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विज्ञान एवं प्रौद्योगिकी मन्त्रालय
MINISTRY OF SCIENCE AND TECHNOLOGY



MK Yadav Sir

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INDIA-JAPAN RELATIONSHIP

(Syllabus: GS Paper 2 – IR)

India, Japan conduct '2+2' dialogue with focus on Indo-Pacific

Two sides hold discussion on defence cooperation, significance of open Indo-Pacific; Rajnath says partnership is based on democratic values

Press Trust of India
NEW DELHI



Japan's Minister of Defence Minoru Kihara receives the guard of honour in the presence of Rajnath Singh. SHASHI SHEKHAR KASHYAP

The India-Japan partnership is set against a larger context of a free, open and rules-based Indo-Pacific and it will continue to grow, External Affairs Minister S. Jaishankar said on Tuesday as both sides held a fresh edition of "2+2" dialogue amid China's increasing military muscle-flexing in the region.

The Japanese delegation at the talks in Delhi was headed by Foreign Minister Yoko Kamikawa and Defence Minister Minoru Kihara. Mr. Jaishankar and Defence Minister Rajnath Singh headed the Indian team.

"In the last decade, our relationship has assumed the form of a special strategic and global partnership. The logic of this evolution is our expanding interests and growing activities," Mr. Jaishankar said.

"As we both step forward into a more volatile and unpredictable world, there is a need for reliable partners with whom there are substantial convergences," he said.

"As a result, we have consciously sought to facilitate each other's endeavours, comprehend each other's objectives, strengthen each other's positions and work with other nations of shared comfort," he added.

In his remarks, Mr. Singh said the India-Japan special strategic and global partnership is based on democratic values and the rule of law.

He said India has set a goal of becoming a developed country by 2047 and building domestic defence capabilities is one of the significant aspects of this vision.

"The India-Japan partnership in the defence sector will be an important aspect to realise our goal. Let us make a vision for this partnership," the Defence Minister said.

Context: The India-Japan partnership, grounded in a commitment to a free, open, and rules-based Indo-Pacific, is poised to strengthen further, as both nations held a new round of "2+2" dialogue amid rising Chinese military assertiveness in the region.

India-Japan Relationship

- **Historical Relation:** India and Japan share a deep historical relationship dating back to the 6th century when Buddhism was introduced to Japan, profoundly influencing Japanese culture through Indian cultural exchanges.
- **Political Relationship**: India and Japan established diplomatic relations in 1952. The India-Japan relationship was elevated to a 'Global and Strategic Partnership' in 2006, expanding from trade and aid to strong security ties.
  - This partnership gained momentum with visits by the Japanese Emperor in 2013 and PM Shinzo Abe in 2014.
- **Trade Relations**: The Comprehensive Economic Partnership Agreement (CEPA) signed in 2011 has bolstered economic cooperation, with bilateral trade reaching >US$ 20 billion in FY2023.
- **Defense Cooperation: Tri-Service Exchanges** between Japan-India: **Dharma Guardian** (military exercise), **JIMEX, Malabar (**Maritime Exercise) & **Shinyuu Maitri** (Air Exercise).
  - **Security and Defence dialogues:** "2+2" meeting, annual Defence Ministerial Dialogue and Coast Guard-to-Coast Guard dialogues.
- **India-Led Initiatives**: Japan actively participates in India-led initiatives like the International Solar Alliance (ISA), Coalition for Disaster Resilient Infrastructure (CDRI), and Leadership Group for Industry Transition (LeadIT).
- **Science and Technology Cooperation**: Bilateral Science & Technology Cooperation Agreement, India-Japan Digital Partnership (IJDP) etc.
  - Cooperation in **Nuclear Energy.**
  - **SRO** & **JAXA** signed an MoU for exploration of outer space for peaceful purposes.
- **Skill Development**: Under the India-Japan MoC signed in 2016, Japanese companies have established 35 Japan-India Institute of Manufacturing (JIM) in India and 11 Japanese Endowed Courses (JEC) in Indian Engineering Colleges.

