

Topics - MINDS MAPS included (Daily current affairs) 10 & 11th November 2024



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- **Gluten Formation**
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-



By saurabh Pandey



THE HINDU

- **Caterpillar fungus**
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THE HINDU

Target Mains -2025/26 -

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France evaluating India's Pinaka rocket system for its use

Dinakar Peri

NEW DELHI

France is considering India's Pinaka multi-barrel rocket launch (MBRL) system for its requirements and is soon going to carry out a detailed evaluation of the system, according to a senior French Army officer.

"Indians presented to my Chief of Army Staff last February the Pinaka. It is very interesting for us. We are organising evaluation of 3-4 best providers of this system, India being among them," Brigadier-General Stephane Richou, French Army staff general international affairs, told *The Hindu* in an interview. "We have a special mission that is going to come to India in the coming weeks, to evaluate both the launcher and the ammunition... We are considering the possibility among several other systems that we are considering."

Noting that procurement processes take a lot of time, he said it was in the initial stage.

Brigadier-General Richou was in India last week for the 20th Army to Army staff talks.

Importance of ties

"I come here with a letter signed by my Chief of Army, to be delivered to the Indian Army Chief inviting him to France next year," he said, stressing the importance of the India-France relationship. "We have lot of avenues of cooperation," he said, adding, "Open the eyes and the arms... and we can cooperate as strong as the cooperation that exists between Air Force and Navy."

France has announced plans to replace its M270 Lance-Roquettes Unitaire (LRU) rocket systems in service.

The French Army has 13 upgraded M270 systems and since the beginning of



Parading Pinaka: The Pinaka rocket system during the 75th Republic Day parade in Delhi. SHIV KUMAR PUSHPAKAR

the war in Ukraine, six systems were transferred to Ukraine.

Armenia became the first export customer for the indigenously developed Pinaka with interest expressed by several countries in the system.

The Indian Army has four Pinaka regiments in service and six more are on order.

The Pinaka Mk1 has a

range of 38 km and it can fire a variety of ammunition. Several extended range ammunition are under development.

Trials for guided extended range Pinaka rockets are in the final stages which would increase the range to over 75 km. Eventually, the plan is to increase the range to 120 km and then to 300 km.

While noting that land

cooperation is not as visible as the Air Force and Navy cooperation, the visiting officer said what they are looking for is not visibility but for partnership. "Lot of things are converging to make us strengthen our ties," Brigadier-General Richou stated.

The seventh edition of the bilateral Army exercise Shakti was held at Meghalaya in May. He said the next edition of Exercise Shakti would focus on high altitude warfare.

Four broad domains

On the focus of the staff talks, he said there were four broad domains in the cooperation – capability; education, information and training; equipment and understanding between the senior leadership.

On the global geopolitical situation and the discussions over that, he said they spanned various issues and with a reference

to the United Nations Interim Force In Lebanon (UNIFIL) said, "France is one of the most important countries, and I have colleagues from the Army, we are standing between Lebanon, Hezbollah and Israel and we stay there... the international law has to be respected... We are near the Indian position."

His remarks come against the backdrop of the recent attacks on the UNIFIL in the ongoing Israeli offensive in Lebanon. India has 903 troops under the UNIFIL, while France has 665 troops.

India and France are currently in advanced stages of negotiations for 26 Rafale-M fighter jets and three additional Scorpene-class conventional submarines for the Indian Navy. Discussions are also under way for the co-design and co-development of a jet engine for India's Advanced Medium Combat Aircraft that is under development.

Topic → Pinaka Rockets

Overview

Indian multi-barrel rocket launcher system
Designed for long-range precision strikes
Enhances artillery capabilities

Key Features

Range: Up to 300 km
Payload: Multiple types of munitions
Deployment: Rapid deployment capabilities



Current Developments

Interest from France and Armenia

Evaluated for potential military procurement

Ongoing advancements in rocket technology

Potential Markets

European Market: France evaluating systems

Southeast Asia: Increasing interest in Indian defense exports

US: Collaboration possibilities in defense



Mpox clade Ia has evolved to jump from humans-to-humans: new study

Researchers have found a surge in the prevalence of mutations that can be attributed to a protein family in the human body called APOBEC. This protein is used by the immune system as a mechanism to introduce random changes in foreign DNA. It can introduce changes to the viral DNA while it is being copied in the cells

Arun Panchapakesan

Since the world eradicated smallpox in 1980, scientists have known that the battle against poxviruses was far from over. Of the multiple types that exist, scientists have been wary of one in particular: mpox. In fact, one of the points in the World Health Assembly's post-eradication policies was the "continuation of monkeypox surveillance in West and Central Africa, at least until 1985."

In 2022-2023, the World Health Organisation (WHO) declared the then global outbreak of mpox a "public health emergency of international concern." In August this year, the WHO declared mpox to be a public health emergency for the second time in two years.

(Note: In 2022, the WHO designated "mpox" as a preferred synonym for "monkeypox" disease. The virus is still called "monkeypox," according to the International Committee on the Taxonomy of Viruses. For uniformity's sake, this article will use "mpox" to refer to both the disease and the virus clades.)

New cause for worry

The declaration ensured multiple countries would pledge vaccines to the 15 African nations affected by the outbreak, six of which had never reported a single case of mpox before. But the paucity of doses has forced countries to prioritise their campaigns. Barely two months since these countries started their targeted vaccinations, scientists have a new cause for worry. A preprint paper uploaded on *Virologica*, a scientists' discussion forum online, on October 24 reported evidence that yet another strain of the mpox virus appeared to have achieved human-to-human transmission.

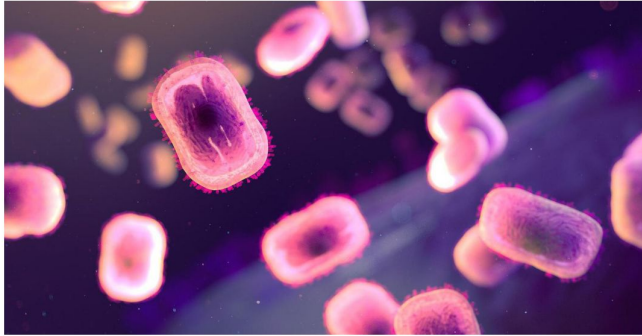
There are two clades of mpox: I and II. Clade I viruses have been shown to cause more severe disease in the mouse model, but that doesn't mean the same may be true for humans. Both clades are classified into two subclades, making a total of four known variants: Ia, Ib, IIa, and IIb. Of these, clade IIb was responsible for the 2022 outbreak, which is still continuing in certain parts of Africa.

Clade Ib, discovered towards the end of 2023, is the primary cause of infection in central Africa.

Researchers believed these two clades to be the primary contributors to the present mpox problem. They know very little about clade Ia except that it causes infections in western Africa.

When viruses make 'mistakes'

Clade Ia, on the other hand, is the oldest known variant of the mpox virus. It has



Extracellular, brick-shaped mpox virions. Backlighting shows the surface membranes of the virions and the outlines of nucleocapsids. [i4410](#)

been known to cause sporadic infections in humans, mostly children, since 1970. But these infections were always limited to a few families or communities, and the transmission was always from animals to humans. There was no proof of sustained human-to-human transmission until recently.

The preprint posted on *Virologica* reported evidence that the DNA of clade Ia viruses sequenced from the present outbreak bears clear signs of human-to-human transmission.

Viruses evolve by introducing changes to their genetic material. Each time a virus infects a new host, an enzyme known as a polymerase makes multiple copies of the virus's genetic material (DNA or RNA), which is then packed into new viruses. But sometimes the polymerases make a mistake. These mistakes, called mutations, could have a positive, negative, or no impact on the virus, meaning the virus can get better or worse or be the same at its job.

The rate at which the polymerases make mutations is different for different viruses. Generally, viruses that have RNA as their genetic material, such as the human immunodeficiency virus (HIV) and influenza, make mistakes much more frequently than those that have DNA, like the human papillomavirus (HPV) and adenoviruses.

This error rate is even lower in some DNA viruses, like the members of the pox family, which also have an error-correction mechanism built into them. This mechanism, called proofreading, ensures few mistakes are

Africa has pinned its hopes on the few doses of vaccines it has and is hoping against odds that its targeted campaign will suffice to stem the rising tide of mpox cases

made: around one mistake every three years in a circulating viral strain.

The APOBEC family

However, viral polymerases are not the only source of mistakes in a virus's genetic material.

The immune system also has a mechanism to introduce random changes in foreign DNA. A family of proteins called APOBEC – short for "apolipoprotein B mRNA editing enzyme, catalytic polypeptide-like" – can introduce changes to the viral DNA while it is being copied in the cells.

By doing so, APOBEC proteins force mistakes, some of which can be lethal to the virus. Importantly, of the four bases that DNA is made of, namely adenine, guanine, cytosine, and thymine, viral DNA polymerases can make a mistake anywhere, but APOBEC's activity is usually limited to changing a cytosine to a thymine.

