants of concern.
- Mu has mutations that potentially allow it to evade the protection conferred by vaccines

Electric vehicle

- First, the government increased the FAME-II incentives for electric two-wheelers (E2W) to ₹15,000/kWh. Second, more States such as Gujarat and Maharashtra have announced State-level electric vehicle incentives as part of their State policies. Third, many start-ups are launching new electric two-wheeler models.
- As a result, E2W sales in India are likely to at least double in 2021 compared with 2020 levels.
- Reluctance
- The industry leaders (Hero MotoCorp, Honda, TVS, Bajaj, Suzuki, Royal Enfield and Yamaha), who account for nearly 99% of all two wheelers sold in India, offer only two electric models between them, and only in a handful of cities.

Way ahead

- The first is to establish a zero emission vehicles (ZEV) credit programme.
- This requires manufacturers of vehicles to ensure that either a certain fraction of their sales are ZEVs or that they purchase ZEV credits from manufacturers who have sold more ZEVs than required by the credit programme.
- The second is by putting in place a fuel efficiency/CO2 emission standard stringent enough that it can best be met by making and selling ZEVs
- E2W purchased today will contribute to an absolute reduction in greenhouse gas emissions.

Li Fi

- A new way of connecting to the internet which uses light is on show. Li Fi is light based Wi Fi, it uses light instead of radio waves. Light has the ability to unscrew 1,000 times more bandwidth than radio for carrying data. A Li Fi network uses the light from LED lamps to send data to a device and infrared light from the device to transmit data back. Multiple lights can be added to a single network allowing you to move around a space from light to light without any interruption to the connection.
- Each Li Fi lamp acts as a transmitter and receiver, sending out and collecting data from nearby users.
- A Li Fi enabled device such as a laptop or tablet has a receiver to pick up light signals and a transmitter to send signals back to the lamp. Light waves and radio waves are both part of the electromagnetic spectrum
- LiFi technology will allow us to connect to the internet using light from lamps, streetlights or LED televisions. In addition to being cheaper, safer and faster than WIFI, it does not need a router. All you need to do is point your mobile or tablet towards a light bulb to surf the web.
- Light waves have a frequency more than 1,000 times greater than radio waves. The user doesn't have to be directly under a lamp. Light reflected off walls and other surfaces also carries the digital signal.
- The Li Fi product consists of three primary sub-assemblies like emitter, RF driver, Power supply.
- Li Fi technology operate with variety of LED lights and there is no interfere with other communications systems. Li-Fi can transmit more data to more users in a room because you can add more lights extending the capacity.
- With Li Fi you can lock the door on your data. Li Fi can be more beneficial in hospitals and aircraft where Wi-Fi will be in trouble due to interference.

- We can insert LED light anywhere and there can be data. Li Fi technology is working RF hostile network areas. Li Fi is providing high speed, dense and reliable networks.
- Pharmacists use Li fi for receiving and screening electronically approved prescriptions directly in the unit.
- Retailers can use Li Fi for understanding behaviour for most customers.
- For understanding the demographics of their shoppers
- For targeting marketing campaigns
- Conducting display advertising campaigns
- Checking real-time stock availability.



Applications

- Directional lighting
- Energy efficiency
- Intrinsic security
- High data rate capability
- Signal blocking by walls
- Integrated networking capability

Supercomputers

- A computer with a high level of computing performance compared to a general purpose computer and performance measured in FLOPS.
- High speed and High memory are the two important points of a supercomputer. The performance of supercomputers is generally evaluated in petaflops.
- Sequoia supercomputer of 17.1 petaflops, PANGAEA III **supercomputer of 17.8** petaflops, Lessen, SuperMUC-NG, AI Bridging Cloud Infrastructure, Trinity
- Memory is averaged around 250000 times of the normal computer. Housed in large clean rooms with high air flow to permit cooling. Used to solve problems that are too complex and huge for standard computers.
- Supercomputers have a high level of computing performance compared to a general purpose computer. There are top 3 supercomputers and the National Supercomputing Mission.
- In 1964, Cray's CDC 6600 replaced Stretch as the fastest computer on earth with 3 million floating-point operations per second (FLOPS). The term supercomputer was coined to describe CDC 6600.
- Earlier supercomputers used to have very few processors.
- The technology evolved and vector processing was turned into parallel processing, use of processors multiplied manifold resulting into super-fast supercomputers of the current decade.
- India started its journey towards supercomputers after it was denied the import of Cray supercomputers from the United States of America.
- America thought India might use the same technology for the development of military rather than civilian purposes since supercomputers came under dual-use technology. Then India developed its own technology.