TIMES OF INDIA

Aug 20

MIYAWAKI METHOD

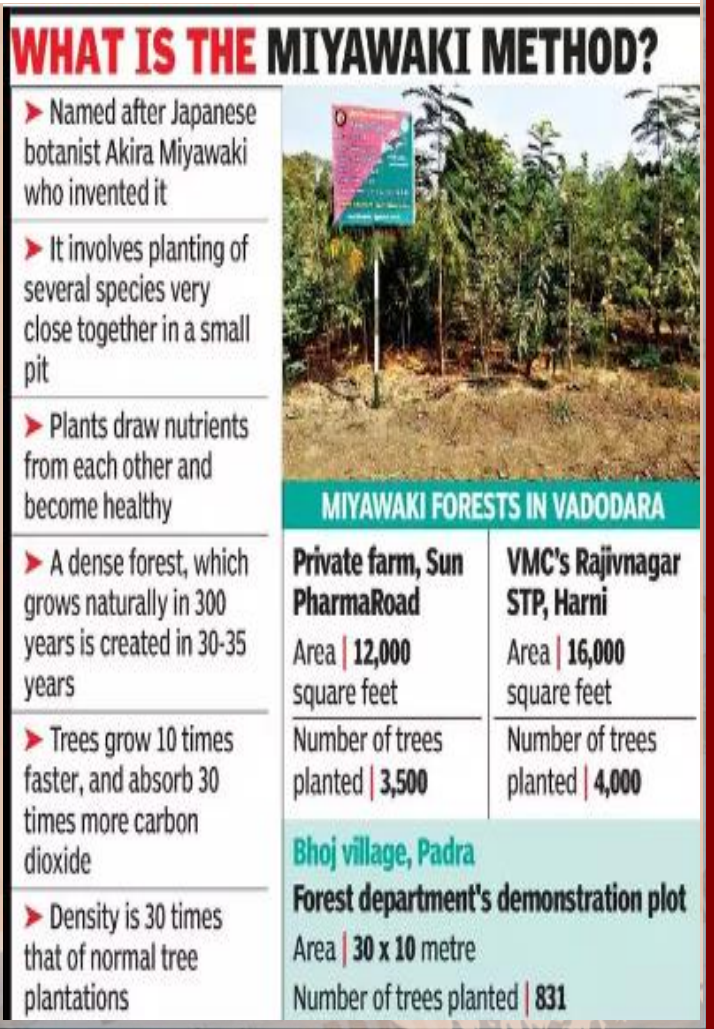
(Syllabus GS Paper 3 – Env and Eco)

Japan's Miyawaki mini forests to combat urban heat island, pollution: Forest dept

Context: The Chhattisgarh Forest Department recently held a Van Mahotsav in the MCB district, where saplings were planted using the Miyawaki method.

Miyawaki Method

- **About:** it is a dense afforestation technique that uses native plant species to create multilayered forests with perforators, water retainers, organic manure and mulch; guarantees a high survival and growth rate compared with conventional methods
- **Also called the:** Potted seedling method
- **Developed by**: Japanese botanist Professor Akira Miyawaki.
- **Objective**: To densify green cover within small areas of land, promoting biodiversity and ecosystem health.
- **Self-Sustainability**: Trees planted using the Miyawaki method reach their full length within three years and become self-sustaining, requiring minimal maintenance.
- **Benefits**
  - A dense green buffer between garbage mound and habitation/ national highway.
  - At a test stage to see what kind of species will survive in the area.
  - To act as a carbon sink.
  - Results from this stretch to be used for greening more patches around landfill.



PIB

Aug 20

NATIONAL GEOSCIENCE AWARDS

(Syllabus: GS Paper 1 – Awards)

President of India to Confer National Geoscience Awards-2023 Tomorrow

Context: The President of India will confer the prestigious National Geoscience Awards - 2023 at the Rashtrapati Bhavan Cultural Centre, New Delhi.

National Geoscience Awards

- **About:** It one of the oldest and most prestigious national awards in the field of geosciences.
- **Institution Year**: Instituted by the Ministry of Mines, Govt. of India in 1966.
- **Previous Name**: National Mineral Awards before 2009.
- **Purpose**: To honor individuals and teams for extraordinary achievements and outstanding contributions in various geoscience fields, including mineral discovery, exploration, mining technology, mineral beneficiation, and fundamental/applied geosciences.
- **Eligibility**: Any citizen of India with significant contributions in any geoscience field is eligible for the award.
- **Award Categories:**
  - National Geoscience Award for Lifetime Achievement.
  - National Geoscience Award.
  - National Young Geoscientist Award.
- **Recognition and Impact**: Represents recognition and appreciation for exceptional individuals and organizations in geosciences.

S.N.	Category of Award	Number of Awards
1	National GeoScience Award for Lifetime Achievement	1 Award
2	National GeoScience Awards	8 Award (3 Team Awards + 3 Joint Awards + 2 individual Awards= 20 awardees)
3	National Young Geoscientist Award	1 Award
	Total	10 Awards (22 Awardees)

THE HINDU Page 14

POCSO ACT 2012

(Syllabus: GS Paper 2 – Social Issues)

SC slams HC 'suggestions' given to adolescent girls

The Hindu Bureau
NEW DELHI



The Supreme Court on Tuesday dismissed "unwarranted" suggestions made by a Calcutta High Court Bench in a judgment last year, including that the Protection of Children from Sexual Offences (POCSO) Act, 2012, must be amended to decriminalise consensual sexual acts involving adolescents above 16 years of age.

A Bench headed by Justice A.S. Oka also slammed the High Court Bench for "surprisingly carving out a non-existing category of romantic cases in rape cases". The case in question concerned the sexual assault of a 14-year-old girl by a 25-year-old man in 2018. She was compelled to marry him and have a child.

