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THE HINDU NEWSPAPER

12 APRIL 2026

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GS Paper 1: History	12 April 2026
TOPICS COVERED	
12A	

Holy fire



Celebrating victory: Christian Orthodox pilgrims hold up candles during the Holy Fire ceremony at the Church of the Holy Sepulchre, the site in the Old City of Jerusalem where, according to tradition, Jesus was crucified and buried, on Saturday. AP

Celebrating victory: Christian Orthodox pilgrims hold up candles during the Holy Fire ceremony at the Church of the Holy Sepulchre, the site in the Old City of Jerusalem where, according to tradition, Jesus was crucified and buried, on Saturday.



GS Paper 1: Society

12 April 2026

TOPICS COVERED

12A Traditions in transition
परिवर्तन के दौर में परंपराएँ

Traditions in transition

With a belief system intertwined with nature, and with music and dance intrinsic to daily life, an endangered tribe in Odisha strives to keep its visual tradition intact



K.R. DEEPAK
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The Lanjia Saora community, a particularly vulnerable tribal group living in the forested regions of Rayagada and Gajapati districts in Odisha, continues to hold on to visual traditions that are as striking as they are symbolic. Living in mud-and-thatch homes scattered across undulating terrain, the community sustains itself through shifting cultivation, foraging, and small-scale farming. Their belief system is closely tied to nature, with rituals, music, and dance forming an integral part of everyday life.

Among the most distinctive visual traditions are their large metal earrings — thick, circular ornaments that are not merely worn but fixed into stretched earlobes, often over years. For the older generation, these earrings are markers of identity and endurance, their weight carried with quiet pride. The lobes, elongated and shaped by time, speak of a life lived in close rhythm with inherited customs.

Equally evocative are the tattoos once etched permanently onto the skin. These intricate patterns, often geometric or inspired by nature, were considered both protective and spiritual — an extension of the Saora worldview.

But as one walks through the villages today, a subtle shift is visible.

Among the younger members of the community, tradition is being reinterpreted. The heavy earrings are still present, but many now prefer to wear them as hooked adornments rather than permanently fixing them to the ear. It is a compromise between continuity and comfort, identity and mobility.

The tattoos, too, are no longer always lifelong commitments. Instead, younger members often recreate the motifs using temporary black markings during festivals and rituals — honouring tradition while allowing for change.

This evolving aesthetic reflects a community negotiating modernity on its own terms.



Mark of tradition: An elderly tribal woman with stretched earlobes. A visual tradition marked by wearing traditional wooden ear plugs over several years.

12A, Traditions in transition परिवर्तन के दौर में परंपराएँ

- With a belief system intertwined with **nature**, and with **music and dance** intrinsic to daily life, an endangered tribe in **Odisha** strives to keep its **visual tradition** intact.
प्रकृति से जुड़ी हुई आस्था प्रणाली और दैनिक जीवन में संगीत और नृत्य के अभिन्न होने के साथ, ओडिशा की एक संकटग्रस्त जनजाति अपनी दृश्य परंपरा को बनाए रखने का प्रयास कर रही है।
- The **Lanjia Saora community**, a particularly vulnerable tribal group living in the forested regions of **Rayagada** and **Gajapati** districts in Odisha, continues to hold on to visual traditions that are as striking as they are symbolic.
लंजिया साओरा समुदाय, जो ओडिशा के **रायगड़ा** और **गजपति** जिलों के वन क्षेत्रों में रहने वाला एक अत्यंत संवेदनशील जनजातीय समूह है, ऐसी दृश्य परंपराओं को बनाए हुए है जो जितनी आकर्षक हैं उतनी ही प्रतीकात्मक भी हैं।
- Living in **mud-and-thatch homes** scattered across undulating terrain, the community sustains itself through **shifting cultivation**, **foraging**, and **small-scale farming**.
यह समुदाय ऊबड़-खाबड़ भूभाग में फैले मिट्टी और फूस के घरों में रहता है और झूम खेती, खाद्य संग्रहण और छोटे पैमाने की खेती के माध्यम से अपना जीवन यापन करता है।
- Their belief system is closely tied to **nature**, with **rituals**, **music**, and **dance** forming an integral part of everyday life.
उनकी आस्था प्रणाली प्रकृति से गहराई से जुड़ी है, जिसमें अनुष्ठान, संगीत और नृत्य दैनिक जीवन का अभिन्न हिस्सा हैं।
- Among the most distinctive visual traditions are their large **metal earrings** — thick, circular ornaments that are not merely worn but fixed into stretched **earlobes**, often over years.
उनकी सबसे विशिष्ट दृश्य परंपराओं में बड़े धातु के झूमके शामिल हैं — मोटे, गोल आभूषण जो केवल पहने नहीं जाते बल्कि वर्षों में खिंचे हुए कान के लोब में स्थायी रूप से लगाए जाते हैं।
- For the older generation, these earrings are markers of **identity** and **endurance**, their weight carried with quiet pride.
पुरानी पीढ़ी के लिए ये झूमके पहचान और सहनशीलता के प्रतीक हैं, जिनका भार गर्व के साथ उठाया जाता है।



- The lobes, elongated and shaped by time, speak of a life lived in close rhythm with inherited **customs**.
समय के साथ खिंचे और आकार लिए हुए कान के लोब, विरासत में मिली **परंपराओं** के साथ सामंजस्यपूर्ण जीवन की कहानी बताते हैं।
- Equally evocative are the **tattoos** once etched permanently onto the skin.
उतने ही प्रभावशाली हैं वे **टैटू**, जो पहले त्वचा पर स्थायी रूप से उकेरे जाते थे।
- These intricate patterns, often **geometric** or inspired by **nature**, were considered both **protective** and **spiritual** — an extension of the Saora worldview.
ये जटिल डिज़ाइन, जो अक्सर **ज्यामितीय** या **प्रकृति** से प्रेरित होते थे, **सुरक्षात्मक** और **आध्यात्मिक** दोनों माने जाते थे — साओरा दृष्टिकोण का विस्तार।
- But as one walks through the villages today, a subtle shift is visible.
लेकिन आज जब कोई गांवों से गुजरता है, तो एक सूक्ष्म परिवर्तन दिखाई देता है।
- Among the younger members of the community, tradition is being **reinterpreted**.
समुदाय के युवा सदस्यों के बीच परंपराओं को **पुनः व्याख्यायित** किया जा रहा है।
- The heavy earrings are still present, but many now prefer to wear them as **hooked adornments** rather than permanently fixing them to the ear.
भारी झुमके अभी भी मौजूद हैं, लेकिन अब कई लोग उन्हें कान में स्थायी रूप से लगाने के बजाय **हुक वाले आभूषण** के रूप में पहनना पसंद करते हैं।
- It is a compromise between **continuity and comfort**, identity and mobility.
यह **निरंतरता और आराम**, पहचान और गतिशीलता के बीच एक समझौता है।
- The tattoos, too, are no longer always lifelong commitments.
अब टैटू भी हमेशा जीवन भर के लिए स्थायी नहीं रहे हैं।
- Instead, younger members often recreate the motifs using **temporary black markings** during festivals and rituals — honouring tradition while allowing for change.
इसके बजाय, युवा सदस्य अक्सर त्योहारों और अनुष्ठानों के दौरान **अस्थायी काले चिह्नों** से इन डिज़ाइनों को बनाते हैं — परंपरा का सम्मान करते हुए परिवर्तन को स्वीकार करते हैं।
- This evolving aesthetic reflects a community negotiating **modernity** on its own terms.
यह विकसित होती सौंदर्य दृष्टि एक ऐसे समुदाय को दर्शाती है जो अपनी शर्तों पर **आधुनिकता** के साथ तालमेल बिठा रहा है।

GS Paper 1: Geography		12 April 2026
TOPICS COVERED		
12A	Waters at sea समुद्र के जल	
12A	Ukraine attacked Kursk, Belgorod regions: Russian regional officials यूक्रेन ने कुर्स्क और बेलगोरोद क्षेत्रों पर हमला किया: रूसी क्षेत्रीय अधिकारियों का दावा	

Waters at sea

Why do the oceans have currents?

GS I: Geography

The earth formed as a molten world. Around 4 billion years ago, its surface cooled enough for water vapour to condense. Torrential rains then fell for centuries, filling basins to create the first oceans around 3.8 billion years ago.

Once liquid water covered large parts of the surface, three forces set it in motion.

The sun heated the atmosphere unevenly, creating winds. These winds pushed the ocean's surface, dragging the top layer of water along. The sun also heated water near the equator directly,

making it less dense, so it rose and spread towards the poles. Meanwhile, cold water sank at the poles while warmer water rose near the equator, establishing a 'conveyor belt' of circulation called thermohaline circulation. Finally, the earth's rotation deflected these moving water masses sideways, bending currents into large swirling circles called gyres. As tectonic plates shifted and continents formed, landmasses blocked the water's path and forced it into specific routes.

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

12A. Waters at sea समुद्र के जल

- Why do the oceans have **currents**?
महासागरों में **धाराएं** क्यों होती हैं?
- The earth formed as a **molten world**.
पृथ्वी एक **पिघली हुई दुनिया** के रूप में बनी।
- Around **4 billion years ago**, its surface cooled enough for **water vapour** to condense.
लगभग **4 अरब वर्ष पहले**, इसकी सतह इतनी ठंडी हो गई कि **जलवाष्प** संघनित हो सके।
- Torrential rains then fell for centuries, filling basins to create the first **oceans** around **3.8 billion years ago**.