- The first indigenous supercomputer was developed indigenously in 1991 by Centre for Development of Advanced Computing which was called as PARAM 8000.
- PARAM 8000 installed at ICAD Moscow in 1991 under Russian collaboration.
- In 2007, India held top 10 spots for speeds of supercomputers.
- India has now 9 supercomputers with speeds in top 500

How powerful are supercomputers as compared to a general computer?

- The performance of ordinary computers is generally quoted in MIPS (million instructions per second).
- MIPS is about the fundamental programming commands (read, write, store, and so on) the processor can manage.
- Supercomputers are rated and handled in a different way because they are dealing with scientific calculations.
- They are measured according to how many floating point operations per second (FLOPS) they can do.
- Since supercomputers were first developed, their performance has been measured in successively greater numbers of FLOPS.
- Supercomputers have a high level of computing. The super computers unit, flops and names are mentioned below.

Unit	Flops	Name of super computers
Hundred Flops	10^2	ENIAC
KFLOPS	10^3	IBM704
MFLOPS	10^6	CDC 6600

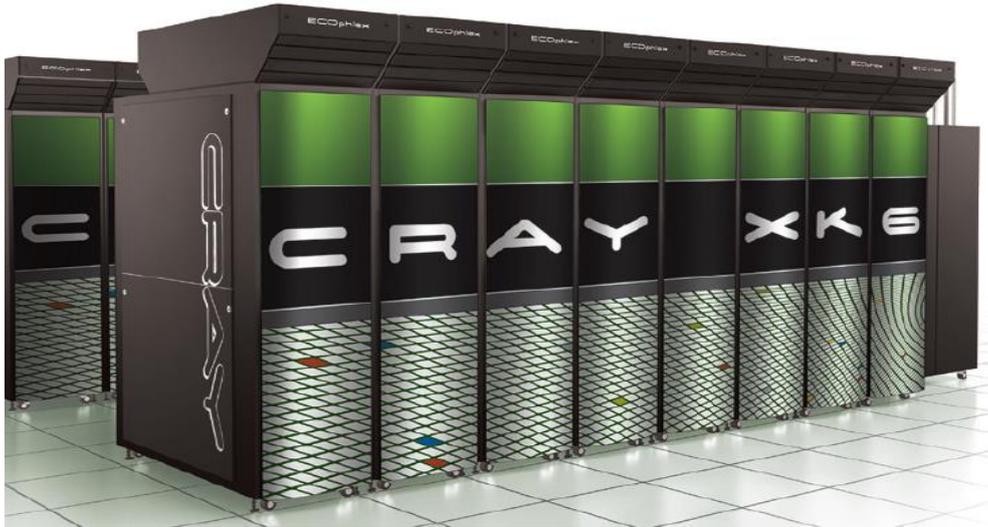
GFLOPS	10^9	Cray-2
TFLOPS	10^{12}	ASCI Red
PFLOPS	10^{15}	Jaguar

Name of few supercomputers

- Sunway TaihuLight was developed in China.
- Titan from the US. Computing capacity is 17.5 petaflop/s.
- PARAM Shivaye: The supercomputer of 833 teraflop capacity, built at the cost of Rs 32.5 crore, under the National Supercomputing Mission at IIT-BHU.
- Pratyush: This is the latest supercomputer that is kept at IITM, Pune “Pratyush” is a Cray-XC40 System running at the performance of 4,006 TFLOPS and a total system memory of 414TB. The system is composed of 18 Compute cabinets and uses Cray’s Aries AOC with Dragonfly Interconnect network topology. It has a peak performance of 42.56 TFLOPS and a total memory of 1.5TB.

Cray-1 Supercomputer

- The Cray-1 was the first supercomputer to successfully implement the vector process design. These systems improve the performance of math operations by arranging memory and register to quickly perform a single operation on a large set of data.