In a 2023 paper that appeared in *Science*, researchers showed that since the mutations made by APOBEC are more numerous than those by the viral polymerase, a sudden surge in the prevalence of mutations in circulating mpox viral DNA can be attributed to the

activity of APOBEC. That is, the virus came from human cells, and APOBEC must have acted on it. Otherwise, those mutations couldn't have arisen so quickly.

The researchers also estimated that, on average, APOBEC activity would introduce around six mutations every year. Based on how many mutations the researchers observed and the nature of those mutations, they predicted mpox clade Ia viruses have achieved human-to-human transmission since 2016.

The new study described in the preprint used the same method to show clade Ia viruses have achieved human-to-human transmission as well. This is because 63% of mutations they observed in the clade Ia infections were consistent with changes that could be introduced by APOBEC.

Viruses' responses to antivirals

The news that clade Ia viruses can spread from humans to humans is not likely to affect the vaccination strategies of the affected countries. However, it is certainly cause for worry because researchers know that the different mpox clades respond differently to certain antiviral drugs used to treat them. For now, Africa has pinned its hopes on the few doses of vaccines it has and is hoping against odds that its targeted campaign will suffice to stem the rising tide of mpox cases.

(Arun Panchapakesan is an assistant professor at the Y.R. Gaitonde Centre for AIDS Research and Education, Chennai. arun.panchapakesan@gmail.com)

THE GIST

Scientists have been wary of the reemergence of poxviruses, particularly mpox. In 2022-2023, the WHO declared the mpox outbreak a "public health emergency of international concern"

Clade Ia is the oldest known variant of the mpox virus. It has been responsible for sporadic infections in humans, mostly children, since 1970. But transmission was always from animals to humans

Researchers used APOBEC activity to show clade Ia viruses have achieved human-to-human transmission. This is because 63% of mutations they observed in the clade Ia infections were consistent with changes that could be introduced by APOBEC

Topic → Mpox Outbreak and Variants Overview

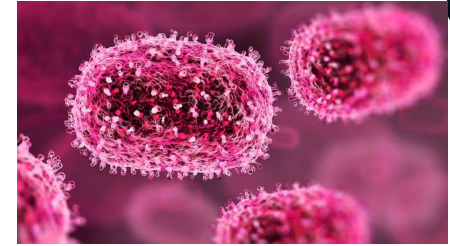


Key Points

Historical Context:

Eradication of *smallpox* in 1980.

Continued surveillance of *monkeypox* (mpox) since then.



Recent Developments:

WHO declared mpox a public health emergency in 2022-2023.

Ongoing surveillance and vaccination efforts in African nations.

New Concerns:

Emergence of new strains.

Variants of mpox: Clade I (more severe) and Clade II with subclades (Ia, Ib, IIa, IIb)

Mpox Virus Clade Ia: Evolution and Transmission



Clade Ia Origin

Oldest Variant: Clade Ia is the earliest known variant of the mpox virus, first identified in 1970.

Sporadic Infections: Primarily affected children with isolated cases.

Limited Transmission

Animal to Human: Historically, the virus was transmitted from animals to humans.

Localized Spread: Infections were confined to specific families or communities.

Recent Evidence

Human-to-Human Transmission: New findings suggest clade Ia viruses are now spreading between humans.

Source: Recent preprint from Virologica highlights this shift.



Mutation Process

Viral Evolution: Mutations occur during the replication of genetic material.

Polymerase Role: Polymerases introduce these mutations, affecting the virus differently.



Mutation Rates

RNA vs. DNA Viruses: RNA viruses like HIV mutate more rapidly than DNA viruses such as HPV.

Comparison: DNA viruses have lower mutation rates due to error-correction mechanisms.



Error-Correction Mechanism

Proofreading: Some DNA viruses, including poxviruses, have mechanisms to reduce mutation rates.

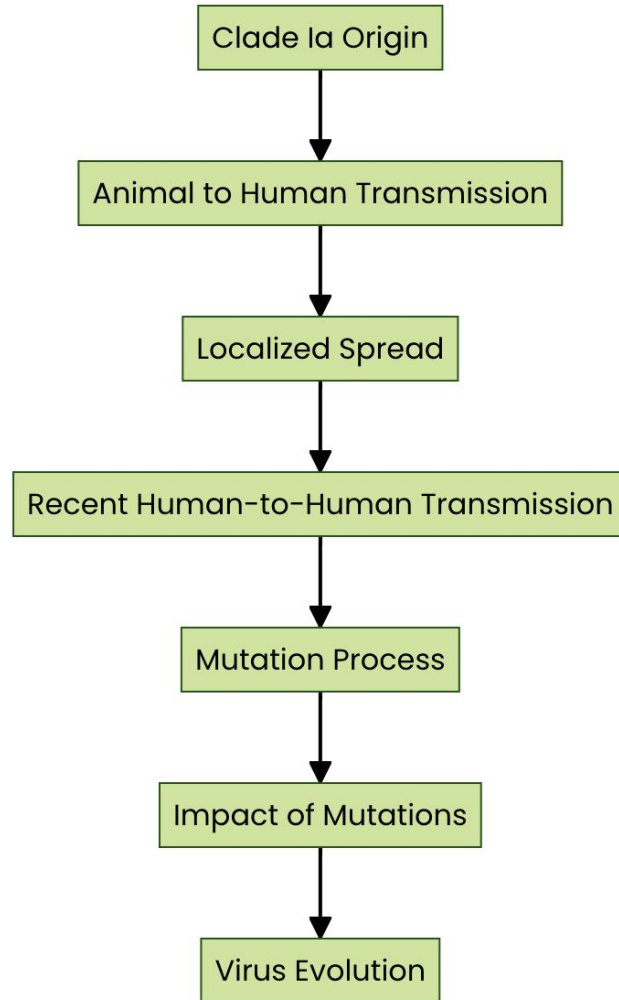
Frequency: Errors occur approximately once every three years.


Impact of Mutations


Varied Effects: Mutations can be beneficial, harmful, or neutral.


Virus Dynamics: They influence the virus's ability to infect and spread.


Summary: Clade Ia of the mpox virus, once limited to animal-to-human transmission, now shows potential for human-to-human spread, with mutations significantly influencing its evolution.




 **APOBEC Family:** A group of proteins known as APOBEC can introduce random changes to viral DNA during replication.

 **Mechanism of Action:** APOBEC proteins primarily convert cytosine to thymine in viral DNA, creating mutations that can be lethal to the virus.

 **Mutation Surge:** A 2023 study published in *Science* indicated that the increase in mutations in mpox viral DNA is largely due to APOBEC activity rather than viral polymerase errors.

 **Mutation Rate:** On average, APOBEC is estimated to introduce about six mutations per year in viral DNA.

 **Circulation of mpox:** The study suggests that mpox clade IIb has been circulating among humans in Africa since 2016, based on the observed mutations.



Clade Ia Transmission: The same research demonstrated that clade Ia viruses have also achieved human-to-human transmission, with 63% of mutations aligning with APOBEC-induced changes.



Research Implications: The findings highlight the significant role of the immune system in shaping viral evolution through mechanisms like APOBEC

WHAT IS IT?

Gluten: animator of the dough

Many cereal grains — but in particular barley, wheat, and rye — contain specific proteins that, when mixed with water and kneaded, create an elastic mass. This mass is called gluten. Two important types of these proteins are gliadins and glutenins. At the microscopic level, gluten is an elastic mesh of the protein molecules.

It allows the dough to rise and gives it its chewy character. The ability of gliadins and glutenins to create gluten makes them prized ingredients in the food industry.

This said, gluten is equally infamous for the allergic reaction it induces in some people. An enzyme called protease helps digest proteins, but it doesn't do a good job of breaking down gluten. When such gluten reaches the small intestine, the body can develop gastrointestinal problems.

The most well-known of these problems is coeliac disease (pronounced “see-lee-ack”). It's characterised by a severe allergic reaction in the small intestine, prompting the immune system to produce a large number of antibodies that attack the body's own proteins. The disease is present in around 2% of the general population. Its primary symptoms are



Gluten is infamous for the allergic reaction it induces in some people. VICTOR RODRIGUEZ IGLESIAS/UNSPASH

severe loose diarrhoea and anaemia, but there are other symptoms too. In fact, while doctors can diagnose coeliac disease using a blood test, an endoscopy, and/or a test looking for genetic predisposition to the condition, diagnosis is often delayed, and the symptoms are often misattributed to a different cause.

Maintaining a diet very low in gluten is the only effective way to treat coeliac disease at present.


- Vasudevan Mukunth


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Topic → Gluten Formation





 **Gluten Formation:** Gluten is formed from specific proteins in cereal grains, particularly barley, wheat, and rye, when mixed with water and kneaded.


 **Protein Types:** The two main proteins responsible for gluten are gliadins and glutenins, which create an elastic mesh at the microscopic level.

 **Dough Characteristics:** Gluten allows dough to rise and provides a chewy texture, making it a valuable ingredient in the food industry.