- फिर सदियों तक भारी वर्षा हुई, जिससे बेसिन भर गए और लगभग **3.8 अरब वर्ष पहले** पहले महासागर बने।
- Once liquid water covered large parts of the surface, three forces set it in motion. जब तरल जल ने सतह के बड़े हिस्से को ढक लिया, तब तीन शक्तियों ने इसे गति दी।
 - The **sun** heated the atmosphere unevenly, creating **winds**.
सूर्य ने वायुमंडल को असमान रूप से गर्म किया, जिससे हवाएं बनीं।
 - These winds pushed the ocean's surface, dragging the top layer of water along. इन हवाओं ने समुद्र की सतह को धकेला और पानी की ऊपरी परत को साथ ले गईं।
 - The sun also heated water near the **equator** directly, making it less dense, so it rose and spread towards the **poles**.
सूर्य ने भूमध्य रेखा के पास के पानी को सीधे गर्म किया, जिससे वह कम घनत्व वाला हो गया और ऊपर उठकर ध्रुवों की ओर फैल गया।
 - Meanwhile, cold water sank at the poles while warmer water rose near the equator, establishing a '**conveyor belt**' circulation called **thermohaline circulation**.
इसी बीच ठंडा पानी ध्रुवों पर नीचे गया जबकि गर्म पानी भूमध्य रेखा के पास ऊपर उठा, जिससे '**कन्वेयर बेल्ट**' परिसंचरण बना जिसे **थर्मोहेलाइन परिसंचरण** कहा जाता है।
 - Finally, the earth's **rotation** deflected these moving water masses sideways, bending currents into large swirling circles called **gyres**.
अंत में, पृथ्वी के घूर्णन ने इन जल द्रव्यमानों को मोड़ दिया और उन्हें बड़े घूमते हुए चक्रों में बदल दिया जिन्हें **गायर्स** कहा जाता है।
 - As **tectonic plates** shifted and continents formed, landmasses blocked the water's path and forced it into specific routes.
जैसे-जैसे **टेक्टोनिक प्लेट्स** खिसकीं और महाद्वीप बने, भू-भाग ने पानी के रास्ते को रोककर उसे विशेष मार्गों में बहने के लिए मजबूर किया।

MOSCOW

Ukraine attacked Kursk, Belgorod regions: Russian regional officials



GS I: Geography REUTERS
Governors of two Russian border regions said Ukrainian drones had attacked targets in the Kursk and Belgorod regions, injuring five persons. The attacks were reported after a 32-hour Orthodox Easter ceasefire went into effect. Russian President Vladimir Putin announced the ceasefire on Thursday. REUTERS

12A. Ukraine attacked Kursk, Belgorod regions: Russian regional officials

यूक्रेन ने कुर्स्क और बेलगोरोद क्षेत्रों पर हमला किया: रूसी क्षेत्रीय अधिकारियों का दावा

- Governors of two Russian border regions said Ukrainian **drones** had attacked targets in the **Kursk** and **Belgorod** regions, injuring five persons.
दो रूसी सीमा क्षेत्रों के गवर्नरों ने कहा कि यूक्रेनी ड्रोन ने कुर्स्क और बेलगोरोद क्षेत्रों में लक्ष्यों पर हमला किया, जिसमें पांच लोग घायल हुए।
- The attacks were reported after a **32-hour Orthodox Easter ceasefire** went into effect.
ये हमले 32 घंटे के ऑर्थोडॉक्स ईस्टर युद्धविराम लागू होने के बाद रिपोर्ट किए गए।
- Russian President **Vladimir Putin** announced the ceasefire on Thursday.
रूसी राष्ट्रपति **व्लादिमीर पुतिन** ने गुरुवार को इस युद्धविराम की घोषणा की।

GS Paper II: Governance

12 April 2026

TOPICS COVERED

- 12A** Bid to clean up a rotten food trail
खराब खाद्य श्रृंखला को साफ करने का प्रयास



Bid to clean up a rotten food trail

Beneath Hyderabad's booming food economy lies a dark web of **adulteration, mislabelling and unsafe practices**. Of late, an unprecedented **police-led crackdown** is pulling back the curtain on a **sprawling food fraud network** that thrives on gaps in regulation and consumer trust. But as enforcement tightens and complaints surge, the city finds itself trying not just to fix a broken food chain, but also to restore faith in what lands on every plate. Write **Serish Naniiseti and Lavpreet Kaur**

Thak, thak, thak. The first thing that hits you is the sound. The early-morning summer sunlight slants into the hunk of meat as Rahul lifts a three-pound net cleaver and brings it down with practised precision, reducing 'medium cuts' into 'small' ones at the slaughterhouse in Hyderabad's Jiyaguda.

Around him, life unfolds in familiar chaos. Men and women in gumboots and rubber slippers sip chai, rinse their hands, sort meat. Buyers haggle, cleaners scrub, traders shout instructions. Some move about in clothes stained with blood and flesh, unfazed, immersed in routine. "Today it is clean. There is no smell, as we reopened today," says Prasad Nethkar, who has been in the trade for three decades at the same spot. "We were closed for eight days and lost money. But now we are back," he adds.

Just hours earlier, the gates of this very slaughterhouse had been forced open. A Telangana legislator, accompanied by traders, had broken the seal and led a dramatic entry into a facility that civic authorities had declared unhygienic and polluting. The premises had been shut on April 2, citing traffic congestion, hygiene issues and other violations.

Between that act of defiance and the conditions inside lies the larger, messier story of Hyderabad's escalating battle over food safety. For decades, food regulation in the city rested largely with civic authorities. That balance is now shifting. The Telangana government has brought in the police, signalling that the problem has outgrown routine enforcement.

The results have been jarring. Photographs and videos released by officials show raids on warehouses stocked with fake paneer, adulterated ginger-garlic paste, chemically treated tea powder, spoiled eggs and tonnes of decomposing offal. The visuals are stark, unsettling and difficult to ignore. For many residents, however, the crisis begins much closer to home.

For 36-year-old M. Priyadarshini, it started with a walk to her neighbourhood *kirana* store in Mailandepally to pick up treats for her elder son's sixth birthday. She picked up a colourful cake, some brightly glazed donuts and a handful of snacks which were on discount.

By the next morning, the celebration had given way to discomfort. One after another, family members began complaining of stomachache. What seemed like a harmless indulgence quickly turned into suspicion about what they had eaten the night before.

Her complaint led police to a cramped unit in Katedan. Inside, officers found cakes and donuts being prepared using rotten eggs and chemical



There are places that, once you see them, you would not want to see again. And certainly not eat anything produced there.

N. RANJITH KUMAR GOUD,
H-FAST inspector

additives, in conditions far removed from what consumers imagine while picking up bakery items from a shelf.

In another part of the city, V. Rishab was nudged towards a stack of ginger-garlic paste sachets while waiting at his regular chicken shop on a Sunday. Those were part of a buy-one-get-one-free deal placed conveniently beside the weighing scale. Pressed for time and reassured by familiarity, he decided to buy a few sachets. It was only later, at home, that doubt crept in. There was no brand name, no manufacturing date, no ingredient list.

He decided to file a complaint, triggering a series of raids across Tappachabutra, Borabanda and other parts of Hyderabad. Police uncovered small manufacturing units producing ginger-garlic paste using synthetic colours and additives, packed in unhygienic conditions and supplied widely to local shops.

Safeguarding food business

Hyderabad's food economy has expanded rapidly alongside India's broader economic growth. Cloud kitchens, food delivery apps and a growing network of intermediaries have transformed how food is produced and consumed. According to an industry estimate, the city has nearly 80,000 restaurants.

Add to this hundreds of hostels and paying-guest accommodations, and the scale becomes staggering. Lakhs depend daily on food that passes through multiple hands before reaching their plate. This ecosystem also sustains lakhs of workers drawn from across the country. Ensuring food safety, in such a system, is no longer optional. It is essential, and increasingly complex.

The first public indication of a tougher approach came in December 2025, during the annual police briefing by Hyderabad Police Commissioner V.C. Sajjanar. Three months later, on March 19, the Hyderabad Food Adulteration Surveillance Team (H-FAST) was formally launched. The impact was immediate.

In March alone, 61 cases of food adulteration were registered in the Hyderabad commissionerate. Authorities seized 15 tonnes of adulterated food products and arrested 64 persons. The first week of April saw continued crackdowns, with more seizures of unsafe food items.

On March 30, Chief Minister A. Revanth Reddy outlined plans for a dedicated enforcement authority on the lines of Hyderabad Disaster Response and Asset Protection Agency or HYDRAP (for land protection) and EAGLE (for narcotics control), underlining the urgency of cleaning up the food business.

Meanwhile, H-FAST's helpline – 8712661212 – has been constantly ringing.

Complaints on the rise

With growing awareness, the number of complaints has surged. Police now receive between 50 and 60 calls a day. Nearly 30-40% of raids are directly linked to citizen inputs.

The complaints range from missing labels and expired products to suspicious pricing and health issues after consumption. In some cases, residents have reported foul smells from suspected manufacturing units. Occasionally, rival businesses tip off authorities, though officers say even those leads often prove useful.

According to DCP (Task Force) Vaibhav Gaikwad, misbranding is rampant. Ice cream, for instance, must contain milk fat. If vegetable oils like palm oil are used, the product must be labelled 'frozen dessert'. Instead, it is often sold loosely as ice cream.

Similarly, cheaper paneer made using vegetable fat should be labelled as a non-dairy product or cheese analogue. Instead, it is often sold loose, without packaging or disclosure.

In the non-vegetarian segment, improper storage and processing and stored at temperatures between -18°C and -40°C is often kept at higher temperatures, without proper cleaning or licensing, increasing the risk of contamination.



From a restaurateur's perspective, such raids can be disruptive in the moment, but ultimately send the right message. They push the entire industry toward better hygiene and accountability. If carried out consistently and fairly, they don't scare customers; they reassure them that dining out is becoming safer.

UTTAM REDDY,
Restaurant owner

Even fruits are not spared. Mangoes, officials say, are frequently exposed to excessive ripening agents such as ethylene, far beyond recommended limits. Instead of one packet per 10 kilograms, multiple packets are used, sometimes out of ignorance, sometimes to accelerate trade.

"Police are the first point of contact for the public," Gaikwad says, noting that limited resources within food safety departments have made such collaboration necessary.

Every raid begins with a single doubt. Once a complaint is made, officers start visiting shops in plain clothes and pose as customers, making casual enquiries. Sometimes they purchase samples for testing. At other times, they return repeatedly, to trace patterns.

Gradually, a network begins to take shape: suppliers, intermediaries, small manufacturing units tucked away in residential areas. Only after this chain is mapped do teams move in for coordinated raids, often involving H-FAST, local police and Task Force units.

"Verification is the important first step," says H-FAST inspector N. Ranjith Kumar Goud.

What they encounter inside these units is often disturbing – dim, poorly ventilated rooms,

raw materials piled on the floor, containers stained with residue, and workers, often without protective gear, mixing and packing food meant for mass consumption.