Various applications of supercomputers in different areas

1. Academic research
2. Monsoon and weather forecasting
3. High level computation
4. Data Mining
5. Space operations
6. DNA computing
7. Quantum computing
8. Medical fields

US Methane emission plan

- U.S. President Joe Biden announced the Global Methane Pledge, a U.S.–EU led effort to cut methane emissions by a third by the end of this decade
- This will not only rapidly reduce the rate of global warming, but it will also produce a very valuable side benefit, like improving public health and agricultural output,”
- Methane, a greenhouse gas, is 80 times more potent than carbon dioxide in terms of its global warming capacity.

- Approximately 40% of methane emitted is from natural sources and about 60% comes from human-influenced sources, including livestock farming, rice agriculture, biomass burning and so forth
- The world is on a catastrophic pathway to 2.7 degrees Celsius heating
- India has announced a renewable energy capacity goal of 450 GW by 2030 and Indian Railways has committed to achieving 'net zero' emissions by that year, but India as a whole has not committed to a time frame for reaching that target.
- Some 130 countries are considering a net zero emissions target by 2050.

Serotype 2 Dengue

- Dengue infections are caused by four closely related viruses named DEN-1, DEN-2, DEN-3, and DEN-4. These four viruses are called serotypes because each has different interactions with the antibodies in human blood serum.
- The four dengue viruses are similar they share approximately 65% of their genomes but even within a single serotype, there is some genetic variation.
- Despite these variations, infection with each of the dengue serotypes results in the same disease and range of clinical symptoms.
- Dengue virus belongs to the family Flaviviridae and comprises four antigenically distinct groups, designated as serotypes 1–4.
- Human infections are acquired by the bite of the mosquito, usually by *Aedes aegypti*, and often present as a self-limited febrile illness, dengue fever.
- Some of these infections may progress to a more severe condition, dengue haemorrhagic fever (DHF), characterized by thrombocytopenia and plasma leakage.
- All four dengue virus serotypes have the potential to cause DHF. However, studies in Southeast (SE) Asia suggest that secondary infection with dengue

serotype 2 (DEN-2) virus is more likely to cause severe disease than do other serotypes

- Dengue serotype 2 (DEN-2) viruses with the potential to cause dengue haemorrhagic fever have been shown to belong to the Southeast (SE) Asian genotype.
- These viruses appear to be rapidly displacing the American genotype of DEN-2 in the Western Hemisphere

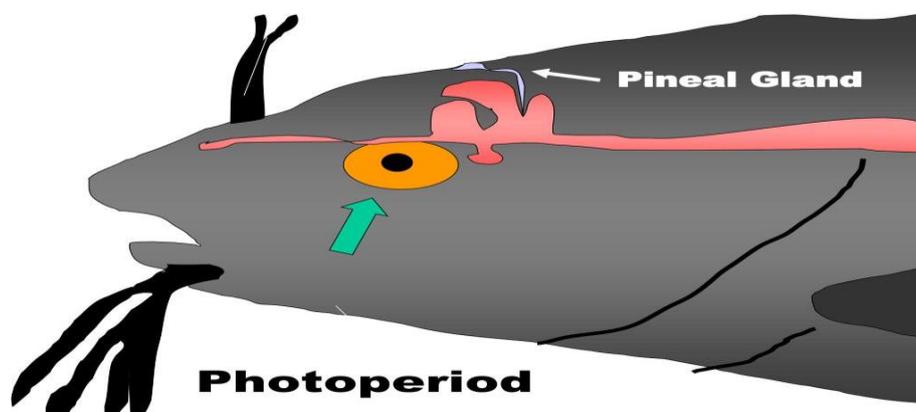
Alternative to single use plastic

- According to a report by Central Pollution Control Board of India, for the year 2018-2019, 3.3 million metric tonnes of plastic waste are generated by Indians.
- The bad news is that this may well be an under-estimation of the problem.
- Another alarming statistic is that of all the plastic waste produced in the world, 79% enters the environment. Only 9% of all plastic waste is recycled.
- Accumulation of plastic waste is detrimental to the environment and when this waste finds its way into the sea, there can be major harm to aquatic ecosystems, too.