The POCSO court had sentenced the man to 20 years' imprisonment for aggravated sexual assault under the POCSO Act and for rape. In appeal, the High Court set aside the conviction of the man under POCSO Act while making a reference to the fact that the girl had continued to stay with him after her mother had "disowned" her. The High Court had urged adolescents, especially girls, to "control their sexual urges".

The Supreme Court had taken *suo motu* cognisance of the High Court judgment of October 2023 and appointed senior advocates Madhavi Divan and Liz Mathew as *amici curiae*.

In his 50-page judgment, Justice Oka slammed the remarks made in the High Court judgment as "unwarranted". Judges, the top court said, should avoid expressing their personal views in judgments.

"The High Court was not dealing with the sexual acts involving adolescents above 16 years, as the age of the victim was 14 years and the accused was 25 years at the relevant time... Perversity is writ large on the face of the judgment," Justice Oka wrote.

The Supreme Court revived the conviction of the man for aggravated sexual assault under POCSO Act and rape.

The court directed the West Bengal government to constitute a committee of three experts, including a clinical psychologist and a social scientist, to meet with the woman and help her make an informed choice on whether she would want to continue with the man or come out and avail State benefits promised for her welfare.

Context: The Supreme Court junked "unwarranted" suggestions made by a Calcutta High Court Bench in a judgment in 2023, including that the Protection of Children from Sexual Offences (POCSO) Act of 2012 must be amended to decriminalise consensual sexual acts involving adolescents above 16 years of age.

Protection of Children from Sexual Offences (POCSO) Act of 2012

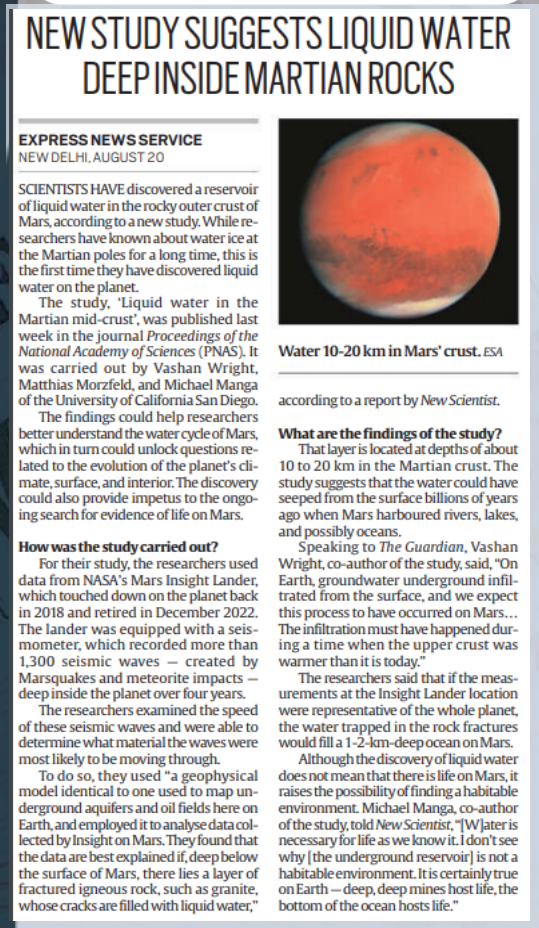
- **About:** This Act comprehensively outlines different categories of sexual offenses directed at children and imposes severe penalties on those found guilty of such crimes.
- **Salient features**:
- **Gender neutral**: The Act is gender neutral and regards the best interests and welfare of the child as a matter of paramount importance at every stage so as to ensure the healthy physical, emotional, intellectual and social development of the child.
- **Forms of abuse:** It defines different forms of sexual abuse, including penetrative and non-penetrative assault, as well as sexual harassment and pornography, and deems a sexual assault to be "aggravated" under certain circumstances.
- **Stringent Punishment:** The Act prescribes stringent punishment graded as per the gravity of the offence, with a maximum term of rigorous imprisonment for life, and fine.
- **Special Courts**: The Act mandates the creation of Special Courts to expedite the trial process for cases related to child sexual abuse.
- **Mandatory Reporting**: Any individual, including parents, teachers, or doctors, must report known cases of child sexual abuse; failure to report is a punishable offense.

Government Initiatives:

- **NCPCR's Role**: The National Commission for Protection of Child Rights (NCPCR) monitors the enforcement of the POCSO Act and other child protection laws and conducts awareness programs.
- **Guidelines for Handling Cases**: NCPCR provides guidelines and conducts training for handling child sexual abuse cases to ensure proper legal and psychological support.
- **Integrated Child Protection Scheme (ICPS)**: The ICPS aims to create a secure environment for children by establishing Child Welfare Committees (CWCs) and Juvenile Justice Boards (JJBs) to address child protection issues.