"These are places that, once you see them, you would not want to see again. And certainly not eat anything produced there," Goud says.

Earlier crackdowns by civic authorities focused largely on restaurants and food outlets with expired FSSAI certifications, hygiene violations and compliance gaps. But the current wave of raids has exposed an industrial-scale manipulation of the food supply chain, with small, unregulated factories operating out of residential areas or on the city outskirts, producing large quantities of dubious products.

Paneer, the dish of choice for most vegetarians, offers a telling example. Hyderabad consumes an estimated 15,000 kilograms of paneer daily, requiring nearly one lakh litres of milk. Genuine production is resource-intensive, with every kilogram of paneer requiring around six litres of milk.

But raids have uncovered imitation products made using milk solids and palm oil instead of milk fat. To the consumer, it looks identical and is sold as paneer. But nutritionally, it falls short and may even pose health risks. Even when products are genuine, the absence of a reliable cold chain, from storage to transport, can result in spoilage, making safety as much about handling as the ingredients.

The supply chain problem

What makes these operations difficult to curb is their wide reach. The buyer base, police say, spans everyone, from individual consumers to restaurants, wholesale dealers, and retail shops. Intermediaries in the supply chain are often aware of the adulteration but continue procurement due to the cost advantage.

"Customers are mostly unaware. They assume what they are buying is genuine," Goud says.

Price becomes the biggest lure. A consumer might pay ₹200 for 250 grams of paneer in one shop, while another might get 500 grams for the same price. The apparent bargain often overrides caution.

Complaints of food poisoning and seizures of contaminated products are no longer confined to one city. They travel fast, fuelling a ripple effect of doubt.

For the restaurant industry, the crackdown is a double-edged sword. "From a restaurateur's perspective, such raids can be disruptive in the moment, but ultimately send the right message. They push the entire industry toward better hygiene and accountability. If carried out consistently and fairly, they don't scare customers; they reassure them that dining out is becoming safer," says Uttam Reddy, owner of Rayalaseema Ruchulu, a restaurant chain specialising in Rayalaseema, Andhra and Telangana cuisine.

Officials echo that sentiment. "These raids are not meant to scare the public, but to make them aware," says a police officer. "People should read labels, question unusual pricing and be mindful of what they are consuming."

But even as enforcement intensifies, gaps remain. Some of Hyderabad's most recognisable food establishments – those that serve tea, biryani and other staples for nearly 18 hours a day – have so far been left untouched. These outlets are woven into the city's identity, but they also leave a lot to be desired when it comes to hygiene, food storage or service practices. For now, they stand outside the immediate sweep of inspections. But, perhaps, not for long.

12A. Bid to clean up a rotten food trail खराब खाद्य श्रृंखला को साफ करने का प्रयास

- Beneath Hyderabad's booming food economy lies a dark web of **adulteration, mislabelling and unsafe practices**. हैदराबाद की तेजी से बढ़ती खाद्य अर्थव्यवस्था के नीचे मिलावट, गलत लेबलिंग और असुरक्षित प्रथाओं का एक जाल छिपा है।
- Of late, an unprecedented **police-led crackdown** is pulling back the curtain on a **sprawling food fraud network** that thrives on gaps in regulation and consumer trust. हाल ही में अभूतपूर्व पुलिस कार्रवाई ने एक बड़े खाद्य धोखाधड़ी नेटवर्क का पर्दाफाश किया है जो नियमों की कमी और उपभोक्ता विश्वास पर निर्भर करता है।
- But as enforcement tightens and complaints surge, the city finds itself trying not just to fix a broken **food chain**, but also to restore faith in what lands on every plate. लेकिन जैसे-जैसे सख्ती बढ़ रही है और शिकायतें बढ़ रही हैं, शहर न केवल टूटी हुई खाद्य श्रृंखला को सुधारने बल्कि खाने पर विश्वास बहाल करने की कोशिश कर रहा है।
- Thak, thak, thak. ठक, ठक, ठक।
- The first thing that hits you is the sound. सबसे पहले जो चीज़ आपको प्रभावित करती है वह आवाज़ है।
- The early-morning sunlight falls on hunks of meat as **Rahul** cuts them at a slaughterhouse in **Jiyaguda, Hyderabad**. सुबह की धूप में राहुल हैदराबाद के जियागुड़ा स्थित बूचड़खाने में मांस काटता है।



- Around him, life unfolds in familiar chaos.
उसके आसपास जीवन सामान्य अव्यवस्था में चलता है।
- People sip tea, clean hands, sort meat, and trade.
लोग चाय पीते हैं, हाथ साफ करते हैं, मांस छांटते हैं और व्यापार करते हैं।
- Some move about in blood-stained clothes, immersed in routine.
कुछ लोग खून से सने कपड़ों में भी सामान्य रूप से काम करते हैं।
- "Today it is clean," says **Prasad Nethikar**.
"आज साफ है," **प्रसाद नेथिकार** कहते हैं।
- He says they reopened after eight days of closure.
वे बताते हैं कि आठ दिन बाद फिर से काम शुरू हुआ।
- Just hours earlier, the slaughterhouse had been forcibly opened.
कुछ घंटे पहले ही बूचड़खाना जबरन खोला गया था।
- A **Telangana legislator** led traders into the sealed facility.
एक **तेलंगाना विधायक** व्यापारियों को अंदर लेकर गया।
- The premises had been shut due to hygiene and traffic issues.
इस जगह को स्वच्छता और यातायात समस्याओं के कारण बंद किया गया था।
- This reflects Hyderabad's larger **food safety crisis**.
यह हैदराबाद के बड़े **खाद्य सुरक्षा संकट** को दर्शाता है।
- Food regulation earlier rested with civic authorities.
पहले खाद्य नियमन स्थानीय निकायों के पास था।
- Now the **Telangana government** has involved the police.
अब **तेलंगाना सरकार** ने पुलिस को शामिल किया है।
- Raids revealed fake paneer, adulterated products, and spoiled food.
छापों में नकली पनीर, मिलावटी उत्पाद और खराब भोजन मिला।
- The visuals are shocking and disturbing.
ये दृश्य चौंकाने वाले और परेशान करने वाले हैं।
- For many residents, the crisis feels personal.
कई लोगों के लिए यह संकट व्यक्तिगत लगता है।
- For **M. Priyadarshini**, it began with buying food items.
एम. प्रियदर्शिनी के लिए यह घटना खाने की खरीद से शुरू हुई।
- Her family fell sick after eating cake and snacks.
केक और स्नैक्स खाने के बाद उनका परिवार बीमार पड़ गया।
- Her complaint led to a raid in **Katedan**.
उनकी शिकायत के बाद **काटेदान** में छाप पड़ा।
- Police found food made using rotten eggs and chemicals.
पुलिस को सड़े अंडों और रसायनों से बना खाना मिला।
- Similarly, **V. Rishab** bought ginger-garlic paste sachets.
इसी तरह **वी. ऋषभ** ने अदरक-लहसुन पेस्ट खरीदा।
- Later he found no labels or details on them.
बाद में उसमें कोई लेबल या जानकारी नहीं थी।
- His complaint triggered raids in **Tappachabutra** and **Borabanda**.
उनकी शिकायत के बाद **तप्पाचाबुत्रा** और **बोराबंडा** में छापे पड़े।
- Police found unhygienic manufacturing units.
पुलिस को अस्वच्छ उत्पादन इकाइयाँ मिलीं।

Safeguarding food business

खाद्य व्यवसाय की सुरक्षा

- Hyderabad's food economy has expanded rapidly.
हैदराबाद की खाद्य अर्थव्यवस्था तेजी से बढ़ी है।
- The city has nearly **80,000 restaurants**.
शहर में लगभग **80,000 रेस्तरां** हैं।
- Lakhs depend on food passing through multiple hands.
लाखों लोग ऐसे भोजन पर निर्भर हैं जो कई हाथों से गुजरता है।



- Ensuring **food safety** is now essential and complex.
खाद्य सुरक्षा सुनिश्चित करना अब जरूरी और जटिल है।
- In December 2025, a tougher approach was indicated.
दिसंबर 2025 में सख्त रुख का संकेत मिला।
- In March, **H-FAST** was launched.
मार्च में **H-FAST** शुरू किया गया।
- 61 cases were registered and 15 tonnes of food seized.
61 मामले दर्ज हुए और 15 टन खाद्य सामग्री जब्त हुई।
- Chief Minister **A. Revanth Reddy** proposed stricter enforcement.
मुख्यमंत्री **ए. रेवंत रेड्डी** ने सख्त कार्रवाई की योजना बनाई।
- The helpline received constant complaints.
हेल्पलाइन पर लगातार शिकायतें आने लगीं।

Complaints on the rise शिकायतों में वृद्धि

- Police now receive **50-60 calls daily**.
पुलिस को रोज़ **50-60 कॉल** मिलती हैं।
- 30-40% raids are based on citizen complaints.
30-40% छापे नागरिक शिकायतों पर आधारित हैं।
- Complaints include missing labels and health issues.
शिकायतों में लेबल की कमी और स्वास्थ्य समस्याएं शामिल हैं।
- According to **Vaibhav Gaikwad**, misbranding is widespread.
वैभव गायकवाड़ के अनुसार गलत ब्रांडिंग व्यापक है।
- Ice cream is often mislabeled.
आइसक्रीम अक्सर गलत तरीके से बेची जाती है।
- Paneer is also adulterated and mislabeled.
पनीर भी मिलावटी और गलत लेबल वाला होता है।
- Improper storage of meat increases contamination risk.
मांस का गलत भंडारण संक्रमण का खतरा बढ़ाता है।
- Cold chain gaps worsen food safety.
कोल्ड चेन की कमी खाद्य सुरक्षा को प्रभावित करती है।
- Fruits like mangoes are treated with excess chemicals.
आम जैसे फलों में अधिक रसायनों का उपयोग होता है।
- Police conduct undercover checks before raids.
पुलिस छापे से पहले गुप्त जांच करती है।
- They trace suppliers and networks.
वे आपूर्ति श्रृंखला का पता लगाते हैं।
- Units often have poor hygiene conditions.
इन इकाइयों में अक्सर खराब स्वच्छता होती है।