Pineal organ

- In fish, the pineal organ uses two proteins known as opsins present in a single cell to detect colour.
- Lampreys – jawless fish that retained many primitive vertebrate features use a two-cell system.
- Researchers hypothesise that the one-cell system may have evolved from the two-cell system.
- The pineal gland was described as the “Seat of the Soul” by Renee Descartes and it is located in the centre of the brain.

- The main function of the pineal gland is to receive information about the state of the light-dark cycle from the environment and convey this information to produce and secrete the hormone melatonin.
- Extreme premature infants carry high risk of brain damage.
- A new study from Vienna finds a connection between gut microbiome and brain damage.
- An excess of Klebsiella in the gut was found to be associated with high presence of certain immune cells and also neurological damage in premature babies.



This study suggests a way to prevent this damage.

- Klebsiella is a type of Gram-negative bacteria that can cause different types of healthcare-associated infections, including pneumonia, bloodstream infections, wound or surgical site infections, and meningitis.

Amyloid plaque

- In Alzheimer's disease, amyloid plaques build up in the person's brain for nearly two decades before the first signs such as forgetfulness are exhibited.
- Now an algorithm, published in a paper in Neurology, by using data from a single PET brain scan of the amyloid and the person's age, can yield an estimate of how much longer it will take for the symptoms to manifest.
- A brain positron emission tomography (PET) scan is an imaging test of the brain.

- It uses a radioactive substance called a tracer to look for disease or injury in the brain.
- A PET scan shows how the brain and its tissues are working.
- Amyloid plaques are aggregates of misfolded proteins that form in the spaces between nerve cells.
- These abnormally configured proteins are thought to play a central role in Alzheimer's disease.
- The amyloid plaques first develop in the areas of the brain concerned with memory and other cognitive functions

Helina

- The helicopter-launched Nag Anti-Tank Guided Missile (ATGM), Helina, being developed indigenously, has completed all trials
- Helina is a third-generation fire-and-forget class ATGM mounted on an indigenous Advanced Light Helicopter (ALH), and has a minimum range of 500 metres and a maximum range of 7 kilometres.
- It is developed by DRDO.

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- While plastic waste causes one type of pollution, agricultural stubble burning is responsible for air pollution in several State.
- Researcher developed polymers using non-edible oil and cellulose extracted from agricultural stubble.
- These polymers can be moulded into sheets having properties suitable for making bags, cutlery or containers.
- The material so made is bio-degradable, leak-proof and non-toxic

Green hydrogen

- The forthcoming 26th UN Climate Change Conference of the Parties (COP26) in Glasgow from November 1-12, 2021 is to re-examine the coordinated action plans to mitigate greenhouse gases and climate adaptation measures.
- Governments are placing large bets in the hope of adopting a multi-faceted practical approach to utilise 'Green hydrogen' as a driving source to power our industries and light our homes with the 'zero emission' of carbon dioxide.
- Hydrogen as energy source
- Hydrogen is the most abundant element on the planet, but rarely in its pure form which is how we need it. It has an energy density almost three times that of diesel.
- This phenomenon makes it a rich source of energy, but the challenge is to compress or liquefy the LH2 (liquid hydrogen);
- it needs to be kept at a stable minus 253° C (far below the temperature of minus 163° C at which Liquefied Natural Gas (LNG) is stored; entailing its 'prior to use exorbitant cost
- Black hydrogen is produced by use of fossil fuel, whereas pink hydrogen is produced through electrolysis, but using energy from nuclear power sources.