INDIAN EXPRESS Page 15

NEW STUDY ON MARS
(Syllabus: GS Paper 1 – Geography)



NEW STUDY SUGGESTS LIQUID WATER DEEP INSIDE MARTIAN ROCKS

EXPRESS NEWS SERVICE
NEW DELHI, AUGUST 20

SCIENTISTS HAVE discovered a reservoir of liquid water in the rocky outer crust of Mars, according to a new study. While researchers have known about water ice at the Martian poles for a long time, this is the first time they have discovered liquid water on the planet.

The study, 'Liquid water in the Martian mid-crust', was published last week in the journal *Proceedings of the National Academy of Sciences* (PNAS). It was carried out by Vashan Wright, Matthias Morzfeld, and Michael Manga of the University of California San Diego.

The findings could help researchers better understand the water cycle of Mars, which in turn could unlock questions related to the evolution of the planet's climate, surface, and interior. The discovery could also provide impetus to the ongoing search for evidence of life on Mars.

How was the study carried out?

For their study, the researchers used data from NASA's Mars Insight Lander, which touched down on the planet back in 2018 and retired in December 2022. The lander was equipped with a seismometer, which recorded more than 1,300 seismic waves — created by Marsquakes and meteorite impacts — deep inside the planet over four years.

The researchers examined the speed of these seismic waves and were able to determine what material the waves were most likely to be moving through.

To do so, they used "a geophysical model identical to one used to map underground aquifers and oil fields here on Earth, and employed it to analyse data collected by Insight on Mars. They found that the data are best explained if, deep below the surface of Mars, there lies a layer of fractured igneous rock, such as granite, whose cracks are filled with liquid water,"

Water 10-20 km in Mars' crust. ESA

according to a report by *New Scientist*.

What are the findings of the study?

That layer is located at depths of about 10 to 20 km in the Martian crust. The study suggests that the water could have seeped from the surface billions of years ago when Mars harboured rivers, lakes, and possibly oceans.

Speaking to *The Guardian*, Vashan Wright, co-author of the study, said, "On Earth, groundwater underground infiltrated from the surface, and we expect this process to have occurred on Mars… The infiltration must have happened during a time when the upper crust was warmer than it is today."

The researchers said that if the measurements at the Insight Lander location were representative of the whole planet, the water trapped in the rock fractures would fill a 1-2-km-deep ocean on Mars.

Although the discovery of liquid water does not mean that there is life on Mars, it raises the possibility of finding a habitable environment. Michael Manga, co-author of the study, told *New Scientist*, "[W]ater is necessary for life as we know it. I don't see why [the underground reservoir] is not a habitable environment. It is certainly true on Earth — deep, deep mines host life, the bottom of the ocean hosts life."

Context: According to a new study, there could be oceans' worth of liquid water deep in the rocky outer crust of Mars.

Liquid water in the Martian mid-crust'

- **Conducted by:** University of California San Diego.
- **Purpose of the Study**: The findings aim to enhance understanding of Mars' water cycle, which could provide insights into the planet's climate, surface, and interior evolution, and support the search for life on Mars.
- **Findings:**
  - **Location of Water**: A layer of fractured igneous rock filled with liquid water was found approximately 10 to 20 km below Mars' surface.
  - **Water Source**: The study suggests the water may have seeped from the surface billions of years ago when Mars had bodies of water like rivers, lakes, and possibly oceans.
  - **Volume of Water:** If representative of the entire planet, the water in rock fractures could form a 1-2 km-deep ocean on Mars.
- **Implications**:
  - **Potential for Life:** The discovery of liquid water does not confirm life but suggests the possibility of a habitable environment on Mars.
  - **Historical Context**: The water's presence indicates that Mars' upper crust was once warmer, allowing groundwater infiltration from the surface.

Mars

- **About**: It is the fourth planet from the Sun, derives its name from the Roman God of war and is commonly referred to **as the "Red Planet"** due to its distinctive reddish appearance.
- **Composition:** The reddish coloration of Mars is attributed to the presence of a significant amount of iron oxide, commonly known as rust, in its surface rocks and soil.
- **Size**: Mars is almost half the size of Earth, with a diameter of 6,791 kilometers, making it the second smallest planet in our solar system after Mercury.
- **Moons**: It is also home to the moons Phobos and Deimos.

THE HINDU

Science II

JUICE MISSION

(Syllabus: GS Paper 3 – Sci and Tech)

Jupiter probe to stage first lunar-earth double fly-by manoeuvre

Reuters

European scientists were due to attempt a first in orbital gymnastics late on August 19, tapping into the gravity of the earth in quick succession to guide the JUICE probe towards Jupiter in the first-ever double slingshot manoeuvre.

Just over a year after it was launched, the European Space Agency's Jupiter Icy Moons Explorer (JUICE) is returning towards the earth on August 19-20 and will use the braking effect of its gravity to take a shortcut to Venus and onwards to Jupiter.

In a novel double manoeuvre, the Airbus-built JUICE probe will first use the gravity of the moon to swing towards the earth on exactly the right trajectory.