 **Allergic Reactions:** Gluten can cause allergic reactions in some individuals, leading to gastrointestinal issues when it reaches the small intestine.

 **Coeliac Disease:** Coeliac disease, affecting about 2% of the population, is a severe allergic reaction to gluten that prompts the immune system to attack the body's own proteins.

 **Diagnosis Challenges:** Diagnosis of coeliac disease can be complicated, often requiring blood tests, endoscopy, or genetic testing, and symptoms may be misattributed to other causes.

 **Dietary Management:** The only effective treatment for coeliac disease is maintaining a very low gluten diet.

Summary: Gluten, formed from specific proteins in grains, can cause severe allergic reactions in some individuals, notably leading to coeliac disease, which requires strict dietary management.

States and the Centre's fetter of 'net borrowing ceiling'

The central government, in 2023, imposed a 'Net Borrowing Ceiling' (NBC) on the State of Kerala to restrict the maximum possible borrowing that the State can make under the law. This ceiling is 3% of the projected Gross State Domestic Product (GSDP) for FY2023-24. The NBC now encompasses all borrowing avenues, including open market loans, financial institution loans, and liabilities from the public account of the State. Furthermore, to stop States from circumventing the borrowing cap through State-owned enterprises, the ceiling has been extended to cover certain borrowings by these entities as well.

This has been a huge blow to the financial position of the State, with Kerala finding it difficult to meet its expenditure. In addition, this has restrained the State from investing further in developmental and welfare activities. It has also ignited political and legal controversies which have created an incompatible situation between the Centre and the State. Kerala approached the Supreme Court of India on the issue of the encroachment on the executive power that is conferred on the State under Article 293 of the Constitution of India to borrow on the security and guarantee of the Consolidated Fund. The State has alleged that the State's fiscal autonomy, as guaranteed and enshrined in the Constitution of India, has been illegally curtailed by the Centre. This has been the first case in the history of the Court wherein Article 293 has come up for interpretation.

Borrowing powers and provisions

Chapter II of Part XII of the Constitution deals with the borrowing powers of the Centre and States. Article 292 speaks about the borrowing power of the central government which entitles the central government to borrow loans upon the security of the Consolidated Fund of India. Article 293 empowers the State government to borrow within the territory of India upon the security of the consolidated fund of the State. In both cases, the extent of borrowing may be fixed from time to time by a law enacted by Parliament and the State legislature, respectively. As in Article 293(2), the Government of India may grant loans to any State subject to conditions laid down by any law made by Parliament up to the limits fixed under Article 292.

The central government can also provide guarantees upon the Consolidated Fund of India in respect of loans raised by any State. Article 293(3) imposes a restriction on the State government if the repayment of loans or a guarantee which has been given by the Government of India (if taken by the predecessor government is still outstanding). In such a case, the consent of the central government is essential to raise such a loan. The central government is afforded broad discretion over "consent" by



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The Centre's NBC step and, subsequently, Kerala's move to approach the higher judiciary on the issue, highlight the need to revisit Article 293 of the Constitution

specifying that it may be granted subject to any conditions as the Government of India deems appropriate.

Article 293 of the Constitution is adopted from Section 163 of the Government of India Act, 1935. In the Constituent Assembly, while Article 293 (draft Article 269) was debated on August 10, 1949, a member, Ananthasayanam Ayyangar, noted that the issue of borrowings and loans requires greater scrutiny as borrowing imposes heavy obligations on not only the present generation but also future generations. He suggested that a commission akin to the Finance Commission may be constituted.

Section 163(4) of the Government of India Act, 1935 stated that while exercising the power conferred under Section 163(3) regarding 'consent', the Federation shall not refuse or make unreasonable delay in granting the loan or providing guarantee, or impose any unreasonable conditions when sufficient cause is shown by the provinces. If any dispute arises out of the matter stated it was to be referred to the Governor-General whose decision shall be final.

But this clause was not adopted into the Constitution. The reason was that this provision was included in the Government of India Act, 1935 as it expected that a different agency that was not a national of India would be in charge of the administration. But after the Independence, it was felt that such a provision was not necessary as State governments replaced the provinces and a national government was established at the Centre.

Eliminating revenue shortfall

To implement the mandates in Article 292, the Fiscal Responsibility and Budget Management (FRBM) Act, 2003 was enacted to maintain financial restraint by establishing goals such as the elimination of revenue shortfall and the reduction of fiscal deficit. To eliminate the revenue shortfall and the budgetary deficit, a target of 3% of GDP is established for the Centre's yearly fiscal deficit ratio (FD). As in the Centre's directives, States enacted their own pieces of legislation to control their fiscal deficit. The FRBM Amendment Act, 2018 required the central government to ensure that the fiscal deficit did not surpass 3% of GDP and that the total public debt did not surpass 60% of GDP. By 2025-26, the government expects to reduce the fiscal deficit to less than 4.5% of GDP. The Centre's restriction on the borrowing limits of the States so as to attain fiscal consolidation by restricting the fiscal deficit, and without considering the financial position of States, is an encroachment of the autonomy of States. It also lowers their ability at budget balancing.

The issue of the borrowing power of States guaranteed under Article 293 of the Constitution is before the Supreme Court in the case filed by the State of Kerala. As the interpretation of Article

293 of the Constitution of India raises key questions about fiscal decentralisation, State fiscal autonomy and past borrowing practices, the Court has referred the issue of a State's borrowing powers to a Constitutional Bench. The matter also touches on whether the fiscal regulations imposed by the Centre have negatively impacted the Reserve Bank of India's control over fiscal consolidation.

Contemplating the transforming economic, political, and fiscal landscape in India, it is time to revisit Article 293 of the Constitution. Section 163(4) of the Government of India Act, 1935 warns the unnecessary refusal or delaying or the imposing of conditions in granting loans by the Centre. Similarly, a remedial measure, as mentioned in Section 163(4), could have been adopted in the Constitution when a dispute arises.

There is a need to strengthen this Article

Article 293 of the Constitution must be strengthened in the following manner.

As suggested by Ananthasayanam Ayyangar, a commission akin to the Finance Commission is essential to decide any issues that may arise regarding the approval of a loan upon considering the financial position of States as well as the Centre's goal of limiting fiscal deficit.


There must be proper guidelines which are to be adhered to when the Centre exercises the wide powers granted under Article 293(4) of the Indian Constitution – crucial in maintaining a balanced fiscal framework between the Centre and the States, and which enhance cooperative federalism. Otherwise, there could be arbitrary decision-making that may disrupt fiscal discipline, leading to either unchecked borrowing or overly restrictive conditions.


When exercising the wide powers granted under Article 293(4), the Centre should adhere to the following guidelines: transparency in decision-making thereby ensuring that the procedures and standards for accepting or rejecting governmental borrowings are transparent to the public; having a consultative process, where there is consultation with State governments before prescribing any terms or limitations on borrowing which enhances cooperative approach; ensuring equitable treatment where there an employment of borrowing terms and restrictions applied uniformly for all States to eliminate prejudice or favouritism; an admiration for fiscal autonomy, ensuring that there is financial autonomy for a State, the restrictions are reasonable and do not unduly hamper a State's ability to manage its finances effectively.


Adhering to these guidelines can ensure that the Centre's powers under Article 293(4) are exercised fairly, transparently and in a manner that supports balanced fiscal management and cooperative federalism.


Topic → Net Borrowing Ceiling (NBC):





 Net Borrowing Ceiling (NBC): In 2023, the central government imposed a borrowing limit of 3% of the projected Gross State Domestic Product (GSDP) for Kerala for FY2023-24.

 Scope of NBC: The NBC applies to all borrowing methods, including open market loans, financial institution loans, and liabilities from the public account of the State.

 State-Owned Enterprises: The ceiling also includes certain borrowings by State-owned enterprises to prevent circumvention of the borrowing cap.

 Impact on State Finances: The NBC has significantly affected Kerala's financial position, making it challenging for the State to meet its expenditures and invest in developmental and welfare activities.


 Political and Legal Controversies: The imposition of the NBC has led to political and legal disputes between the Centre and the State.


 Supreme Court Involvement: Kerala has approached the Supreme Court, arguing that the NBC infringes on its fiscal autonomy under Article 293 of the Constitution of India.


 Historical Significance: This case marks the first instance in which Article 293 has been interpreted by the Supreme Court

Constitutional Borrowing Framework in India

Overview of Borrowing Powers


 Constitutional Framework: Chapter II of Part XII of the Constitution outlines the borrowing powers of both the Centre and States in India.


 Central Government Borrowing: Article 292 allows the central government to borrow against the security of the Consolidated Fund of India.

 State Government Borrowing: Article 293 permits State governments to borrow within India, secured by the Consolidated Fund of the State, with limits set by respective legislatures.


Loan Conditions and Historical Context




 Loan Conditions: The central government can impose conditions on loans granted to States, and consent is required for States with outstanding loans guaranteed by the central government.

 Historical Context: Article 293 is derived from Section 163 of the Government of India Act, 1935, reflecting historical borrowing practices.