- 'Green hydrogen', the emerging novel concept, is a zero-carbon fuel made by electrolysis using renewable power from wind and solar to split water into hydrogen and oxygen.
- This 'Green hydrogen' can be utilised for the generation of power from natural sources wind or solar systems and will be a major step forward in achieving the target of 'net zero' emission.
- Presently, less than 0.1% or say ~75 million tons/year of hydrogen capable of generating ~284GW of power, is produced
- The 'production cost' of 'Green hydrogen' has been considered to be a prime obstacle.
- According to studies by the International Renewable Energy Agency (IREA), the production cost of this 'green source of energy' is expected to be around \$1.5 per kilogram (for nations having perpetual sunshine and vast unused land), by the year 2030; by adopting various conservative measures.
- The global population is growing at a rate of 1.1%, adding about 83 million human heads every year on the planet.
- As a result, the International Energy Agency (IEA) forecasts the additional power demand to be to the tune of 25%-30% by the year 2040.
- India is the world's fourth largest energy consuming country (behind China, the United States and the European Union), according to the IEA's forecast, and will overtake the European Union to become the world's third energy consumer by the year 2030.
- India is also gradually unveiling its plans.
- The Indian Railways have announced the country's first experiment of a hydrogen-fuel cell technology-based train by retrofitting an existing diesel engine

- It is high time to catch up with the rest of the world by going in for clean energy, decarbonising the economy and adopting 'Green hydrogen' as an environment-friendly and safe fuel for the next generations.

Man-made fibres (MMF)

- Fibres are classified in 2 groups; natural fibres and man-made fibres (MMF).
- Natural fibres are fibres made by nature. Typical examples are cotton and wool, which are mainly used in textile clothing but there are many other natural fibres produced in smaller quantities such as e.g. silk, flax or hemp.
- Man-made fibres (MMF) are fibres made by man. MMF can be organic or inorganic. Organic MMF can be made from natural materials like wood, or are made from synthetic polymers.
- For more information, visit the website of BISFA - the International Bureau for the Standardization of Man-made Fibres.
- Viscose is a typical example and an important MMF, which is made from wood pulp, a cellulose material.
- Other MMF are petroleum based synthetic fibres such as polyamide, polyester, acrylic, aramids, etc.
- MMF are not only used in all kinds of textiles and apparel, but also in a wide range of technical applications.

India-US Climate and Clean Energy Agenda 2030 Partnership

- Climate Action and Finance Mobilisation Dialogue (CAFMD), one of the two main tracks of the U.S.-India Agenda 2030 Partnership that announced at the Leaders' Summit on Climate in April 2021
- "India-US Climate and Clean Energy Agenda 2030 Partnership."

- The Partnership will represent one of the core venues for India-US collaboration and focus on driving urgent progress in this critical decade for climate action.
- Both India and the United States have set ambitious 2030 targets for climate action and clean energy. In its new nationally determined contribution, the United States has set an economy-wide target of reducing its net greenhouse gas emissions by 50-52 percent below 2005 levels in 2030.
- As part of its climate mitigation efforts, India has set a target of installing 450 GW of renewable energy by 2030.
- Through the Partnership, India and the United States are firmly committed to working together in achieving their ambitious climate and clean energy targets and to strengthening bilateral collaboration across climate and clean energy.
- The Partnership will aim to mobilize finance and speed clean energy deployment; demonstrate and scale innovative clean technologies needed to decarbonize sectors including industry, transportation, power, and buildings; and build capacity to measure, manage, and adapt to the risks of climate-related impacts.

Botanical survey 2020

- The Botanical Survey of India, in its new publication Plant Discoveries 2020 has added 267 new taxa/ species to the country's flora.
- The 267 new discoveries include 119 angiosperms; 3 pteridophytes; 5 bryophytes, 44 lichens; 57 fungi, 21 algae and 18 microbes.
- Among the new discoveries this year, nine new species of balsam (*Impatiens*) and one species of wild banana (*Musa pradhanii*) were discovered from Darjeeling and one species each of wild jamun (*Syzygium anamalaianum*) from Coimbatore in Tamil Nadu and fern (*Selaginella odishana*) were recorded from Kandhamal in Odisha.

- 22% of the discoveries were made from the Western Ghats followed by the Western Himalayas (15%), the Eastern Himalayas (14%) and the Northeast ranges (12%).
- The west coast contributed 10% while the east coast contributed (9%) in total discoveries; the Eastern Ghats and south Deccan contribute 4% each while the central highland and north Deccan added 3% each.

World Rhino day

- The “world’s largest stockpile” of rhino horns was consigned to flames in eastern Assam’s Bokakhat, the headquarters of the Kaziranga National Park and Tiger Reserve.
- The event, timed with World Rhino Day, was aimed at dispelling myths that have driven the illegal horn trade and the poaching of the animal
- Organised this event to convey to the world that rhino horns are just a mass of compacted hair and they have no medicinal value.
- We urge people not to kill these rare animals or buy their horns based on superstitions or myths.