That's risky because the slightest error at that stage would be amplified by the second part of the routine, which involves using the earth's gravity to slow down. Scientists warn that this could derail the eight-year odyssey to reach Jupiter and its moons.

"Inherently, this is a bit tricky, because you would need to correct any error, and you would need propellant for that," Nicolas Altobelli, JUICE Mission Manager, said in an interview.

Scientists have used the "gravity assist"

The fly-by will put JUICE on course to reach Jupiter in 2031 with the help of three further single gravity assists: Venus in 2025, and earth again in 2026 and 2029

method for decades to navigate the solar system while saving propellant.

It involves brushing past a planet or moon and using the power of its gravity to speed up, slow down, or alter course.

But this week's lunar-earth fly-by involves the first ever attempt to carry out two such manoeuvres back-to-back.

If successful, it will put JUICE on course to reach Jupiter and its three large ocean-bearing moons – Callisto, Europa and Ganymede – in 2031 with the help of three further single gravity assists: Venus in 2025, and then the earth again in 2026 and 2029.

ESA scientists had weighed several options for getting Juice to Jupiter without the unrealistically large rocket that would be needed to get it there without any gravity assistance at all.

Using the moon's gravity to change course allowed them to catch the earth in front of its orbit around the Sun, which has the effect of slowing down the probe, whereas passing behind the planet would speed it up, Altobelli said.

That in turn allowed ESA's planners to target Venus and take advantage of its exceptionally powerful slingshot effect.

"It's a very good configuration of the moon's position around the earth... So we are being opportunistic," Altobelli told Reuters.

Following up on NASA's 1990s Galileo mission to Jupiter, the ESA-led JUICE mission will orbit the solar system's largest planet, perform fly-bys of its three large icy moons, and finally orbit Ganymede to study its potential to support life.

"It means studying the conditions and understanding whether those moons could be a potential habitat, and could have conditions favourable for life as we know it," Altobelli said.

Context: European scientists were due to attempt a first in orbital gymnastics late on August 19, tapping into the gravity of the earth in quick succession to guide the JUICE probe towards Jupiter in the first-ever double slingshot manoeuvre.

JUICE Mission

- **About:** This is a large scale mission for the exploration of Jupiter's icy moons being led by ESA (the European Space Agency).
- **Full form:** Jupiter Icy Moons Explorer (JUICE).
- **Launch**: 14 April 2023
- **Launch vehicle:** Ariane 5
- **Objective**: The mission will utilize a suite of remote sensing, geophysical, and in situ instruments for its observations.
- **Aim**: JUICE will conduct detailed observations of Jupiter and its three large, ocean-bearing moons—Ganymede, Callisto, and Europa—using advanced remote sensing, geophysical, and in situ instruments.
- **Reasearch:** The mission aims to characterize these moons both as planetary bodies and potential habitats, exploring their geological and environmental features in depth.
    - JUICE will investigate Jupiter's complex environment, studying the planet and its moons as an archetype for gas giants throughout the Universe.
    - The mission's findings are expected to offer valuable clues about Jupiter's formation and the broader processes involved in planetary system development.
    - By examining Jupiter and its Galilean moons, JUICE seeks to provide insights into the formation of the solar system and the origins of extrasolar planetary systems.



LIVEMINT Aug 20

DengiALL

(Syllabus: GS Paper 3 – Sci and Tech)

ICMR and Panacea Biotec begin Phase 3 clinical trial of India's 1st indigenous dengue vaccine DengiAll

Context: The Indian Council of Medical Research (ICMR) and Panacea Biotec Limited announced the initiation of the first ever phase 3 clinical trial for a dengue vaccine in India.

DengiAll

- **Developed by**: Panacea Biotec, commenced with the first participant vaccinated at Pandit Bhagwat Dayal Sharma Post Graduate Institute of Medical Sciences in Rohtak.
- **Vaccine Background**: The tetravalent dengue vaccine strain (TV003/TV005), originally developed by the U.S. National Institutes of Health, has demonstrated promising results in both preclinical and clinical trials globally.
- **Development Stage**: Panacea Biotec, one of three Indian companies to receive the vaccine strain, is at the most advanced stage of developing and testing the vaccine in India.

- **Dengue**
- **About:** It is a viral infection transmitted through the bite of infected Aedes species mosquitoes.
- **Found**: Tropical and sub-tropical climates worldwide, mostly in urban and semi-urban areas.
- **Symptoms:** Usually begin 4–10 days after infection and last for 2–7 days. Symptoms may **include**: high fever, severe headache, pain behind the eyes, nausea, vomiting, swollen glands and rash.
- **Severe Symptoms**: severe abdominal pain, persistent vomiting, rapid breathing, bleeding gums or nose, fatigue and restlessness.
- **Treatment**: There is no specific treatment for dengue.