The supply chain problem आपूर्ति श्रृंखला की समस्या

- The network includes consumers, retailers and intermediaries.
इस नेटवर्क में उपभोक्ता, व्यापारी और मध्यस्थ शामिल हैं।
- Many knowingly buy adulterated products due to low cost.
कई लोग कम कीमत के कारण मिलावटी उत्पाद खरीदते हैं।
- Consumers are mostly unaware.
उपभोक्ता अक्सर अनजान रहते हैं।
- Low price becomes the main attraction.
कम कीमत सबसे बड़ा आकर्षण होती है।
- Food safety issues are spreading beyond one city.
खाद्य सुरक्षा समस्याएं एक शहर तक सीमित नहीं हैं।



- For restaurants, crackdowns are a double-edged sword. रेस्तरां के लिए छापे दोधारी तलवार हैं।
- They improve hygiene but may disrupt business. वे स्वच्छता बढ़ाते हैं लेकिन व्यापार प्रभावित करते हैं।
- Officials say raids aim to create awareness. अधिकारियों का कहना है कि छापों का उद्देश्य जागरूकता है।
- Consumers should read labels and check prices. उपभोक्ताओं को लेबल पढ़ना और कीमत जांचनी चाहिए।
- Some major food outlets remain unchecked. कुछ बड़े खाद्य प्रतिष्ठान अभी जांच से बाहर हैं।
- But stricter inspections may come soon. लेकिन जल्द ही सख्त जांच हो सकती है।

GS Paper II: International Relations		12 April 2026
TOPICS COVERED		
12A	U.K. pauses its plan to cede Chagos Islands after Trump's opposition ट्रम्प के विरोध के बाद यू.के. ने चागोस द्वीप सौंपने की योजना रोकी	

LONDON

U.K. pauses its plan to cede Chagos Islands after Trump's opposition



GS II: IR Britain's government said on Saturday it had put on hold its deal to cede sovereignty of the Chagos Islands — home to the U.S.-British Diego Garcia air base — which has been criticised by U.S. President Donald Trump. Prime Minister Keir Starmer's office said London would try to persuade Washington to give its approval. REUTERS

12A. U.K. pauses its plan to cede Chagos Islands after Trump's opposition
ट्रम्प के विरोध के बाद यू.के. ने चागोस द्वीप सौंपने की योजना रोकी

• Britain's government said on Saturday it had put on hold its deal to cede sovereignty of the **Chagos Islands** — home to the **U.S.-British Diego Garcia air base** — which has been criticised by **U.S. President Donald Trump**.

ब्रिटेन की सरकार ने शनिवार को कहा कि उसने चागोस द्वीप की संप्रभुता सौंपने के अपने समझौते को रोक दिया है — जहां अमेरिका-ब्रिटेन का डिएगो गार्सिया एयर बेस स्थित है — जिसकी अमेरिकी राष्ट्रपति डोनाल्ड ट्रम्प ने आलोचना की है।

• Prime Minister **Keir Starmer's** office said London would try to persuade Washington to give its approval.

प्रधानमंत्री **कीर स्टार्मर** के कार्यालय ने कहा कि लंदन वाशिंगटन को अपनी मंजूरी देने के लिए मनाने की कोशिश करेगा।

GS Paper III: Economy		12 April 2026
TOPICS COVERED		
12A	States nudged to adopt farm solar to cut power subsidy bill राज्यों को बिजली सब्सिडी बिल घटाने के लिए कृषि सौर अपनाने के लिए प्रेरित किया गया	
12A	Centre hikes windfall gains tax on diesel, ATF for exports केंद्र ने डीजल और एटीएफ के निर्यात पर विंडफॉल टैक्स बढ़ाया	



States nudged to adopt farm solar to cut power subsidy bill

ES, In Economy
Jacob Koshy
NEW DELHI

Indian States collectively spend nearly ₹2.4 lakh crore a year on subsidising electricity for agricultural and domestic consumers, says Santosh Kumar Sarangi, Secretary, Ministry for New and Renewable Energy, with the Centre's solar programmes increasingly designed not just to add clean energy capacity but to persuade States that this subsidy bill can be eliminated over time.

"Different States have different amounts which they give. So to that extent they will save on this huge subsidy outgo once they adopt more and more farm solarisation and more and more rooftop solarisation," Mr. Sarangi told *The Hindu* in an interview.

India has an installed capacity of 535 GW as of March 2026, with about 150 GW coming in from solar — the single largest non-

fossil energy source. With 54% of India's installed power capacity drawing from non-fossil energy sources, the Centre — while expanding coal use — has generally touted its solar and wind capacity as evidence of its green commitments at international fora.

Mr. Sarangi's remark frames two of India's flagship solarisation schemes — PM KUSUM for agricultural feeders and PM Surya Ghar for household rooftops — as fiscal instruments rather than merely climate or energy programmes.

Maharashtra model

Maharashtra has emerged as the Centre's primary exhibit. The State launched the *Mukhyamantri Saur Krishi Vahini Yojana* in 2017, installing decentralised solar plants of 2 MW-10 MW capacity within a 5 km radius of agriculture-dominated substations, replacing expensive grid power on agricultural



Energy source: PM KUSUM and PM Surya Ghar are the two flagship solarisation schemes.

feeders with cheaper solar generation. Under MSKVY 2.0, the State scaled its ambitions to 16 GW — far exceeding the Central Financial Assistance (CFA), (the Centre's share of funds) available under PM KUSUM. "The CFA under PM KUSUM is only for about 4.5 GW," Mr. Sarangi said, "but the rest they did because they realised that this kind of an intervention is helping them to wipe off the cross-subsidy charges

towards agriculture subsidy."

Maharashtra's ambition has, however, created a wrinkle in the Centre's domestic manufacturing push. A portion of the State's tender was structured under its own State-run scheme rather than under PM KUSUM, which allowed it to seek an exemption from the Approved List of Models and Manufacturers (ALMM) requirement for solar cells —

effectively permitting the import of cheaper Chinese cells, even as modules must still comply with ALMM norms. Cells joined together make up solar modules (or panels) that produce electricity.

The ALMM — the Approved List of Models and Manufacturers — is the Centre's primary tool for building a domestic solar manufacturing base. Introduced in 2019, it requires all Union government-backed solar projects, including those under PM KUSUM and PM Surya Ghar, to use only MNRE-approved domestic equipment.

The challenge here is that such equipment is usually costlier than that in China and Vietnam and in short supply for vendors who are charged with installing solar equipment.

Mr. Sarangi explained this as saying that the Maharashtra exemption was available only because the

State's tender was issued before a cut-off date of December 9, 2024. "Rest of the States haven't done so they will not get this exemption."

The same subsidy-elimination logic now underpins the Utility-Led Aggregation (ULA) model within PM Surya Ghar. The scheme's conventional demand-driven mode has already covered 35 lakh households, but it has a structural limitation: poor and lower-middle-class households that receive heavily subsidised or near-free electricity have no incentive to install rooftop solar. Under ULA, the utility installs rooftop solar on behalf of these households — either through its own capital expenditure or via a RESCO (renewable energy service company) contractor — so that the consumer pays nothing upfront.

"The consumer doesn't feel the pinch," the Secretary said.

12A. States nudged to adopt farm solar to cut power subsidy bill

राज्यों को बिजली सब्सिडी बिल घटाने के लिए कृषि सौर अपनाने के लिए प्रेरित किया गया

- Indian States collectively spend nearly ₹2.4 lakh crore a year on subsidising electricity for **agricultural and domestic consumers**, says **Santosh Kumar Sarangi**, Secretary, Ministry for **New and Renewable Energy**, with the Centre's solar programmes increasingly designed not just to add clean energy capacity but to persuade States that this subsidy bill can be eliminated over time.

भारतीय राज्य सामूहिक रूप से हर साल लगभग ₹2.4 लाख करोड़ कृषि और घरेलू उपभोक्ताओं के लिए बिजली सब्सिडी पर खर्च करते हैं, नवीन और नवीकरणीय ऊर्जा मंत्रालय के सचिव संतोष कुमार सारंगी के अनुसार, केंद्र की सौर योजनाएं अब केवल स्वच्छ ऊर्जा क्षमता बढ़ाने के लिए नहीं बल्कि राज्यों को यह समझाने के लिए भी बनाई जा रही हैं कि यह सब्सिडी बोझ समय के साथ समाप्त किया जा सकता है।

- "Different States have different amounts which they give. "विभिन्न राज्यों द्वारा दी जाने वाली राशि अलग-अलग होती है।
- So to that extent they will save on this huge subsidy outgo once they adopt more and more **farm solarisation** and more and more **rooftop solarisation**," Mr. Sarangi told *The Hindu* in an interview.

इसलिए जैसे-जैसे वे अधिक कृषि सौरकरण और अधिक रूफटॉप सौरकरण अपनाएंगे, वे इस बड़े सब्सिडी खर्च में बचत कर पाएंगे," श्री सारंगी ने एक साक्षात्कार में कहा।

- India has an installed capacity of **535 GW** as of March 2026, with about **150 GW** coming in from solar — the single largest **non-fossil energy source**.

मार्च 2026 तक भारत की स्थापित क्षमता **535 गीगावाट** है, जिसमें लगभग **150 गीगावाट** सौर ऊर्जा से आता है — जो सबसे बड़ा गैर-जीवाश्म ऊर्जा स्रोत है।

- With **54%** of India's installed power capacity drawing from non-fossil energy sources, the Centre — while expanding coal use — has generally touted its solar and wind capacity as evidence of its **green commitments** at international fora.

भारत की स्थापित बिजली क्षमता का **54%** गैर-जीवाश्म स्रोतों से आने के साथ, केंद्र — कोयले के उपयोग को बढ़ाते हुए — अंतरराष्ट्रीय मंचों पर अपनी **हरित प्रतिबद्धताओं** के प्रमाण के रूप में सौर और पवन क्षमता को प्रस्तुत करता रहा है।

- Mr. Sarangi's remark frames two of India's **flagship solarisation schemes** — **PM KUSUM** for agricultural feeders and **PM Surya Ghar** for household rooftops — as **fiscal instruments** rather than merely climate or energy programmes.