World Rhino day

- Every year on September 22, the world honours the five species of rhinos.
- The five rhino species are Black, White, Greater One-horned, Sumatran, and Javan. Humans' desire for rhinoceros' unique horns has driven all five of the world's different rhinoceros species to the brink of extinction.
- The horns are in high demand due to their therapeutic qualities
- The IUCN lists the one-horned rhino, also known as the Indian rhinoceros, as a vulnerable species. The animal is primarily found in the Himalayan foothills India and Nepal.
- A Javan rhino subspecies was declared extinct in 2011. Only 80 Sumatran rhinos are left today. The black rhino is likewise on the verge of extinction. White rhinos are the most numerous of the five rhino species, with around 20,000 in the wild.
- The larger one-horned rhino, sometimes known as the Indian rhino, is increasing in number in India as a result of conservation initiatives. There are currently around 3,500 of these rhinos. They are, however, nonetheless regarded susceptible.

WHO tighten air quality Norms

- The World Health Organisation (WHO), in its first-ever update since 2005, has tightened global air pollution standards in recognition of the emerging science in the past decade that the impact of air pollution on health is much more serious than earlier envisaged.
- The move does not have an immediate effect in India as the National Ambient Air Quality Standards (NAAQS) do not meet the WHO's existing standards.
- The government has a dedicated National Clean Air Programme that aims for a 20% to 30% reduction in particulate matter concentrations by 2024 in 122 cities, keeping 2017 as the base year for the comparison of concentration
- The upper limit of annual PM2.5 as per the 2005 standards, which is what countries now follow, is 10 microgram per cubic metre.
- That has now been revised to five microgram per cubic metre.
- The 24-hour ceiling used to be 25 microgram but has now dropped to 15.
- The upper limit of PM10, or particulate matter of size exceeding 10 microgram, is 20 microgram and has now been revised to 15, whereas the 24- hour value has been revised from 50 to 45 microgram.
- India's NAAQs last revised in 2009 specify an annual limit of 60 microgram per cubic metre for PM10 and 100 for a 24-hour period.
- Similarly it's 40 for PM 2.5 annually and 60 on a 24-hour period.
- There are also standards for a host of chemical pollutants including sulphur dioxide, lead and nitrogen dioxide
- The 10 recommendations in the COP26 Special Report on Climate Change and Health propose a set of priority actions from the global health community to governments and policy makers, calling on them to act with urgency on the current climate and health crises.

- The recommendations were developed in consultation with over 150 organizations and 400 experts and health professionals. They are intended to inform governments and other stakeholders ahead of the 26th Conference of the Parties (COP26) of the United Nations Framework Convention on Climate Change (UNFCCC) and to highlight various opportunities for governments to prioritize health and equity in the international climate movement and sustainable development agenda. Each recommendation comes with a selection of resources and case studies to help inspire and guide policymakers and practitioners in implementing the suggested solutions.

Sea level Rise

- The recently published Intergovernmental Panel on Climate Change (IPCC) Assessment Report from Working Group I 'Climate Change 2021: The Physical Science Basis' is a clarion call for climate action.
- It provides one of the most expansive scientific reviews on the science and impacts of climate change.
- The report discusses five different shared socio-economic pathways for the future with varying levels of greenhouse gas (GHG) emissions.
- The scenarios illustrated are the following: very low and low GHG emissions, where emissions decline to net zero around or after the middle of the century, beyond which emissions are net negative; intermediate GHG emissions; high and very high emissions where they are double the current levels by 2100 and 2050, respectively.
- Even in the intermediate scenario, it is extremely likely that average warming will exceed 2°C near mid-century.