Debates and Omitted Provisions


 Debate on Borrowing Scrutiny: During the Constituent Assembly debates, concerns were raised about the long-term implications of borrowing, suggesting a commission for oversight.


 Omitted Provisions: A clause from the Government of India Act regarding unreasonable delays in loan consent was not included in the Constitution due to the establishment of a national government post-Independence.


Key Aspects of the FRBM Act





 Fiscal Responsibility and Budget Management (FRBM) Act: Enacted in 2003 to ensure financial discipline and eliminate revenue shortfalls.


 Fiscal Deficit Target: Aims for a fiscal deficit ratio of 3% of GDP annually for the Centre.

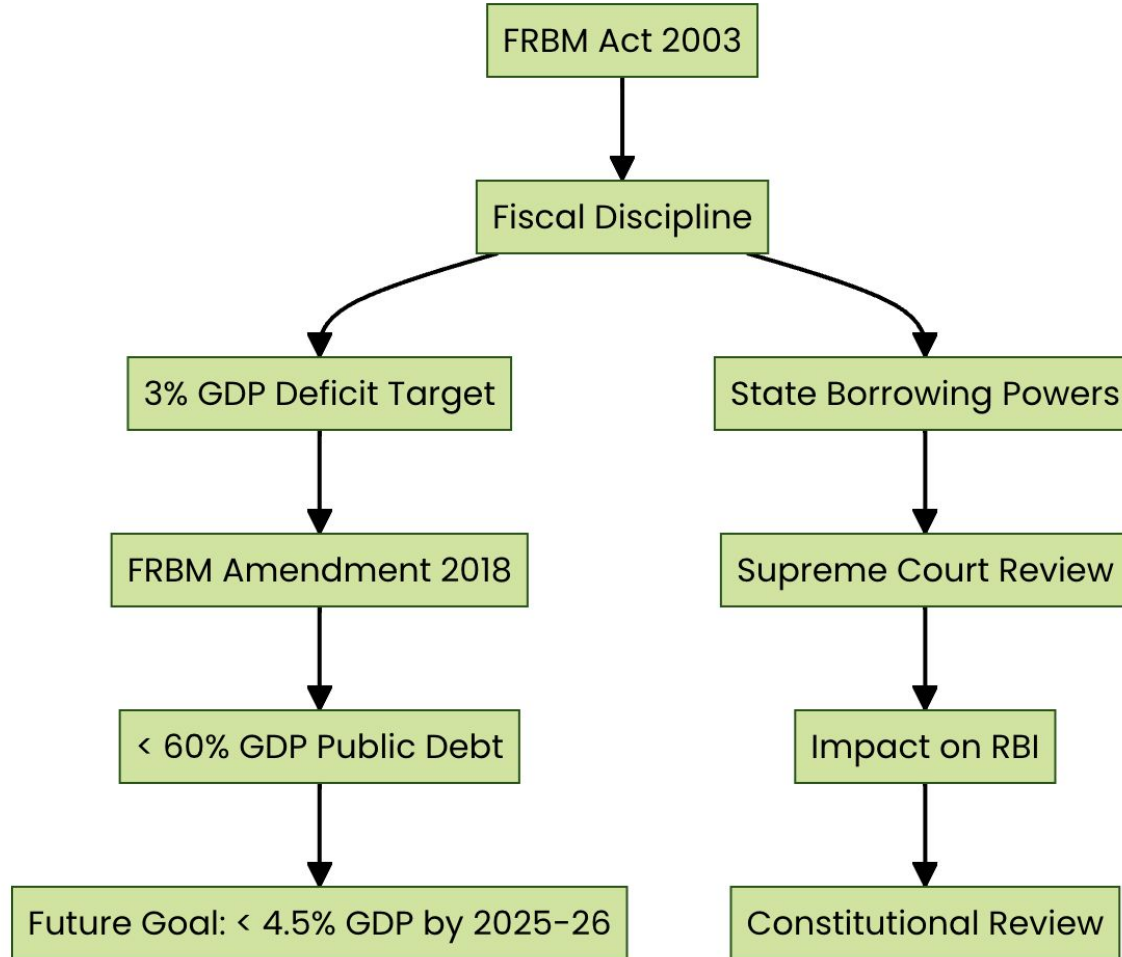
 FRBM Amendment Act, 2018: Stipulates that the fiscal deficit should not exceed 3% of GDP, and total public debt should remain below 60% of GDP.


 Future Fiscal Goals: The government plans to reduce the fiscal deficit to under 4.5% of GDP by 2025-26.


 State Borrowing Powers: The Supreme Court is examining the borrowing powers of States under Article 293, raising issues of fiscal decentralization and autonomy.


 Impact on Reserve Bank of India: Central fiscal regulations may have influenced the Reserve Bank of India's role in fiscal consolidation.


 Need for Constitutional Review: Calls to revisit Article 293 in light of evolving economic and political contexts, referencing Section 163(4) of the Government of India Act, 1935.





 **Strengthening Article 293:** There is a call to enhance Article 293 of the India Constitution to better manage state and central financial relations.

 **Need for a Commission:** A commission similar to the Finance Commission is proposed to address loan approval issues, considering both state financial positions and central fiscal goals.

 **Guidelines for Borrowing:** Proper guidelines are necessary for the Centre's exercise of powers under Article 293(4) to maintain fiscal balance and cooperative federalism.

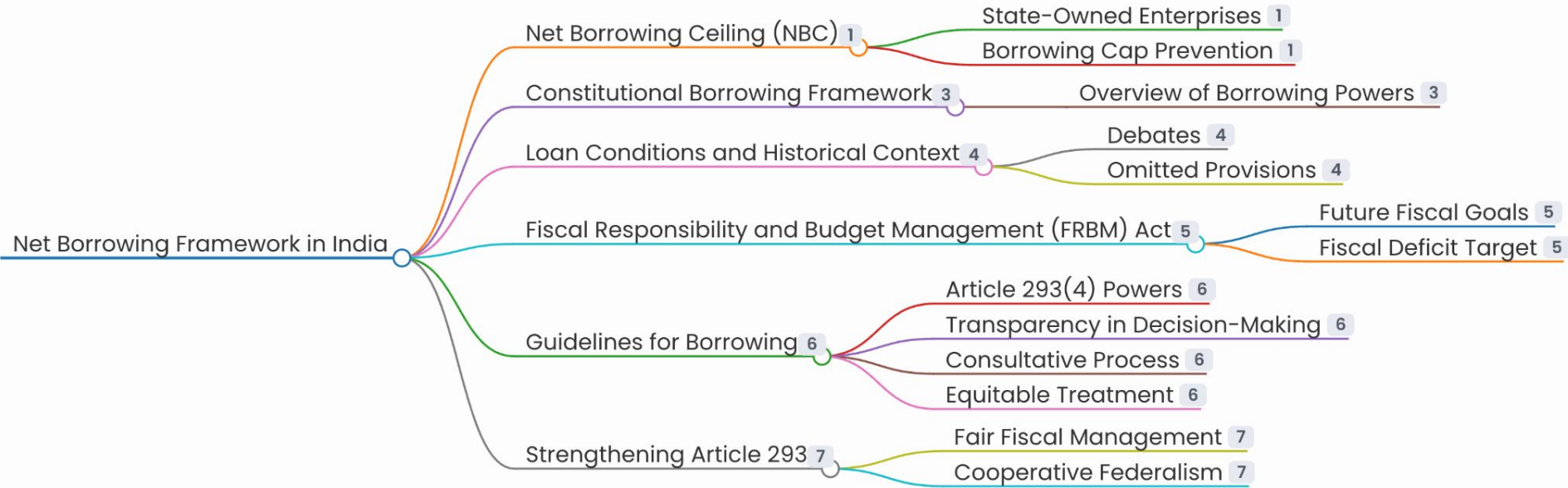
 **Transparency in Decision-Making:** The Centre should ensure transparency in its borrowing decisions, making processes clear to the public.

 **Consultative Process:** There should be a consultative approach with state governments before imposing borrowing terms to foster cooperation.

 **Equitable Treatment:** Borrowing terms must be applied uniformly across all states to prevent favoritism and ensure fairness.

💰 Respect for Fiscal Autonomy: States should maintain financial autonomy, with reasonable restrictions that do not hinder their financial management capabilities.

Summary: Strengthening Article 293 of the Indian Constitution is essential for fair and transparent fiscal management between the Centre and States, emphasizing guidelines for borrowing and cooperative federalism.



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On improving wind energy generation

What is Tamil Nadu's wind power capacity? What about national wind energy capacity? What does repowering and refurbishing of wind turbines mean? Why are wind energy generators opposing the new policy of the Tamil Nadu government?

EXPLAINER

M. Soundariya Preetha

The story so far:

Tamil Nadu, which is a pioneer in wind mill installations, has wind turbines that are over 30 years old. The Tamil Nadu government released the "Tamil Nadu Repowering, Refurbishment and Life Extension Policy for Wind Power Projects - 2024" in August this year. However, wind energy generators have opposed the policy, approached the Madras High Court and got a stay. They have demanded a policy that will "promote wind energy generation".