Current Scenario

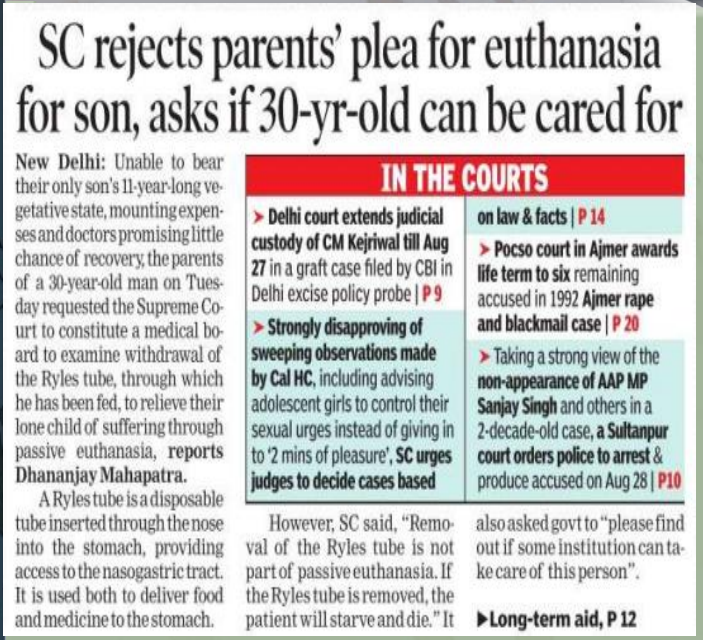
- **High Incidence:** Dengue is a significant public health issue in India, ranking among the top 30 countries globally with the highest incidence of the disease.
- **Asymptomatic Infections:** Approximately 75-80% of dengue infections in India are asymptomatic, yet these individuals can still transmit the virus via Aedes mosquito bites.
- **Risk to Children:** Among the 20-25% of symptomatic cases, children face a considerably higher risk of hospitalization and mortality.
- Currently, there is no antiviral treatment or licensed vaccine against dengue in India.

TIMES OF INDIA

Page 1

EUTHANASIA

(Syllabus: GS Paper 2 – Health/Govt Policies)



SC rejects parents' plea for euthanasia for son, asks if 30-yr-old can be cared for

New Delhi: Unable to bear their only son's 11-year-long vegetative state, mounting expenses and doctors promising little chance of recovery, the parents of a 30-year-old man on Tuesday requested the Supreme Court to constitute a medical board to examine withdrawal of the Ryles tube, through which he has been fed, to relieve their lone child of suffering through passive euthanasia, **reports Dhananjay Mahapatra.**

A Ryles tube is a disposable tube inserted through the nose into the stomach, providing access to the nasogastric tract. It is used both to deliver food and medicine to the stomach.

However, SC said, "Removal of the Ryles tube is not part of passive euthanasia. If the Ryles tube is removed, the patient will starve and die." It also asked govt to "please find out if some institution can take care of this person".

▶Long-term aid, P 12

IN THE COURTS

- **Delhi court extends judicial custody of CM Kejriwal till Aug 27** in a graft case filed by CBI in Delhi excise policy probe | P 9
- **Strongly disapproving of sweeping observations made by Cal HC**, including advising adolescent girls to control their sexual urges instead of giving in to '2 mins of pleasure', **SC urges judges to decide cases based on law & facts** | P 14
- **Pocso court in Ajmer awards life term to six** remaining accused in 1992 **Ajmer rape and blackmail case** | P 20
- Taking a strong view of the **non-appearance of AAP MP Sanjay Singh** and others in a 2-decade-old case, **a Sultanpur court orders police to arrest** & produce accused on Aug 28 | P10

Context: The Supreme Court refused to grant an aged couple's plea to allow "passive euthanasia" for their 30-year-old son, who has been lying comatose at home for 11 years after a fall from the fourth floor of a building.

Euthanasia

- **About**: Euthanasia refers to the practice of intentionally ending a person's life to relieve suffering or pain.
- **Types**:
  - **Active Euthanasia:** Involves a deliberate intervention to end a person's life using lethal substances or external force.
    - ✓ Examples include administering a lethal injection or medication with the intention of causing death.
    - ✓ Illegal in India.
  - **Passive Euthanasia**: Involves withdrawing life support or medical treatment necessary to keep a terminally ill person alive.
    - ✓ It includes withholding essential treatment like antibiotics or disconnecting life-supporting equipment such as ventilators.
    - ✓ Legal in India.
- **Living Will**: It is a legal document that outlines an individual's medical treatment preferences in case they become unable to communicate.
- **Different Countries with Euthanasia**: Netherlands, Luxembourg, and Belgium allow both euthanasia and assisted suicide under certain conditions.
  - Switzerland bans euthanasia but allows assisted dying in the presence of a doctor or physician.
  - United Kingdom considers it illegal and equivalent to manslaughter.

Supreme Court judgement

- **Common Cause vs Union of India (2018)**: The Supreme Court reaffirmed that the right to die with dignity, including passive euthanasia based on a 'living will,' is a fundamental right under Article 21.
- **Aruna Shanbaug versus Union of India:** Court allowed passive euthanasia in certain situations, making a distinction between active and passive forms.