- The average global temperature is already 1.09°C higher than preindustrial levels and CO₂ concentration in the atmosphere is currently 410 ppm compared to 285 ppm in 1850

Coastal region

- Close to 700 million people worldwide live along the coast and there continue to be plans to expand coastal cities.
- Therefore, understanding the risks involved from climate change and sea level rise in the 21st and 22nd centuries is crucial.
- Sea level rise will continue after emissions no longer increase, because oceans respond slowly to warming

Sea level rise

- Sea level rise occurs mainly due to the expansion of warm ocean waters, melting of glaciers on land, and the melting of ice sheets in Greenland and Antarctica.
- Global mean sea level (GMSL) rose by 0.2m between 1901 and 2018.
- The average rate of sea level rise was 1.3 mm/year (1901-1971) and rose to 3.7 mm/year (2006-2018)
- Ice sheets can destabilise rapidly as the water gets warm (marine ice sheet instability or MISI).
- Ice cliffs can collapse swiftly in a related process, leading to rapid sea level rise; this is marine ice cliff instability (MICI).
- Under strong warming scenarios, ice shelves become vulnerable and lead to MISI
- According to the UN Environment Programme Emissions Gap Report, the world is heading for a temperature rise above 3°C this century, which is double the Paris Agreement aspiration.

- And there is deep uncertainty in sea level projections for warming above 3°C.

Vulnerability in India

- Communities along the coast in India are vulnerable to sea level rise and storms, which will become more intense and frequent.
- They will be accompanied by storm surges, heavy rain and flooding.
- Even the 0.1m to 0.2m rise expected along India in the next few decades can cause frequent coastal flooding
- Adaptation to sea level rise must include a range of measures, along with coastal regulation, which should be stricter, not laxer, as it has become with each update of the Coastal Regulation Zone.
- The government should not insure or bail out speculators, coastal communities should be alerted in advance and protected during severe weather events, natural and other barriers should be considered in a limited manner to protect certain vulnerable areas, and retreat should be part of the adaptation strategies for some very low lying areas

Low rainfall in August

- "During August 2021, rainfall over the country as a whole was below Long Period Average (LPA) by minus 24 per cent. It is also the lowest August rainfall in last 12 years after 2009,"
- The formation of less number of low pressure systems (LPS) and their lesser number of days compared to the climatology and absence of their longer westward movements during the month of August 2021 contributed to the large deficient rainfall in central India as well as all India, the IMD said.

- It said negative Indian Ocean Dipole (IOD) over tropical Indian Ocean, unfavourable for Indian monsoon prevailed throughout the month of the August, which also contributed to deficient rainfall over India in the month.
- A negative IOD is associated with the heating of waters of the Indian Ocean
- Sustained changes in the difference between sea surface temperatures of the tropical western and eastern Indian Ocean are known as the Indian Ocean Dipole or IOD.

Polar amplification

- Polar amplification is defined as the increased rate at which the Arctic Ocean is warming compared to the other planet. The Arctic gets heat up or warm at a faster rate than the other planets due to the positive feedback loops that occur when ice and snow is lost.
- Snow and ice reflect light. When we lose ice in the Arctic, it is replaced with sea water. Sea water is dark and it absorbs more light than the snow and the ice did. This increases warming because less energy is being reflected and more is absorbed.

Importance of Polar amplification

- According to climate prediction what climate looks like in the future substantial levels of arctic amplification in the near future? The Arctic has been warming twice as much as the rest of earth. It is the phenomenon that any change in the net radiation balance tends to produce a larger change in temperature near the poles than the planetary average. It is also referred to as the ratio of polar warming to tropical warming. Changes to the earth's atmosphere lead to a larger difference in temperature near the north and south poles than to the rest of the world. For measuring the average temperature of the planet. When the

atmosphere's net radiation balance is affected by an increase in greenhouse gases, then it is affected. Greenhouse gases are naturally present in our atmosphere. However, if they are too concentrated, they prevent heat from escaping into space and cause the earth to warm. Climate change due to increased greenhouse gases is causing Arctic ice to melt. Scientists generally agree that polar amplification is primarily caused by melting ice. Ice is more reflective and less absorbent of light than land or the surface of an ocean. When ice melts, it typically uncovers darker land or sea, leading to increased sunlight absorption. Greater absorption of this solar radiation causes more heating and leads to increased melting. Scientists refer to this phenomenon as the ice-albedo feedback, where warming causes yet more warming to occur.

- Melting ice
- Rising sea levels and temperatures
- Melting permafrost