What is the wind energy capacity and potential in India?

The National Institute of Wind Energy (NIWE) says that India has wind power potential for 1,163.86 GW at 150 metres above ground level, and is ranked fourth in the world for installed wind energy capacity.

At 120 metres above ground level, which is the normal height of wind turbines now, the potential is 695.51 GW, including the 68.75 GW from Tamil Nadu. Only about 6.5% of this wind potential is used at the national level and nearly 15% in Tamil Nadu. Gujarat, Tamil Nadu, Karnataka, Maharashtra, Rajasthan, and Andhra Pradesh are the leading States for installed wind energy capacity, collectively contributing 93.37% of the country's wind power capacity installation. Tamil Nadu has seen the installation of wind turbines since the 1980s, and today it has the second largest installed wind energy capacity with 10,603.5 MW, according to data available with the Ministry of New and Renewable Energy (MNRE). Of the 20,000 wind turbines in the State, nearly 10,000 are of small capacities, that is less than one MW.

How are wind turbines maintained?

Wind turbines that are more than 15 years



Powerhouse: Wind turbines along the Kadayannallur-Tenkasi highway in Tamil Nadu. JOTHI RAMALINGAM. B

old or have less than 2 MW capacity, can be completely replaced with new turbines, which is known as repowering. They can also be refurbished by increasing the height of the turbine, changing the blades, installing a higher capacity gear box, etc., to improve the energy generated. These can be done for standalone wind mills, or a group of wind mills owned by multiple generators. When wind energy generators take up safety measures in the old turbines and extend its life, it called life extension.

The MNRE first came out with a "Policy for Repowering of the Wind Power Projects" in 2016 and based on consultations with stakeholders, released the "National Repowering & Life Extension Policy for Wind Power Projects -2023". The NIWE estimates the repowering potential to be 25.4 GW if

wind turbines of less than 2 MW capacity are taken into consideration.

What does repowering and refurbishing entail?

Wind energy generators say that when turbines were installed in the 1980s, potential wind sites were mapped and the mandatory gap required between two wind mills were determined based on the technology available then. All the turbines were in the sub one MW category. Over the years, the wind mill manufacturing sector has matured and technology has evolved. Habitations have come up between wind sites, posing new challenges, and wind energy evacuation and transmission infrastructure close to the wind sites needs to be strengthened to match the generation.

Sources in the wind energy industry

point out that a 2 MW wind turbine is usually 120 metres high and requires 3.5 acres of land. It can generate upto 65 lakh units of power. A 2.5 MW turbine, which is available in the market now, is 140 metres high and can generate 80 lakh units. It requires five acres. So, when an existing wind turbine is to be repowered by replacing it with a high capacity turbine, more land is required.

Further, at Aralvaimozhi in Tamil Nadu, a high potential wind site, the 48 MW installed capacity now is made up of mostly 250 KW turbines and the potential at the site is for 100 MW. A project to have three sub-stations of 230 KVA each at ₹800 crore was sanctioned six years ago and is yet to take off for multiple reasons. In Tamil Nadu, wind mills installed after 2018 do not have banking facility. When a turbine is repowered, it will be treated as a new installation and the generator cannot bank the energy generated. This impacts the financial viability of the project, say the sources.

What is the way forward?

Among the wind energy generating States, the repowering potential is the highest in Tamil Nadu with over 7,000 MW of installed capacity that can be replaced or refurbished. If the small turbines are repowered or refurbished, the contribution of wind energy to total energy consumed during the peak wind seasons can go up easily by 25%, says wind energy consultant A.D. Thirumoorthy.

While there have been generators which have replaced turbines in the past without government support, the policy itself does not promote wind energy generation, claim the generators. It should look at challenges on the field and consider how the wind energy potential can be harnessed fully by the generators. "No industry or energy generator will want to invest in a project that is not financially viable. The repowering policy is not commercially beneficial," said a textile mill owner in Coimbatore who has invested in wind energy.

THE GIST



The National Institute of Wind Energy (NIWE) says that India has wind power potential for 1,163.86 GW at 150 metres above ground level, and is ranked fourth in the world for installed wind energy capacity.



Among the wind energy generating States, the repowering potential is the highest in Tamil Nadu with over 7,000 MW of installed capacity that can be replaced or refurbished.



Wind turbines that are more than 15 years old or have less than 2 MW capacity, can be completely replaced with new turbines, which is known as repowering.

Topic → Wind Energy in Tamil Nadu


Overview

Tamil Nadu: A pioneer in wind energy installations 

Current Policy: "Tamil Nadu Repowering, Refurbishment and Life Extension Policy for Wind Power Projects - 2024"

Opposition: Wind energy generators oppose the policy, seeking better promotion for wind energy generation.

Wind Energy Capacity and Potential in India

Total Potential: 1,163.86 GW at 150 meters above ground level 

Installed Capacity: Ranked 4th globally in wind energy

Utilization: Only 6.5% of total wind potential utilized nationally


Leading States: Tamil Nadu, Gujarat, Karnataka, Maharashtra, Rajasthan, Andhra Pradesh contribute 93.37% of installed capacity

Tamil Nadu's Capacity: 10,603.5 MW, second largest in India

Maintenance of Wind Turbines

Aging Turbines: Over 15 years old or less than 2 MW capacity can be:

Repowered: Replace with new turbines

Refurbished: Upgrade components (height, blades, gearbox) for efficiency 

Safety Measures: Life extension initiatives to maintain older turbines

Future Prospects

Policy Impact: The new policy aims for improved wind energy generation

Repowering Potential: Estimated at 25.4 GW if turbines under 2 MW are considered

Goal: Tamil Nadu aims to generate 25 GW of wind power by 2030 to address peak-hour shortages 

What Does Repowering and Refurbishing Entail in Wind Energy?

Overview

Definition: Repowering refers to replacing older turbines with newer, more efficient models; refurbishing involves upgrading existing turbines.

Context: Many wind turbines installed in the 1980s are now outdated, necessitating repowering and refurbishing to enhance efficiency and meet modern energy demands.

Key Challenges

Site Limitations: Existing wind sites may require more land for new turbines due to increased size and capacity.

Technology Evolution: Turbines have evolved from sub-1 MW to 2-2.5 MW, influencing installation requirements.

Infrastructure Needs: Upgrades to evacuation and transmission infrastructure are required to match increased generation capacity.

Regulatory Hurdles: Policies regarding banking facilities and financial viability impact repowering decisions.

Benefits of Repowering

Increased Capacity: Switching to higher-capacity turbines can significantly boost energy output (e.g., from 250 KW to 2.5 MW).

Enhanced Efficiency: Newer technologies can improve overall energy generation efficiency, potentially raising wind energy contribution by 25% during peak seasons.

Financial Viability: Improving the financial framework for repowering can encourage investment and development in wind energy.

Current Landscape in Tamil Nadu

Installed Capacity: Tamil Nadu has a significant potential for repowering with over 7,000 MW of installed capacity.

Government Policies: Recent policies aim to facilitate repowering and refurbishment, yet concerns persist regarding their effectiveness and financial implications for developers.