NDTV Aug 20

PARVOVIRUS B19

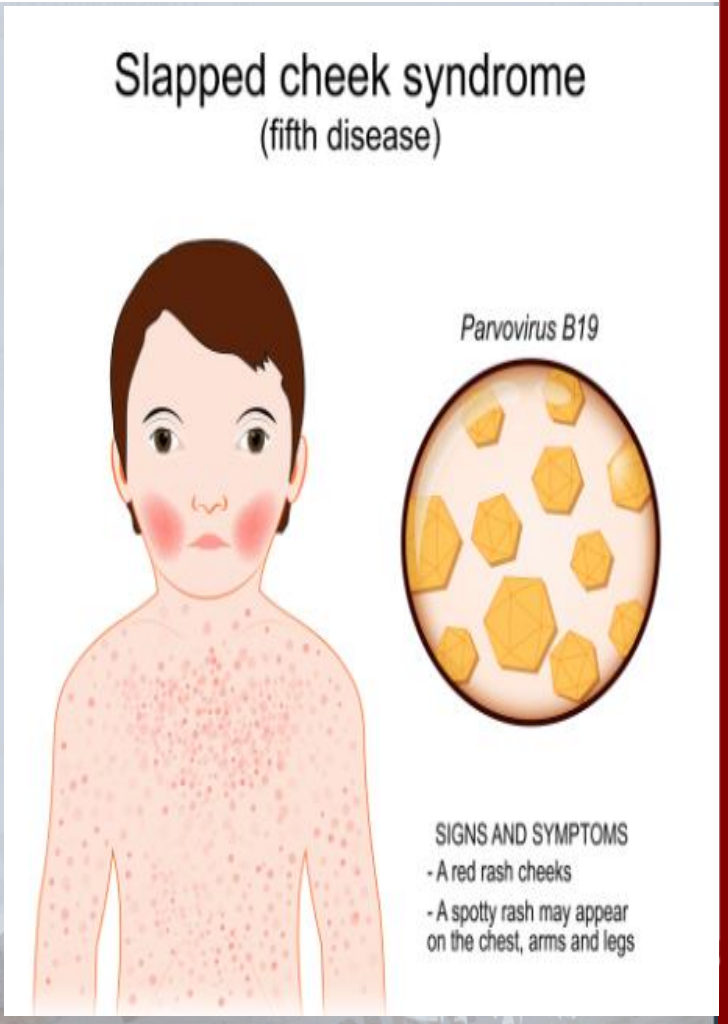
(Syllabus: GS Paper 3 – Sci and Tech)

'Slapped Cheek Virus' On The Rise In US. All About Parvovirus B19

Context: The US centres for Disease Control and Prevention (CDC) recently issued a healthy advisory due to concerning rise in cases of parvovirus B19.

Parvovirus B19

- **About:** It is highly contagious and affects those with weakened immune systems particularly.
- **Known for**: Slapped Cheek Illness
- **Fifth Disease**: Historically categorized as the fifth common childhood illness with a rash.
- **Transmission**:
  - **Airborne Spread**: The virus spreads through airborne droplets when an infected person coughs or sneezes.
  - **Blood Contamination**: It can also be transmitted through blood or contaminated blood products.
  - **Maternal-Fetal Transmission**: Pregnant individuals can transmit the virus to the fetus through the placenta.
- **Symptoms:**
  - **Asymptomatic Cases**: Many people with parvovirus infection show no signs or symptoms.
  - **Age-Dependent Symptoms**: Symptoms vary with age; children often have a "slapped cheek" rash, while adults may experience joint pains.
- **Treatment**:
  - **Self-Limiting**: Infections usually resolve on their own without specific treatment.
  - **Symptom Relief:** Treatment focuses on alleviating symptoms like fever, itching, and joint pain.



INDIAN EXPRESS Page 15

EPINEPHRINE

(Syllabus: GS Paper 3 – Sci and Tech)

A new nasal spray to treat life-threatening allergic reactions

BRENDAN DABHI
AHMEDABAD, AUGUST 20

EXPLAINED HEALTH

EARLIER THIS month, the United States Food and Drug Administration (USFDA) approved the first-ever nasal spray for treating anaphylaxis, a severe and life-threatening allergic reaction that requires immediate medical attention.

The new epinephrine nasal spray called Neffy is designed for the emergency treatment of allergic reactions (Type I), including those that are life-threatening. Type I allergic reactions are caused by food, medications, and insect bites. During anaphylaxis, there may be swelling of the throat, coughing, and dizziness. Affected organ systems typically include the skin, lungs, and gastrointestinal and cardiovascular systems.

The FDA approval, which came on August 9, applies to both adults and children weighing at least 30 kg. Neffy has been developed by US-based ARS Pharmaceuticals.