श्री सारंगी की टिप्पणी भारत की दो प्रमुख **सौरकरण योजनाओं** — कृषि फीडरों के लिए **PM KUSUM** और घरेलू छतों के लिए **PM सूर्य घर** — को केवल जलवायु या ऊर्जा कार्यक्रम नहीं बल्कि **राजकोषीय साधन** के रूप में प्रस्तुत करती है।



Maharashtra model

महाराष्ट्र मॉडल

- Maharashtra has emerged as the Centre's primary exhibit.
महाराष्ट्र केंद्र के प्रमुख उदाहरण के रूप में उभरा है।
- The State launched the **Mukhyamantri Saur Krishi Vahini Yojana** in 2017, installing decentralised solar plants of **2 MW-10 MW** capacity within a 5 km radius of agriculture-dominated substations, replacing expensive grid power on agricultural feeders with cheaper solar generation.
राज्य ने 2017 में **मुख्यमंत्री सौर कृषि वाहिनी योजना** शुरू की, जिसके तहत 5 किमी के दायरे में **2 MW-10 MW** क्षमता के विकेंद्रीकृत सौर संयंत्र स्थापित किए गए, जिससे कृषि फीडरों पर महंगी ग्रिड बिजली की जगह सस्ती सौर ऊर्जा लाई गई।
- Under **MSKVY 2.0**, the State scaled its ambitions to **16 GW** — far exceeding the **Central Financial Assistance (CFA)**, (the Centre's share of funds) available under **PM KUSUM**.
MSKVY 2.0 के तहत राज्य ने अपनी क्षमता को **16 गीगावाट** तक बढ़ाया — जो **PM KUSUM** के तहत उपलब्ध **केंद्रीय वित्तीय सहायता (CFA)** से कहीं अधिक है।
- “The CFA under PM KUSUM is only for about **4.5 GW**,” Mr. Sarangi said, “but the rest they did because they realised that this kind of an intervention is helping them to wipe off the **cross-subsidy charges** towards agriculture subsidy.”
श्री सारंगी ने कहा, “PM KUSUM के तहत CFA केवल लगभग **4.5 गीगावाट** के लिए है, लेकिन बाकी उन्होंने इसलिए किया क्योंकि उन्हें एहसास हुआ कि इस तरह का हस्तक्षेप **क्रॉस-सब्सिडी शुल्क** को समाप्त करने में मदद करता है।”
- Maharashtra's ambition has, however, created a wrinkle in the Centre's **domestic manufacturing push**.
हालांकि, महाराष्ट्र की महत्वाकांक्षा ने केंद्र के **घरेलू विनिर्माण प्रयासों** में एक समस्या पैदा कर दी है।
- A portion of the State's tender was structured under its own State-run scheme rather than under **PM KUSUM**, which allowed it to seek an exemption from the **Approved List of Models and Manufacturers (ALMM)** requirement for solar cells — State's tender was issued before a cut-off date of **December 9, 2024**.
राज्य की निविदा का एक हिस्सा **PM KUSUM** के बजाय राज्य की अपनी योजना के तहत जारी किया गया, जिससे उसे **ALMM (Approved List of Models and Manufacturers)** नियम से छूट मिली — क्योंकि यह निविदा **9 दिसंबर 2024** से पहले जारी की गई थी।
- “Rest of the States haven't done so they will not get this exemption.
“अन्य राज्यों ने ऐसा नहीं किया है इसलिए उन्हें यह छूट नहीं मिलेगी।
- The same **subsidy-elimination logic** now underpins the **Utility-Led Aggregation (ULA)** model within **PM Surya Ghar**.
अब यही **सब्सिडी समाप्ति तर्क PM सूर्य घर** के भीतर **ULA (Utility-Led Aggregation)** मॉडल का आधार है।
- The scheme's conventional demand-driven mode has already covered **35 lakh households**, but it has a structural limitation: poor and lower-middle-class households that receive heavily subsidised or near-free electricity have no incentive to install **rooftop solar**.
इस योजना के पारंपरिक मॉडल ने पहले ही **35 लाख घरों** को कवर किया है, लेकिन इसमें एक संरचनात्मक समस्या है: गरीब और निम्न-मध्यम वर्ग के परिवारों को **रूफटॉप सोलर** लगाने का कोई प्रोत्साहन नहीं है क्योंकि उन्हें सस्ती या मुफ्त बिजली मिलती है।
- Under ULA, the utility installs **rooftop solar** on behalf of these households — either through its own capital expenditure or via a **RESCO (renewable energy service company)** contractor — so that the consumer pays nothing upfront.
ULA के तहत, यूटिलिटी इन घरों की ओर से **रूफटॉप सोलर** स्थापित करती है — या तो अपने खर्च से या **RESCO (नवीकरणीय ऊर्जा सेवा कंपनी)** के माध्यम से — ताकि उपभोक्ता को पहले कोई भुगतान न करना पड़े।
- “The consumer doesn't feel the pinch,” the Secretary said.
सचिव ने कहा, “उपभोक्ता को इसका बोझ महसूस नहीं होता।”
- effectively permitting the import of cheaper **Chinese cells**, even as modules must still comply with **ALMM norms**.



इससे सस्ते चीनी सेल्स के आयात की अनुमति मिलती है, जबकि मॉड्यूल को अभी भी ALMM मानकों का पालन करना होता है।

- Cells joined together make up **solar modules (or panels)** that produce electricity. सेल्स मिलकर **सोलर मॉड्यूल (या पैनल)** बनाते हैं जो बिजली उत्पन्न करते हैं।
- The **ALMM — the Approved List of Models and Manufacturers** — is the Centre's primary tool for building a domestic solar manufacturing base. **ALMM — Approved List of Models and Manufacturers** — घरेलू सौर विनिर्माण को बढ़ावा देने के लिए केंद्र का प्रमुख साधन है।
- Introduced in **2019**, it requires all Union government-backed solar projects, including those under **PM KUSUM** and **PM Surya Ghar**, to use only **MNRE-approved domestic equipment**. **2019** में शुरू किए गए इस नियम के तहत सभी केंद्र सरकार समर्थित सौर परियोजनाओं, जैसे **PM KUSUM** और **PM सूर्य घर**, में केवल **MNRE अनुमोदित उपकरण** का उपयोग करना अनिवार्य है।
- The challenge here is that such equipment is usually costlier than that in **China and Vietnam** and in short supply for vendors who are charged with installing solar equipment. चुनौती यह है कि ऐसे उपकरण **चीन और वियतनाम** की तुलना में महंगे होते हैं और सोलर उपकरण लगाने वाले विक्रेताओं के लिए कम उपलब्ध होते हैं।
- Mr. Sarangi explained this as saying that the Maharashtra exemption was available only because the State's tender was issued before a cut-off date of **December 9, 2024**. श्री सारंगी ने स्पष्ट किया कि महाराष्ट्र को छूट इसलिए मिली क्योंकि उसकी निविदा **9 दिसंबर 2024** से पहले जारी की गई थी।
- "Rest of the States haven't done so they will not get this exemption. "अन्य राज्यों ने ऐसा नहीं किया है इसलिए उन्हें यह छूट नहीं मिलेगी।
- The same subsidy-elimination logic now underpins the **Utility-Led Aggregation (ULA)** model within **PM Surya Ghar**. अब यही सब्सिडी समाप्ति तर्क **PM सूर्य घर** के **ULA मॉडल** का आधार है।
- The scheme's conventional demand-driven mode has already covered **35 lakh households**, but it has a structural limitation: poor and lower-middle-class households that receive heavily subsidised or near-free electricity have no incentive to install **rooftop solar**. इस योजना के पारंपरिक मॉडल ने **35 लाख घरों** को कवर किया है, लेकिन गरीब और निम्न-मध्यम वर्ग के परिवारों को **रूफटॉप सोलर** लगाने का प्रोत्साहन नहीं है।
- Under ULA, the utility installs rooftop solar on behalf of these households — either through its own capital expenditure or via a **RESCO** contractor — so that the consumer pays nothing upfront. ULA के तहत, यूटिलिटी इन घरों के लिए **रूफटॉप सोलर** लगाती है — या तो अपने खर्च से या **RESCO** के माध्यम से — ताकि उपभोक्ता को अग्रिम भुगतान न करना पड़े।
- "The consumer doesn't feel the pinch," the Secretary said. सचिव ने कहा, "उपभोक्ता को कोई बोझ महसूस नहीं होता।"

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What is Anthropic's Claude Mythos model?

Is Mythos really that capable? Why is this LLM not being made available to the public? What is Project Glasswing?

GS III: S&T

The story so far:

In April 7, Anthropic, the AI company behind the coding- and productivity-focused Large Language Model (LLM) family Claude, announced Mythos. This is its most powerful model yet, capable of finding bugs in old software that have not been flagged by humans so far. Anthropic said that it would not release the LLM widely, but only to a consortium of over 40 companies, which will use it to scan decades-old code to find software vulnerabilities not detected by humans yet.

What is Claude and why is it a notable product in AI circles?

Claude is an LLM developed by San Francisco-based Anthropic, like OpenAI's ChatGPT and Google's Gemini. However, its reputation for quality outputs in fields such as coding have lent it a reputation unlike any other LLM on the market. Claude runs through a command-line interface as well as a suite of apps for different platforms, published by Anthropic.

In increasing order of sophistication, Anthropic's other LLMs are Haiku, Sonnet, and Opus. All three have been noted for their performance and reasoning capabilities, which are critical to composing code and performing tasks agentially. AI firms often don't open-source their models, restricting access by rationing access to use and employing subscription- or usage-based pricing for users.

While Mythos is arguably the first to develop a model that can identify vulnerabilities, other models with these capabilities could appear eventually

In spite of generally significant pricing for both usage-based pricing and subscriptions, most AI companies are not profitable, and are staking huge amounts of

operational expenditure in the hopes of coming out on top in the AI race. Anthropic is not an outlier, since it does not make profits, but its usage limits and pricing are the subject of frequent complaints among users.

How is Mythos different from Claude's other models?

Cybersecurity has been an unintended side effect of these models' coding prowess. Opus was able to find multiple bugs in highly scrutinised pieces of open-source software, which are used in both private and public IT systems heavily. Human reviewers frequently find bugs, or security vulnerabilities, and they are "patched" so that attackers cannot exploit them to remotely shut down or gain access to computer systems.

Opus found bugs that humans missed, one Anthropic executive said at a talk in March, leading to worries within the company that its technology could be used by hackers to exploit, rather than find and patch, vulnerabilities.