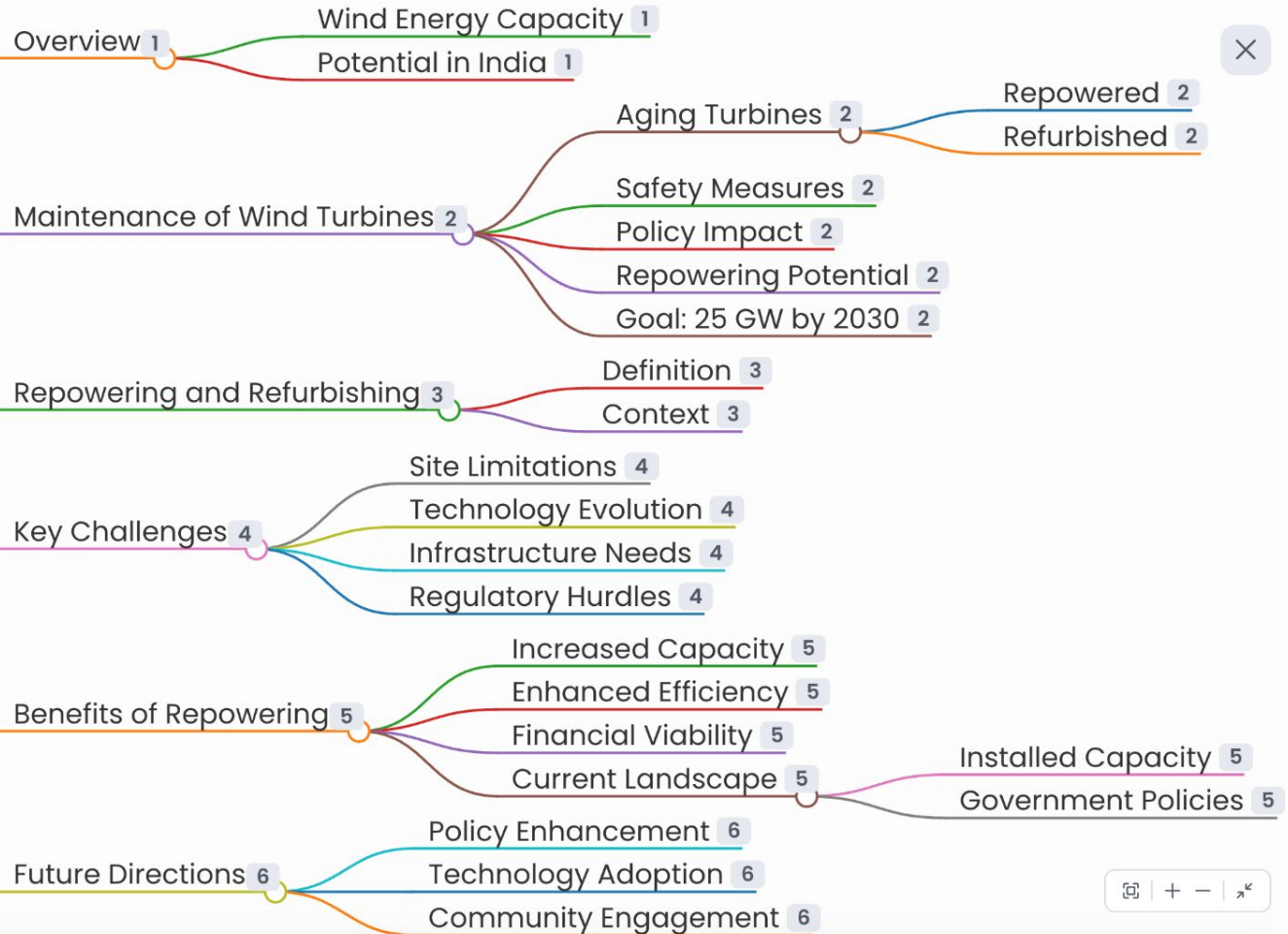
Future Directions

Policy Enhancement: There is a need for policies that promote financial viability and encourage investment in repowering initiatives.

Technology Adoption: Embrace advancements in wind energy technology to maximize output and efficiency.

Community Engagement: Address local concerns about land use and environmental impact to gain support for repowering projects.

Wind Energy in Tamil Nadu



Two strong quakes jolt Cuba, but no tsunami alert

Agence France-Presse

HAVANA

Two powerful earthquakes rocked southern Cuba in quick succession on Sunday, as authorities said no tsunami alert was issued and no deaths immediately reported.

While the first quake was 5.9-strong, the U.S. Geological Survey put the second, more powerful tremor at a magnitude of 6.8 and 23.5 km deep, some 25 miles off the coast of Bartolome Maso, in southern Granma province.



Topic → Why Earthquake in Cuba?

Overview

Recent earthquakes in Cuba have been a topic of concern due to their impact and frequency.

Understanding the geological and environmental factors is key to explaining these events.

Tectonic Plates

Caribbean Plate

North American Plate

Seismic Activity

Historical earthquake data

Recent earthquake occurrences



Geological Features

Fault lines

Mountain ranges

Cuba is located in an area with several active **fault systems** which produce on average about 2000 seismic events each year





Unconfirmed quake Oct 17, 2024 10:50 am







Caterpillar fungus can slow down growth of cancer cells


New research into a chemical produced by a caterpillar fungus that has shown promise as a possible cancer treatment has revealed how it interacts with genes to interrupt cell growth signals. The chemical Cordycepin, interrupts the cell growth signals that are overactive in cancer, an approach that could be less damaging to healthy tissues than most currently available treatments. Cordycepin is converted to cordycepin triphosphate, and this molecule was found to directly affect cancer cells.


Topic → Caterpillar fungus can slow down growth of cancer cells





 Chemical of Interest: The research focuses on Cordycepin, a chemical produced by a caterpillar fungus.


 Mechanism of Action: Cordycepin interrupts overactive cell growth signals associated with cancer.

 Potential Benefits: This treatment approach may be less damaging to healthy tissues compared to existing cancer therapies.

 Conversion Process: Cordycepin is converted into cordycepin triphosphate, which directly affects cancer cells.

 **Research Implications:** The findings suggest a new avenue for cancer treatment that targets genetic interactions.

 **Source of Compound:** The chemical is derived from a caterpillar fungus, highlighting a natural source for potential therapies.

 **Future Directions:** Further research may explore the full therapeutic potential of Cordycepin in oncology.

Summary: New research reveals that Cordycepin, a chemical from a caterpillar fungus, may offer a less harmful cancer treatment by interrupting overactive cell growth signals.




Daytime sleepiness may be tied to dementia syndrome


Older people who are sleepy during the day or lack enthusiasm for activities due to sleep issues may be more likely to develop a syndrome that can lead to dementia. People with the syndrome have a slow walking speed and have some memory issues, although they do not have a mobility disability or dementia. Called motoric cognitive risk syndrome, the condition can occur before dementia develops. The study does not prove that these sleep-related issues cause the syndrome, it only shows an association.


Topic → motoric cognitive risk syndrome


Older individuals experiencing daytime sleepiness may be at higher risk for developing a specific syndrome.


 The syndrome is characterized by slow walking speed and some memory issues.

 This condition is known as motoric cognitive risk syndrome and can precede dementia.

 Individuals with this syndrome do not have mobility disabilities or dementia at the time of diagnosis.

 The study highlights an association between sleep issues and the syndrome but does not establish causation.

 The findings suggest the importance of monitoring sleep patterns in older adults for potential cognitive risks.

 Further research is needed to explore the relationship between sleep-related issues and the development of this syndrome.

Summary: Sleep issues in older adults may be linked to motoric cognitive risk syndrome, which can precede dementia, but causation has not been established.



DNA evidence of people buried in volcanic eruption

In 79 CE, the active volcanic system in southern Italy known as Somma-Vesuvius erupted, burying the small Roman town of Pompeii and everyone in it. Now, ancient DNA collected shows that individuals' sexes and family relationships do not match traditional interpretations formulated largely from modern-day assumptions – an adult wearing a golden bracelet and holding a child, traditionally interpreted as a mother and child,

Topic → The Somma-Vesuvius volcano



The Somma-Vesuvius volcano erupted in 79 CE, impacting southern Italy.



The eruption buried the Roman town of Pompeii and its inhabitants.



Recent ancient DNA analysis reveals new insights into the identities of Pompeii victims.



Traditional interpretations of relationships (e.g., mother and child) are challenged by new findings.



An adult male was found wearing a golden bracelet while holding a child, contradicting previous assumptions.



The study emphasizes the importance of re-evaluating historical interpretations based on modern DNA evidence.



The findings highlight the complexities of familial relationships in ancient societies.

Summary: Recent DNA analysis from Pompeii reveals that traditional interpretations of relationships among victims may be incorrect



Question Corner

Not volcanism


Did the world's best-preserved dinosaurs really die in 'Pompeii-type' events?


By the 1990s, it was clear that the so-called Yixian Formation contained uniquely well-preserved remains of dinosaurs, birds, mammals, insects, frogs, turtles and other creatures. Unlike the skeletal and often fragmentary fossils unearthed in most other places, many animals came complete with internal organs, feathers, scales, fur and stomach contents. It suggested some kind of sudden, unusual preservation process at work. The leading hypothesis for the


perfect fossils up to now has been sudden burial by volcanism, perhaps like the waves of hot ash from Mt. Vesuvius that entombed many citizens of Pompeii in A.D. 79. The Yixian deposits have been popularly dubbed the "Chinese Pompeii". Though the Pompeii idea is highly appealing, a study says it is totally wrong. Instead, the study says the creatures were preserved by more mundane events including collapses of burrows and rainy periods that built up sediments that buried the dead in oxygen-free pockets.


Readers may send their questions / answers to questioncorner@thehindu.co.in


Topic → The Yixian Formation


 The Yixian Formation, discovered in the 1990s, contains exceptionally well-preserved fossils of various species, including dinosaurs, birds, mammals, and insects.


 Unlike typical fossil finds, many specimens in the Yixian Formation include complete remains with internal organs, feathers, scales, fur, and stomach contents.

 The initial hypothesis for the preservation of these fossils suggested sudden burial due to volcanic activity, similar to the events that occurred in Pompeii in A.D. 79.

 The Yixian deposits have been informally referred to as the "Chinese Pompeii" due to their remarkable preservation.

 Recent studies challenge the volcanic hypothesis, proposing that the fossils were preserved through more common events like burrow collapses and sediment buildup during rainy periods.

 These events created oxygen-free pockets that facilitated the preservation of the remains.

 The findings indicate a need to reassess the understanding of fossil preservation processes in the Yixian Formation.

Summary: The Yixian Formation is known for its remarkably preserved fossils, previously thought to be due to volcanic activity, but recent studies suggest more common preservation methods.