The FDA approval marks a significant milestone in immunology and allergy care. Experts have said that the nasal spray has the potential to replace traditional epinephrine auto-injectors and manual adrenaline injections, offering a more convenient and less intimidating option for people who face the constant threat of anaphylaxis.

How does epinephrine work?

The adrenal glands release the epinephrine hormone for the body to cope with stressful situations. It belongs to a class of medications that work by relaxing the muscles of the airways and constricting the blood vessels, which helps tackle the drop in blood pressure due to anaphylaxis.

Until now, epinephrine, the sole life-saving treatment for anaphylaxis, was available only as an injection. The injection is administered alongside emergency medical care to treat life-threatening allergic reactions triggered by insect bites or stings, foods, medications, latex, and other causes.

What was the pathway for Neffy's FDA approval?

The USFDA has approved the 2 mg version of the one-nostril nasal spray.

The approval was based on four studies conducted on 175 healthy adults who did not have anaphylaxis. These studies compared epinephrine levels in the blood after using Neffy to those after using the traditional epinephrine injections.

The results showed that Neffy delivered similar levels of epinephrine in the blood as the injections. Additionally, Neffy had similar effects on increasing blood pressure and heart rate, critical in treating anaphylaxis.



Neffy was approved by the USFDA on August 9.

Why is the approval significant?

Dr Pravin Hissaria, Head of Clinical Immunology and Allergy at Royal Adelaide Hospital, Australia, and a consultant at Zydus Hospital in Ahmedabad, said Neffy could be transformative for low- and middle-income countries. In India, auto-injectors for anaphylaxis have not been approved, forcing patients to manually draw and administer adrenaline.

"In countries where epinephrine auto-injectors are available, they must be kept at a specific temperature and carried in an ice pack because severe allergic reactions can occur at any time. However, in places like India, where we need to establish anaphylaxis management plans and teach patients how to draw the correct amount of adrenaline and inject it themselves — a time-consuming process — a nasal spray could be a game changer," Dr Hissaria said.

Dr Raj Bhagat, an allergy consultant based in Gujarat, added that a nasal spray could be particularly beneficial for children with severe allergies.

"The fear of injections is significant, especially for children. Also, kids often cannot manually draw and inject adrenaline on their own. Parents also worry about leaving these children unsupervised because they might develop anaphylaxis and need an injection, which requires precise dosing. In such situations, an easy-to-use nasal spray could be a real blessing for families," Dr Bhagat said.

How common are severe allergic reactions in India?

In cases of anaphylaxis, the clinical presentation can vary widely depending on the trigger, the patient's comorbidities, age, and whether they are on other medications.

The three most common allergens are foods such as nuts, milk, fish, and certain fruits; medications including vaccines, anti-inflammatories, and antibiotics; and insect venom, particularly from wasps and bee stings. Scientific studies indicate that food-induced anaphylaxis is more common in younger individuals, while drug-induced anaphylaxis occurs more frequently in older patients.

Dr Hissaria pointed out that the incidence of anaphylaxis in India is underreported, largely because the field is spread across various medical specialties and there haven't been enough studies conducted in the country. "While anaphylaxis caused by venom and medicines is well-known, food-induced anaphylaxis is becoming more common in India, possibly due to globalisation, which is making Indian lifestyles more similar to those in the West. In this situation, a nasal spray shows great promise for the future," Dr Hissaria said.

Context: The FDA has approved the first-ever nasal spray for treating anaphylaxis, offering a quicker alternative to the traditional epinephrine injection for managing life-threatening allergic reactions.

Epinephrine

- **About**: This is a hormone medication that relaxes the muscles in the airways and constricts the blood vessels, making it the only life-saving treatment for anaphylaxis.
- **Hormonal Release**: Epinephrine is released by the adrenal glands to help the body cope with stressful situations.
- **Mechanism of Action**: It helps manage stressful situations by relaxing airway muscles and constricting blood vessels, counteracting the dangerous drop in blood pressure associated with anaphylaxis.
- **Administration**: Traditionally administered as an injection, epinephrine is used alongside emergency medical care to address life-threatening allergic reactions.
- **Triggers for Use**: It is effective in treating allergic reactions caused by insect bites, stings, foods, medications, latex, and other allergens.
- **Critical in Emergencies**: As the only life-saving treatment for anaphylaxis, timely administration of epinephrine is essential to prevent severe complications.

Efficacy of Neffy

- **FDA Approval Basis**: Neffy was approved by the FDA after four studies involving 175 healthy adults compared its efficacy to traditional epinephrine injections.
- **Comparable Epinephrine Levels**: Neffy delivered similar levels of epinephrine in the bloodstream as those achieved by standard epinephrine injections.
- **Critical Physiological Responses**: Neffy demonstrated similar effects on increasing blood pressure and heart rate, essential for managing anaphylaxis.
- **Consistent Performance**: The studies confirmed that Neffy performs on par with traditional injection methods in treating anaphylactic reactions.

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