Mythos has already been able to find "hundreds" of "severe" security vulnerabilities. Anthropic announced Project Glasswing, a defensive cybersecurity initiative, in partnership with Microsoft, Apple, Cisco, and other companies whose products and services form the backbone of several other companies and products across cyberspace.

Is Mythos really that capable? What is the problem if everyone has access?

It is not possible to know exactly how capable Mythos is since only a select group has access to it. But the fact that Anthropic has been able to announce specific vulnerabilities it has been able to co-develop patches for in established pieces of open source software indicates that its value as a cybersecurity tool is too significant for large IT and software firms to ignore.

The issue with making Mythos available generally is a transitional one. While Mythos is arguably the first to develop a model that can identify vulnerabilities, it is likely that other models with these capabilities will appear eventually. Anthropic's logic with Project Glasswing is that if the companies and individuals developing these foundational systems have access, they can get a head start in plugging vulnerabilities before attackers gain access to Mythos-class models and start attempting cyberattacks with these capabilities.

What are the implications for India? Is the government doing anything?

The Indian IT industry relies on a range of foreign platforms and software, and often builds its own bespoke software solutions. If Project Glasswing finds a wide range of bugs before Mythos-class models proliferate, Indian companies would benefit by patching all the software they use in time. However, their own software may be vulnerable to sophisticated attackers. No Indian IT firm has been publicly listed as a Project Glasswing partner as yet. The Data Security Council of India under Nasscom has been holding meetings on Mythos over the last week, its CEO Vinayak Godse told *The Hindu*. The IT Ministry and its subordinate Indian Computer Emergency Response Team have been studying the implications of Mythos, a senior government official told *The Hindu*.



12A. What is Anthropic's Claude Mythos model? Anthropic का Claude Mythos मॉडल क्या है?

- Is Mythos really that capable?
क्या Mythos वास्तव में इतना सक्षम है?
- Why is this LLM not being made available to the public?
यह LLM जनता के लिए उपलब्ध क्यों नहीं कराया जा रहा है?
- What is Project Glasswing?
Project Glasswing क्या है?
- On April 7, **Anthropic**, the AI company behind the coding- and productivity-focused Large Language Model (LLM) family **Claude**, announced **Mythos**.
7 अप्रैल को **Anthropic**, जो कोडिंग और उत्पादकता आधारित LLM **Claude** परिवार के पीछे की AI कंपनी है, ने **Mythos** की घोषणा की।
- This is its most powerful model yet, capable of finding **bugs in old software** that have not been flagged by humans so far.
यह अब तक का उसका सबसे शक्तिशाली मॉडल है, जो **पुराने सॉफ्टवेयर में बग्स** खोज सकता है जिन्हें अब तक इंसानों ने नहीं पहचाना है।
- Anthropic said that it would not release the LLM widely, but only to a consortium of over 40 companies, which will use it to scan decades-old code to find **software vulnerabilities** not detected by humans yet.
Anthropic ने कहा कि वह इस LLM को व्यापक रूप से जारी नहीं करेगा, बल्कि 40 से अधिक कंपनियों के एक समूह को देगा, जो इसका उपयोग दशकों पुराने कोड में **सॉफ्टवेयर कमजोरियों** को खोजने के लिए करेंगे।

What is Claude and why is it a notable product in AI circles? Claude क्या है और यह AI क्षेत्र में क्यों महत्वपूर्ण है?

- Claude is an LLM developed by San Francisco-based **Anthropic**, like **OpenAI's ChatGPT** and **Google's Gemini**.
Claude एक LLM है जिसे सैन फ्रांसिस्को स्थित **Anthropic** ने विकसित किया है, जैसे **OpenAI का ChatGPT** और **Google का Gemini**।
- However, its reputation for quality outputs in fields such as **coding** have lent it a reputation unlike any other LLM on the market.
हालांकि, **कोडिंग** जैसे क्षेत्रों में इसकी उच्च गुणवत्ता आउटपुट ने इसे अन्य LLMs से अलग पहचान दिलाई है।
- Claude runs through a **command-line interface** as well as a suite of apps for different platforms, published by Anthropic.
Claude एक **कमांड-लाइन इंटरफेस** और विभिन्न प्लेटफॉर्म के लिए ऐप्स के माध्यम से चलता है, जिन्हें Anthropic द्वारा प्रकाशित किया गया है।
- In increasing order of sophistication, Anthropic's other LLMs are **Haiku, Sonnet, and Opus**.
जटिलता के बढ़ते क्रम में, Anthropic के अन्य LLMs हैं **Haiku, Sonnet और Opus**।
- All three have been noted for their **performance and reasoning capabilities**, which are critical to composing code and performing tasks agentially.
इन तीनों को उनके **प्रदर्शन और तर्क क्षमता** के लिए जाना जाता है, जो कोड लिखने और कार्य करने के लिए महत्वपूर्ण हैं।
- AI firms often don't open-source their models, restricting access by rationing access to use and employing **subscription- or usage-based pricing** for users.
AI कंपनियां अक्सर अपने मॉडलों को ओपन-सोर्स नहीं करतीं और उपयोग को सीमित रखते हुए **सब्सक्रिप्शन या उपयोग आधारित मूल्य निर्धारण** अपनाती हैं।
- In spite of generally significant pricing for both usage-based pricing and subscriptions, most AI companies are not profitable, and are staking huge amounts of **operational expenditure** in the hopes of coming out on top in the AI race.
उपयोग आधारित और सब्सक्रिप्शन दोनों के लिए उच्च मूल्य निर्धारण के बावजूद, अधिकांश AI कंपनियां लाभ में नहीं हैं और AI दौड़ में आगे आने के लिए भारी **परिचालन व्यय** कर रही हैं।
- Anthropic is not an outlier, since it does not make profits, but its usage limits and pricing are the subject of frequent complaints among users.



Anthropic भी अपवाद नहीं है क्योंकि यह लाभ नहीं कमाती, और इसकी उपयोग सीमाएं और मूल्य निर्धारण अक्सर उपयोगकर्ताओं की शिकायत का विषय हैं।

How is Mythos different from Claude's other models? Mythos Claude के अन्य मॉडलों से कैसे अलग है?

- Cybersecurity has been an unintended side effect of these models' **coding prowess**.
साइबर सुरक्षा इन मॉडलों की **कोडिंग क्षमता** का एक अनपेक्षित प्रभाव रही है।
- Opus was able to find multiple bugs in highly scrutinised pieces of **open-source software**, which are used in both private and public IT systems heavily.
Opus ने **ओपन-सोर्स सॉफ्टवेयर** के कई हिस्सों में कई बग्स खोजे, जो निजी और सार्वजनिक IT सिस्टम में व्यापक रूप से उपयोग होते हैं।
- Human reviewers frequently find bugs, or **security vulnerabilities**, and they are "patched" so that attackers cannot exploit them to remotely shut down or gain access to computer systems.
मानव समीक्षक अक्सर बग्स या **सुरक्षा कमजोरियों** को खोजते हैं और उन्हें "पैच" किया जाता है ताकि हमलावर उनका दुरुपयोग न कर सकें।
- Opus found bugs that humans missed, one Anthropic executive said at a talk in March, leading to worries within the company that its technology could be used by hackers to exploit, rather than find and patch, vulnerabilities.
मार्च में एक चर्चा के दौरान Anthropic के एक अधिकारी ने कहा कि Opus ने ऐसे बग्स खोजे जिन्हें इंसानों ने नहीं पाया, जिससे कंपनी में यह चिंता पैदा हुई कि तकनीक का उपयोग हैकर्स द्वारा गलत तरीके से किया जा सकता है।
- Mythos has already been able to find "hundreds" of "severe" **security vulnerabilities**.
Mythos पहले ही "सैकड़ों" गंभीर **सुरक्षा कमजोरियों** को खोज चुका है।
- Anthropic announced **Project Glasswing**, a defensive cybersecurity initiative, in partnership with **Microsoft, Apple, Cisco**, and other companies whose products and services form the backbone of several other companies and products across cyberspace.
Anthropic ने **Project Glasswing** की घोषणा की, जो एक रक्षात्मक साइबर सुरक्षा पहल है, जिसमें **Microsoft, Apple, Cisco** और अन्य कंपनियां शामिल हैं।

Is Mythos really that capable? What is the problem if everyone has access? क्या Mythos वास्तव में इतना सक्षम है? यदि सभी को पहुंच मिल जाए तो समस्या क्या है?

- It is not possible to know exactly how capable Mythos is since only a select group has access to it.
यह ठीक-ठीक जानना संभव नहीं है कि Mythos कितना सक्षम है क्योंकि केवल चुनिंदा लोगों को ही इसकी पहुंच है।
- But the fact that Anthropic has been able to announce specific vulnerabilities it has been able to co-develop patches for in established pieces of open source software indicates that its value as a **cybersecurity tool** is too significant for large IT and software firms to ignore.
लेकिन यह तथ्य कि Anthropic ने स्थापित ओपन-सोर्स सॉफ्टवेयर में विशिष्ट कमजोरियों और उनके समाधान की घोषणा की है, यह दिखाता है कि यह एक **साइबर सुरक्षा उपकरण** के रूप में अत्यंत महत्वपूर्ण है।
- The issue with making Mythos available generally is a transitional one.
Mythos को आम जनता के लिए उपलब्ध कराने का मुद्दा एक संक्रमणकालीन समस्या है।
- While Mythos is arguably the first to develop a model that can identify vulnerabilities, it is likely that other models with these capabilities will appear eventually.
हालांकि Mythos संभवतः पहला मॉडल है जो कमजोरियों की पहचान कर सकता है, लेकिन भविष्य में ऐसे अन्य मॉडल भी आ सकते हैं।
- Anthropic's logic with Project Glasswing is that if the companies and individuals developing these foundational systems have access, they can get a head start in plugging vulnerabilities before attackers gain access to Mythos-class models and start attempting cyberattacks with these capabilities.
Project Glasswing के तहत Anthropic का तर्क है कि यदि इन प्रणालियों को विकसित करने वालों को पहले पहुंच मिल जाए, तो वे हमलावरों से पहले कमजोरियों को ठीक कर सकते हैं।



What are the implications for India? Is the government doing anything?