India will fail to meet 2025 TB ‘elimination’ target

R. Prasad

In March 2018, Prime Minister Narendra Modi set an ambitious goal of “eliminating” TB by 2025, five years ahead of the United Nations Sustainable Development Goals (SDG) deadline set for 2030. Mr. Modi reiterated the government’s goal of “eliminating” TB by 2025 even in March 2023 while inaugurating the One World TB Summit 2023 in Varanasi.

The SDG targets for 2030 is 90% reduction in TB deaths compared with 2015 and 80% reduction in TB incidence compared with 2015. As per WHO’s post-2015 End TB Strategy, compared with 2015, countries are required to meet the 2025 milestones of re-

ducing TB deaths by 75%, and reducing TB incidence rate by 50%. But as per the WHO Global TB Report 2024 and the India TB Report 2024 released a few days ago, India will not be able to even meet the 2025 milestones set by the WHO End TB Strategy, let alone achieving the ambitious goal of “eliminating” TB by 2025.

According to the India TB Report 2024, the TB incidence rate in India in 2015 was 237 per 1,00,000 population and the mortality rate was 28 per 1,00,000 population in 2015. According to the WHO global TB report 2024, the TB incidence rate for India in 2023 was 195 per 1,00,000 population. It was 199 per 1,00,000 in 2022. In the



Lagging: Even in 2023, India has not met the 2020 milestones of the End TB Strategy for both TB incidence and deaths. GETTY IMAGES

case of TB mortality, the rate was 22 per 1,00,000 population in 2023, down from 23 per one lakh in 2022. As per the WHO report, the TB incidence rate in India had reduced by 18% between 2015 and 2023, while the reduction in the total number of TB deaths between 2015 and 2023 was only 24%. Since

the End TB Strategy 2025 milestone requires 75% reduction in the total number of TB deaths and 50% reduction in TB incidence, India has to reduce the TB death rate from 28 per 1,00,000 in 2015 to seven per 1,00,000 by 2025 and the TB incidence rate from 237 per 1,00,000 in 2015 to 118.5 per 1,00,000 by 2025.

Not only will India fail to “eliminate” TB by 2025, it will not even be able to meet even the End TB Strategy 2025 milestones for TB incidence and the total number of TB deaths.

Worse, even in 2023, India has not met the 2020 milestones of the End TB Strategy for both TB incidence and deaths. As per the End TB Strategy target for 2020, there should have been a 35% reduction in the number of TB deaths compared with 2015 and 20% reduction in TB incidence rate compared with 2015. With only 24% reduction in the total number of TB deaths and 18% reduction in TB incidence between 2015 and 2023, India has not even met the 2020 milestones for TB deaths and TB incidence even


three years after the 2020 target date.


India did not meet the ‘elimination’ targets set for 2023 by the India’s National Strategic Plan for TB elimination: 2017-2025 report published in 2017 – reducing the estimated TB incidence rate per lakh population to 77, and reducing the estimated TB deaths per 1,00,000 population to six.


Despite the very slow progress in reducing TB incidence and deaths and far from “eliminating” TB by 2025, a November 5 PIB release says India achieved a “noteworthy 17.7% decline in TB incidence from 2015 to 2023, a rate that is over twice the global average decline of 8.3%”, as reported by the WHO Global TB Report 2024.


Topic → TB Elimination



 WHO's End TB Strategy: Countries must reduce TB deaths by 75% and TB incidence by 50% by 2025, as per the post-2015 strategy.

 India's Progress: India is projected to miss the 2025 milestones for TB deaths and incidence, with only a 24% reduction in deaths and 18% in incidence from 2015 to 2023.

 TB Statistics: In 2015, India had a TB incidence rate of 237 per 100,000 and a mortality rate of 28 per 100,000; by 2023, these figures were 195 and 22, respectively.

 Failure to Meet Targets: India did not meet the 2020 milestones of a 35% reduction in deaths and a 20% reduction in incidence, achieving only 24% and 18% reductions, respectively.

🚫 **Elimination Goals:** The National Strategic Plan for TB elimination aimed for a TB incidence rate of 77 and deaths of 6 per 100,000 by 2023, which were not met.

📈 **Contradictory Claims:** Despite slow progress, a PIB release claimed a 17.7% decline in TB incidence from 2015 to 2023, which is more than double the global average decline of 8.3%.

🔍 **Future Challenges:** India must reduce TB deaths to 7 per 100,000 and incidence to 118.5 per 100,000 by 2025 to meet WHO targets, which seems unlikely.

Summary: India is falling short of WHO's End TB Strategy milestones for 2025, with insufficient reductions in TB incidence and mortality rates

Why Cambodia's H5N1 reassortant virus needs close monitoring

All available data suggest human infections caused by the reassortant virus are attributed to direct poultry-to-human transmission, with no evidence of human-to-human spread

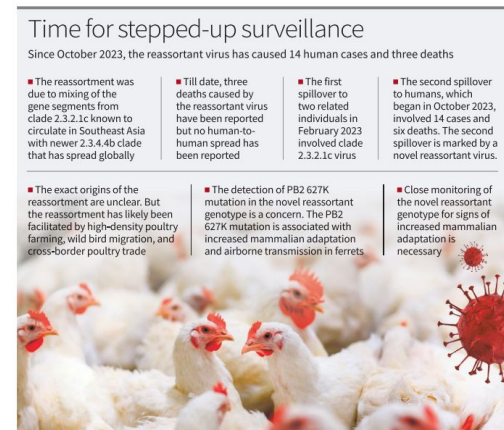
The Hindu Bureau

More than 10 years without any H5N1 case, Cambodia suddenly witnessed a spurt of H5N1 cases in humans, with 16 cases reported between February 2023 and August 2024 caused by A/H5 clade 2.3.2.1c viruses. If the sudden spurt in cases was already concerning, 14 cases were caused by a novel mixing or reassortment of A/H5N1 virus. The reassortment was due to mixing of the gene segments from clade 2.3.2.1c known to circulate in Southeast Asia with the newer 2.3.4.4b clade that has spread globally.

Investigations found that three human cases were in contact with sick poultry or bird droppings. Till date, three deaths caused by the reassortant virus have been reported. However, no human-to-human spread has been reported till date.

In a preprint, which is yet to be peer-reviewed, posted on November 5, a team led by the Pasteur Institute in Cambodia published a detailed genetic analysis of the novel H5N1 reassortant, which yielded new details on the spillover timeline and emphasised the need for stepped-up surveillance.

For each human case, a collaborative One Health investigation was conducted, which was able to link the human cases to infected poultry through rapid whole genome sequencing. The rapid assessment through genome sequencing and linking the human



in Cambodia in March 2014 and one human case caused by this clade thereafter was also reported from Cambodia. The clade 2.3.2.1c viruses continued to circulate since 2014. However, clade 2.3.4.4b viruses were first detected in live bird markets in Cambodia in 2021, co-circulating with clade 2.3.2.1c viruses.

There were two spillovers to humans, with the first occurring in February 2023 involving clade 2.3.2.1c viruses when two related individuals were detected and death of one person. The second spillover to humans began in October 2023. Between October 2023 and the end of August 2024, Cambodia has reported 14 cases with six deaths. The second spillover

unclear. However, the reassortment has very likely been "facilitated by high-density poultry farming, wild bird migration, and cross-border poultry trade in the region, highlighting the ongoing risk of zoonotic transmission in Southeast Asia".

Apparently, after the emergence of the novel reassortant genotype, the clade 2.3.2.1c is no longer in circulation in poultry in Cambodia. "Novel reassortant replaced the circulating 2.3.2.1c clade in Cambodian poultry," Jurje Y. Siegers, from the Institut Pasteur du Cambodge, Phnom Penh, Cambodia and the first author of the preprint said in a post in X (formerly Twitter). "All available data suggest human infections are attri-

but the HA gene segment undertaken by the researchers reveals that all A/H5 viruses sequenced from human cases belong to clade 2.3.2.1c. According to the authors, the virus responsible for the February 2023 case in humans was closely related to clade 2.3.2.1c A/H5N1 viruses that has been circulating in Cambodian poultry and wild birds since 2013.

Significant divergence
But since October 2023, the hemagglutinin (HA) sequences from both humans and poultry in Cambodia displayed significant divergence from earlier Cambodia strains. "These HA genes clustered with two duck samples from Vietnam during July and August 2023, and were de-

er, this indicates an introduction of a sublineage of clade 2.3.2.1c viruses with a common ancestor detected in poultry in Vietnam and Laos, but the exact introduction pathway cannot be pinpointed due to gaps in available surveillance data."

Though the phenotypic contributions of newly introduced clade 2.3.4.4b internal gene segments have yet to be elucidated, the presence of certain amino acid mutations in both human and poultry viruses in the gene segment of 2.3.4.4b suggests enhanced capacity for mammalian infection, they note. "To better understand the zoonotic risk that these viruses pose, further risk assessment in silico, ex vivo, in vivo, and in vitro is critical. In addition, the detection of the PB2 627K mutation in the novel reassortant genotype in poultry is also a concern, as it may become established in widespread circulation," they caution. The PB2 627K mutation is associated with increased mammalian adaptation and airborne transmission in ferrets. This underscores the need for close monitoring of the novel reassortant genotype for signs of increased mammalian adaptation.