भारत के लिए इसके क्या प्रभाव हैं? क्या सरकार कुछ कर रही है?

- The Indian IT industry relies on a range of **foreign platforms and software**, and often builds its own bespoke software solutions.
भारतीय IT उद्योग विभिन्न **विदेशी प्लेटफॉर्म और सॉफ्टवेयर** पर निर्भर करता है और अक्सर अपने कस्टम सॉफ्टवेयर भी बनाता है।
- If Project Glasswing finds a wide range of bugs before Mythos-class models proliferate, Indian companies would benefit by patching all the software they use in time.
यदि **Project Glasswing** Mythos जैसे मॉडलों के फैलने से पहले कई बग्स खोज लेता है, तो भारतीय कंपनियां समय रहते अपने सॉफ्टवेयर को सुरक्षित कर सकती हैं।
- However, their own software may be vulnerable to **sophisticated attackers**.
हालांकि, उनका अपना सॉफ्टवेयर **उन्नत हमलावरों** के प्रति संवेदनशील हो सकता है।
- No Indian IT firm has been publicly listed as a Project Glasswing partner as yet.
अभी तक किसी भी भारतीय IT कंपनी को **Project Glasswing** के साझेदार के रूप में सूचीबद्ध नहीं किया गया है।
- The **Data Security Council of India** under **Nasscom** has been holding meetings on Mythos over the last week, its CEO **Vinayak Godse** told The Hindu.
Nasscom के तहत **Data Security Council of India** पिछले सप्ताह से Mythos पर बैठकें कर रहा है, इसके CEO **विनायक गोडसे** ने कहा।
- The IT Ministry and its subordinate **Indian Computer Emergency Response Team** have been studying the implications of Mythos, a senior government official told The Hindu.
IT मंत्रालय और उसकी इकाई **Indian Computer Emergency Response Team (CERT-In)** Mythos के प्रभावों का अध्ययन कर रही है, एक वरिष्ठ सरकारी अधिकारी ने बताया।

PATRIOTIC IAS



Nuclear paradox

Prototype fast breeder reactor

A milestone in India's nuclear ambitions, but one shadowed by limited oversight and persistent concerns over transparency and accountability

GS III: S&T
Vasudevān Mūkunth

MQB

R. RAGU

A fast breeder reactor (FBR) gets its name from two features. First, it 'breeds' more nuclear fuel than it consumes. Second, it uses fast neutrons – ones that haven't been slowed – to initiate nuclear fission.

France began building an FBR called Superphénix in 1976. After spending around \$10 billion, the reactor became critical in 1985 and commercial in 1986. It operated for 11 years. However, it produced less than 20% of the energy it was capable of producing and, in all, met under 1% of France's electricity demand. Superphénix also spent 25 months on technical fixes and didn't run for 66 months for political reasons. In this time, the spot price of uranium also dropped from \$40 a pound to \$15, wiping out its rationale of saving uranium.

Similarly, Germany built an FBR called SNR-300 from 1972, completed it in 1985, but it never came online, due to political opposition and the Chernobyl disaster. The government cancelled the project in 1991. France and Germany have always been more technologically advanced and have had more mature manufacturing bases than India, and their

These failed experiments with FBRs outline



obvious cautionary tales. India's first FBR with commercial potential, the prototype fast breeder reactor (PFBR) in Kalpakkam, Tamil Nadu, became critical on April 6. Prime Minister Narendra Modi was present at its fuel-loading event in 2024 and hailed the moment when it went critical. The PFBR is politically and energy-wise important for India – the latter because of its rationale that it will be more fuel-efficient than the fleet of pressurised heavy-water reactors (PHWRs) India currently operates and because it promises energy security in the long run. Yet this picture would be incomplete without accounting for the weight of past experience.

The success of India's nuclear energy programme is owed in considerable, but oft-unacknowledged, part to political insulation. The Department of Atomic Energy (DAE) has minimal parliamentary or judicial oversight and resists substan-

tive disclosures under the Right to Information Act. It has also not been above securitising dissent and keeping clearance and operational details out of public view. The PFBR itself has survived multiple governments, delays, and cost overruns *en route* to criticality.

But its barely mitigated authority also risks conditions in which the DAE can pursue the PFBR without public accountability. FBR technology is also nasty. The PFBR uses liquid sodium as a coolant. Sodium is very eager to react with almost anything, even air. So if the coolant leaks, it could take several power plant components down with it. Such a leak at the Monju reactor in Japan in 1995, followed by its operator's attempts to cover up the disaster, doomed the facility after the country had spent three decades and \$15 billion developing it.

Unlike PHWRs, FBRs also respond more quickly to changes in the nuclear chain reaction, leaving

their control systems with less room for error. FBRs produce more plutonium than they consume, using uranium as the primary fuel plus a small plutonium input – a reaction India needs for the third stage of its nuclear power programme, which will burn plutonium and thorium – raising concerns about whether the plutonium will be used for weapons.

A PHWR also produces small amounts of plutonium, but it is not easily accessible because it lies inside spent fuel, which is highly radioactive. An FBR, however, requires plutonium as part of its fuel mix, which means India needs plutonium-handling facilities, and at these facilities it will have access to streams of at least reactor-grade plutonium. The U.S. revealed in 1977 that reactor-grade plutonium can be used in a nuclear weapon. For added measure, the PFBR also falls outside the purview of the International Atomic Energy Agency.

While the reactor represents a great technological feat, albeit one that took too long to fructify, it exists now in a political context that resists assiduous public accounting precisely when the nuclear power programme needs to be all the more accountable – while promising more energy in a world where energy has become its own battleground.

12A. Nuclear paradox परमाणु विरोधाभास

- A milestone in **India's nuclear ambitions**, but one shadowed by limited oversight and persistent concerns over **transparency and accountability**.



भारत की परमाणु महत्वाकांक्षाओं में एक मील का पत्थर, लेकिन सीमित निगरानी और पारदर्शिता व जवाबदेही को लेकर लगातार चिंताओं से घिरा हुआ।

- A fast breeder reactor (FBR) gets its name from two features.
एक फास्ट ब्रीडर रिएक्टर (FBR) को उसका नाम दो विशेषताओं से मिलता है।
- First, it 'breeds' more nuclear fuel than it consumes.
पहला, यह जितना परमाणु ईंधन उपयोग करता है उससे अधिक उत्पन्न करता है।
- Second, it uses fast neutrons — ones that haven't been slowed — to initiate nuclear fission.
दूसरा, यह तेज़ न्यूट्रॉन का उपयोग करता है — जिन्हें धीमा नहीं किया गया — ताकि परमाणु विखंडन शुरू हो सके।
- France began building an FBR called Superphénix in 1976.
फ्रांस ने 1976 में Superphénix नामक FBR का निर्माण शुरू किया।
- After spending around \$10 billion, the reactor became critical in 1985 and commercial in 1986.
लगभग 10 अरब डॉलर खर्च करने के बाद यह रिएक्टर 1985 में क्रिटिकल और 1986 में वाणिज्यिक बना।
- It operated for 11 years.
यह 11 वर्षों तक चला।
- However, it produced less than 20% of the energy it was capable of producing and, in all, met under 1% of France's electricity demand.
हालांकि, यह अपनी क्षमता का 20% से भी कम ऊर्जा उत्पन्न कर सका और कुल मिलाकर फ्रांस की 1% से भी कम बिजली जरूरत पूरी कर पाया।
- Superphénix also spent 25 months on technical fixes and didn't run for 66 months for political reasons.
Superphénix ने 25 महीने तकनीकी सुधारों में बिताए और 66 महीने राजनीतिक कारणों से बंद रहा।
- In this time, the spot price of uranium also dropped from \$40 a pound to \$15, wiping out its rationale of saving uranium.
इस दौरान यूरेनियम की कीमत \$40 प्रति पाउंड से घटकर \$15 हो गई, जिससे इसका उद्देश्य खत्म हो गया।
- Similarly, Germany built an FBR called SNR-300 from 1972, completed it in 1985, but it never came online, due to political opposition and the Chernobyl disaster.
इसी तरह जर्मनी ने 1972 में SNR-300 का निर्माण शुरू किया, 1985 में पूरा किया, लेकिन चेरनोबिल दुर्घटना और राजनीतिक विरोध के कारण यह कभी चालू नहीं हुआ।
- The government cancelled the project in 1991.
सरकार ने 1991 में इस परियोजना को रद्द कर दिया।
- France and Germany have always been more technologically advanced and have had more mature manufacturing bases than India.
फ्रांस और जर्मनी हमेशा भारत की तुलना में अधिक तकनीकी रूप से उन्नत रहे हैं और उनका विनिर्माण आधार अधिक विकसित रहा है।
- These failed experiments with FBRs outline obvious cautionary tales.
FBR के ये असफल प्रयोग स्पष्ट चेतावनी के उदाहरण प्रस्तुत करते हैं।
- India's first FBR with commercial potential, the prototype fast breeder reactor (PFBR) in Kalpakkam, Tamil Nadu, became critical on April 6.
भारत का पहला वाणिज्यिक क्षमता वाला FBR, प्रोटोटाइप फास्ट ब्रीडर रिएक्टर (PFBR), कलपक्कम, तमिलनाडु में 6 अप्रैल को क्रिटिकल हुआ।
- Prime Minister Narendra Modi was present at its fuel-loading event in 2024 and hailed the moment when it went critical.
प्रधानमंत्री नरेंद्र मोदी 2024 में इसके ईंधन लोडिंग कार्यक्रम में उपस्थित थे और इसके क्रिटिकल होने की सराहना की।
- The PFBR is politically and energy-wise important for India.
PFBR भारत के लिए राजनीतिक और ऊर्जा दोनों दृष्टि से महत्वपूर्ण है।
- The latter because of its rationale that it will be more fuel-efficient than the fleet of pressurised heavy-water reactors (PHWRs) India currently operates.
यह इसलिए क्योंकि यह वर्तमान में उपयोग किए जा रहे PHWRs की तुलना में अधिक ईंधन-कुशल होगा।
- And because it promises energy security in the long run.
और क्योंकि यह दीर्घकाल में ऊर्जा सुरक्षा का वादा करता है।
- Yet this picture would be incomplete without accounting for the weight of past experience.
फिर भी, पिछले अनुभवों को ध्यान में रखे बिना यह चित्र अधूरा रहेगा।