This makes it critical to carry out sustained surveillance of avian influenza virus circulation in poultry and wild birds, particularly in high-risk regions like Southeast Asia. Simultaneously, awareness programmes to reduce human exposure to infected poultry is paramount. Also im-

Topic - >Reassortant Virus



Overview

Reassortant Virus: A virus that has undergone genetic reassortment, leading to new strains.

Public Health: Monitoring and responding to outbreaks is critical.

Research: Ongoing studies to understand reassortant viruses and their impacts.

What is the reassortment of viruses?

Reassortment is exclusively seen in viruses with a segmented genome. It is defined as the exchange of intact genes within the entire segment, which occurs during coinfection. Reassortment has been observed in Bunyaviridae, Reoviruses, arenavirus, and Orthomyxoviruses

What are the costs of population decline?



What are the pros and cons of increasing fertility rates? Which are the States with a growing population of the elderly? Has it reached a crisis point in some States? Will an uneven population growth shake up the federal structure? What will happen in the next round of delimitation?

Priscilla Jebaraj

The story so far:

The Chief Ministers of both Andhra Pradesh and Tamil Nadu expressed concerns about the low fertility rates in their States recently. Andhra Pradesh Chief Minister N. Chandrababu Naidu has said that he planned to introduce legislation to incentivise more children per family.

What is the current demographic situation, especially in the southern States?

After decades of family planning policies seeking to slow population growth, India has been waking up to the fact that the success of such policies is also leading to an increasingly ageing population. This is not a uniform phenomenon – southern States, as well as smaller northern States have seen a much sharper decrease in total fertility rates, defined as the average number of children born to women during their child-bearing years. Tamil Nadu and West Bengal, for instance, recorded fertility rates of 1.4 between 2019 and 2021, according to data from the Office of the Registrar General of India, while Andhra Pradesh, Telangana, Kerala, Punjab, and Himachal Pradesh had fertility rates of 1.5. At the other end of the spectrum are Bihar, with a fertility rate of 3, Uttar Pradesh

'Pro-natalist policies by incentivising women to have more children have not been a very successful approach internationally'

(2.7), and Madhya Pradesh (2.6). States with lower fertility rates have largely developed faster, but are now faced with the spectre of a rapidly ageing population. The *India Ageing* report published by UNFPA last year used Health Ministry data to show that while the share of India's elderly population is projected to rise from 10.1% in 2021 to 15% by 2036, the demographic transition is more advanced in some States. In Kerala, senior citizens accounted for 16.5% of the population in 2021, a figure that is set to rise to 22.8% by 2036; T.N.'s elderly will make up 20.8% of its population in 2036, while it will be 19% in Andhra Pradesh. In Bihar, on the other hand, only 7.7% were elderly in 2021, and this is projected to rise to just 11% in 2036.

What is the likely economic impact?

"India's demographic transition is much ahead of its socio-economic transition... To understand the impact of this, the most important indicator is not the proportion of the elderly population, but rather the old age dependency ratio, that is, how many older people are there for every 100 people of working age, between 18 to 59 years," says Srinivas Goli, an Associate Professor at the International Institute for Population Sciences. "When this ratio goes above 15%, that is when you have the onset of an ageing crisis." A number of States have already crossed this point, according to projections by the National Commission on Population, with Kerala having an old age dependency ratio of 26.1 in 2021, followed by Tamil Nadu (20.5), Himachal Pradesh (19.6), and Andhra Pradesh (18.5). This means these States' window of opportunity, to reap the demographic dividend of economic growth from a large number of young workers unburdened by the economic and health demands of a large number of minor or elderly dependents, has already closed.

Health expenses are likely to rise significantly in States with ageing populations. One analysis of NSSO data, in a study on demographic diversity by Tulane University's K.S. James and IIPS scholar Shubra Kriti published by *The India Forum*, shows that the southern States, with just one-fifth of India's population, spent 32% of the country's total out-of-pocket

expenditure on cardiovascular diseases in 2017-18, while eight Hindi belt States with half the country's population, spent just 24%.

The solution proposed by the Chief Ministers of increasing the fertility rate is also likely to reduce women's participation in the labour force, which will also hurt their economies. Southern politicians have also raised concerns with the Finance Commission that while their successful economies have pumped in higher tax revenues to the central pool, they get a diminishing share of the central pie of resources due to their slowing population growth.

What are the political implications?

Uneven population growth is set to shake up the federal structure, with the current freeze on the number of seats in Parliament set to expire in 2026, after which a new delimitation exercise will change the representation that States have in the Lok Sabha. The study by James and Kriti estimated that Uttar Pradesh is likely to gain 12 seats, followed by Bihar (10) and Rajasthan (7), while Tamil Nadu is set to lose nine seats, followed by Kerala (6) and Andhra Pradesh (5), due to their falling share in national population.

What are the solutions being considered?


The southern CMs seem to be advocating pro-natalist policies by incentivising women to have more babies. "This has not been a very successful approach internationally. Educated women know they are not reproductive machines, and forced fertility will not work, nor will incentives that do not recognise what families actually need," says Dr. Goli. He recommends changes in work-family policies, with paid maternity and paternity leaves, accessible childcare, and employment policies that reduce the "motherhood penalty". He notes that States and nations with better gender equity are better able to maintain fertility rates at sustainable levels, as women are more likely to have children if they will not be deprived of economic independence while doing so.

Another approach is to increase the working lifespan and thus reduce the old age dependency ratio. The southern States are already magnets for economic migrants. However, Dr. Goli points out that though these migrants make social security demands of their destination States, they continue to be counted in their home States for political and financial distribution purposes, leaving southern States in a difficult tangle.





An elderly people: Health expenses are likely to rise significantly in States with ageing populations. THULASI KAKKAT


Topic- Cost of Population decline


 Low Fertility Rates: Andhra Pradesh and Tamil Nadu are experiencing low fertility rates, prompting concerns from their Chief Ministers.


 Legislative Action: Andhra Pradesh's Chief Minister, N. Chandrababu Naidu, plans to introduce legislation to incentivize families to have more children.

 Aging Population: India is facing an increasingly aging population, particularly in southern and some northern states, due to past family planning policies.

 Fertility Rate Statistics: Tamil Nadu and West Bengal have a fertility rate of 1.4, while Andhra Pradesh, Telangana, Kerala, Punjab, and Himachal Pradesh have rates of 1.5. In contrast, Bihar has a rate of 3.

 **Economic Impact:** The aging population is expected to increase health expenses and may hinder economic growth, as states like Kerala and Tamil Nadu have already crossed the critical old age dependency ratio.

 **Women's Labor Participation:** Proposed measures to increase fertility rates may negatively impact women's participation in the workforce, further affecting economic stability.

 **Resource Allocation Concerns:** Southern states are raising concerns about receiving a diminishing share of central resources despite contributing higher tax revenues due to their slower population growth.



Population Growth Impact: Uneven population growth will affect the federal structure, with a new delimitation exercise in 2026 changing Lok Sabha representation.




Seat Gains and Losses: Uttar Pradesh is projected to gain 12 seats, Bihar 10, and Rajasthan 7, while Tamil Nadu, Kerala, and Andhra Pradesh are expected to lose seats due to declining populations.





Pro-Natalist Policies: Southern Chief Ministers are advocating for pro-natalist policies to encourage higher birth rates, though this approach has seen limited success internationally.



Work-Family Policy Changes: Dr. Goli suggests improving work-family policies, including paid parental leave and accessible childcare, to support women's economic independence and fertility rates.

 **Gender Equity and Fertility:** States with better gender equity tend to maintain sustainable fertility rates, as women are more likely to have children when they can retain economic independence.

 **Economic Migration Issues:** Southern States attract economic migrants, but these migrants complicate political and financial distributions as they are counted in their home States.

 **Old Age Dependency Ratio:** Increasing the working lifespan is suggested as a way to reduce the old age dependency ratio, addressing demographic challenges.

Summary: The upcoming delimitation in 2026 will reshape political representation in India, with southern states facing challenges due to declining populations, prompting discussions on pro-natalist policies and gender equity.

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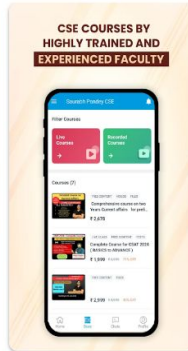
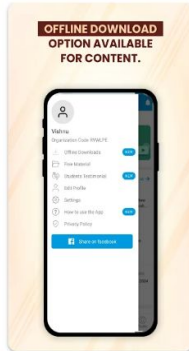
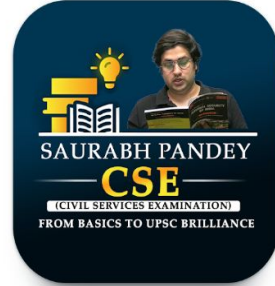
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