- The success of India's nuclear energy programme is owed in considerable part to **political insulation**.
भारत के परमाणु कार्यक्रम की सफलता काफी हद तक **राजनीतिक संरक्षण** पर आधारित है।
- The **Department of Atomic Energy (DAE)** has minimal parliamentary or judicial oversight and resists disclosures under the **Right to Information Act**.
परमाणु ऊर्जा विभाग (DAE) पर संसदीय या न्यायिक निगरानी कम है और यह **सूचना के अधिकार अधिनियम** के तहत जानकारी देने से बचता है।
- It has also not been above securitising dissent and keeping clearance and operational details out of public view.
इसने असहमति को सुरक्षा मुद्दा बनाकर और विवरणों को सार्वजनिक दृष्टि से दूर रखकर काम किया है।
- The PFBR itself has survived multiple governments, delays, and **cost overruns** en route to criticality.
PFBR ने कई सरकारों, देरी और **लागत वृद्धि** के बावजूद सफलता हासिल की।
- But its barely mitigated authority also risks conditions in which the DAE can pursue the PFBR without **public accountability**.
लेकिन इसकी शक्ति **सार्वजनिक जवाबदेही** के बिना काम करने का जोखिम भी पैदा करती है।
- FBR technology is also nasty.
FBR तकनीक जोखिमपूर्ण भी है।
- The PFBR uses **liquid sodium** as a coolant.
PFBR में **तरल सोडियम** को कूलेंट के रूप में उपयोग किया जाता है।
- Sodium is very eager to react with almost anything, even air.
सोडियम लगभग हर चीज़, यहां तक कि हवा के साथ भी तेजी से प्रतिक्रिया करता है।
- So if the coolant leaks, it could take several power plant components down with it.
यदि कूलेंट लीक हो जाए, तो यह कई संयंत्र हिस्सों को नुकसान पहुंचा सकता है।
- Such a leak at the **Monju reactor** in Japan in 1995 led to disaster.
1995 में जापान के **Monju रिएक्टर** में ऐसा रिसाव हुआ जिससे आपदा हुई।
- Followed by its operator's attempts to cover up the disaster, doomed the facility after decades and billions spent.
ऑपरेटर द्वारा इसे छिपाने के प्रयासों ने इस परियोजना को विफल कर दिया।
- Unlike PHWRs, FBRs also respond more quickly to changes in the **nuclear chain reaction**.
PHWRs के विपरीत, FBRs **न्यूक्लियर चेन रिएक्शन** में बदलाव के प्रति तेजी से प्रतिक्रिया करते हैं।
- Leaving their control systems with less room for error.
इससे नियंत्रण प्रणाली के लिए त्रुटि की गुंजाइश कम हो जाती है।
- FBRs produce more **plutonium** than they consume.
FBRs जितना उपयोग करते हैं उससे अधिक **प्लूटोनियम** उत्पन्न करते हैं।
- Using **uranium** as the primary fuel plus a small plutonium input.
मुख्य ईंधन के रूप में **यूरेनियम** और थोड़ी मात्रा में प्लूटोनियम का उपयोग करते हैं।
- A reaction India needs for the third stage of its nuclear power programme.
यह प्रतिक्रिया भारत के परमाणु कार्यक्रम के तीसरे चरण के लिए आवश्यक है।
- Which will burn plutonium and **thorium**.
जिसमें प्लूटोनियम और **थोरियम** का उपयोग होगा।
- Raising concerns about whether the plutonium will be used for **weapons**.
इससे चिंता बढ़ती है कि प्लूटोनियम का उपयोग **हथियारों** में हो सकता है।
- A PHWR also produces small amounts of plutonium, but it is not easily accessible.
PHWR भी प्लूटोनियम बनाता है, लेकिन इसे निकालना आसान नहीं होता।
- Because it lies inside spent fuel, which is highly radioactive.
क्योंकि यह प्रयुक्त ईंधन में होता है, जो अत्यधिक रेडियोधर्मी होता है।
- An FBR, however, requires plutonium as part of its fuel mix.
लेकिन FBR में प्लूटोनियम ईंधन का हिस्सा होता है।
- Which means India needs **plutonium-handling facilities**.
जिसका मतलब है कि भारत को **प्लूटोनियम प्रबंधन सुविधाओं** की जरूरत होगी।
- And at these facilities it will have access to reactor-grade plutonium.
और इन सुविधाओं पर इसे रिएक्टर-ग्रेड प्लूटोनियम तक पहुंच होगी।
- The U.S. revealed in 1977 that reactor-grade plutonium can be used in a **nuclear weapon**.
अमेरिका ने 1977 में बताया कि रिएक्टर-ग्रेड प्लूटोनियम का उपयोग **परमाणु हथियार** में किया जा सकता है।



- For added measure, the PFBR also falls outside the purview of the **International Atomic Energy Agency**.
इसके अलावा PFBR अंतर्राष्ट्रीय परमाणु ऊर्जा एजेंसी के दायरे से बाहर है।
- While the reactor represents a great technological feat.
हालांकि यह रिएक्टर एक बड़ी तकनीकी उपलब्धि है।
- It exists now in a political context that resists **public accountability**.
यह ऐसे राजनीतिक माहौल में मौजूद है जो सार्वजनिक जवाबदेही का विरोध करता है।
- While promising more energy in a world where energy has become its own battleground.
जबकि यह ऐसी दुनिया में अधिक ऊर्जा का वादा करता है जहाँ ऊर्जा स्वयं एक युद्धक्षेत्र बन गई है।

Aluminium alternative emerges to costly catalysts in pharma

Research has found aluminium can be made to behave in the same way that makes transition metals such good catalysts; the stakes are high for India, which currently meets its transition metal needs almost entirely through imports

GS III: S&T

Pratik Kashiramka

For more than a century, aluminium has been chemistry's workhorse, albeit limited in its abilities as a catalyst. New work reported recently in *Nature* may change that.

Transition metals such as palladium, rhodium, and platinum underpin some of the most important industrial chemical processes in the world. India's pharmaceutical and agrochemical industries also depend on them. But they are rare and expensive.

The new study, by researchers at the Southern University of Science and Technology in Shenzhen, has suggested that aluminium can be made to behave in the same way that makes those metals catalytically powerful, opening a potential path to cheaper alternatives.

Transition metals are good catalysts because of their oxidation states – a measure of how many electrons an atom can give up or take on. They can shift easily between oxidation states, temporarily receiving electrons from one molecule and donating them to another, breaking old chemical bonds and forming new ones in the process. This shuttling enables a reaction called redox catalysis, and helps speed up important processes in industrial chemistry like the Heck reaction in modern drug synthesis.

The problem is aluminium's +3 oxidation state –

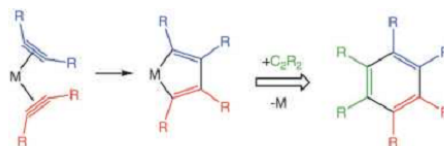
Clever chemistry

Transition metals speed up the reactions used to synthesise drugs but are expensive

Transition metals are essential industrial catalysts but remain expensive and rare compared to common aluminium

Researchers have used a specific ligand to allow aluminium to mimic the flexible oxidation states of transition metals

This new aluminium catalyst successfully facilitated alkyne cyclotrimerisation to create the building blocks of various pharma products



A simplified representation of the alkyne cyclotrimerisation reaction. R denotes a functional group and M is the catalyst metal. PUBLIC DOMAIN

While the turnover number is impressive for this category, the study remains a fundamental proof of concept

The challenges before this catalyst can be used in industry include the catalyst's sensitivity to air and the solvent

Developing affordable aluminium catalysts could eventually reduce the import bill for precious metal supplies

the condition in which it surrenders all three of its outer electrons – is so chemically stable that it almost never exists in any other form in nature.

In the new work, a supporting molecule called a ligand was bound to the aluminium atom, altering its chemical behaviour. Liu Leo Liu, the study's corresponding author and associate professor in the University's Department of Chemistry, called the idea "simple but ambitious".

The researchers' ligand of choice was a carbazolyl compound. They used it in a reaction called alkyne cyclotrimerisation – in which three alkynes (hydrocarbon molecules with at least one carbon-carbon triple bond) join to form the substituted benzene rings that are the building blocks of many pharmaceuticals and agrochemicals.

The aluminium catalyst first binds to an alkyne mo-

lecular, forming a three-membered ring. A second alkyne then inserts itself into this structure, turning it into a five-membered ring. The catalyst rearranges this intermediate into a more stable configuration before a third alkyne is inserted, creating a seven-membered ring. The catalyst then expels itself, ready to begin again.

By capturing and studying several stages of this process directly, the researchers found that a single catalyst molecule could help up to 2,290 product molecules form before it stopped working – a measure called turnover number (TON).

"Within the specific niche of main-group redox catalysis, a TON of 2,290 is exceptionally high, but in large-scale industrial applications, transition metal catalysts often achieve TONs in the tens or hundreds of thousands (and

sometimes millions)," Sakya S. Sen, senior principal scientist at the National Chemical Laboratory in Pune, whose research group specialises in similar reactions, said. "I read the work as an extraordinary academic milestone; fundamentally, it is still a proof-of-concept," he added. Prof. Liu was cautious as well: "At this stage, we see the work as a platform discovery rather than an immediate 'drop-in' industrial catalyst." This is partly because the catalyst is sensitive to air and moisture, only works as designed in certain solvents, and has thus far been demonstrated for only one reaction type. "The near-term goal ... is expanding generality and simplifying practical handling; applications will follow once a compelling process case emerges," Prof. Liu said.

The stakes of this kind of research are acute for In-

dia. Swadhin Mandal, whose lab at the Indian Institute of Science Education and Research, Kolkata, has been working on comparable catalytic systems, said, "It is now widely recognised that certain essential elements will be depleted within the next 100 years due to their increasing industrial demand."

India meets almost all its demand for palladium, platinum, and rhodium through imports. An aluminium-based alternative, made from a metal India has in abundance and at a fraction of the cost, could eventually significantly reduce that dependence.

Both Prof. Mandal and Dr. Sen were clear that the bridge between a laboratory discovery and an industrial process requires deliberate long-term investments, but the timeline for that transition is uncertain. "It would be great if Indian industries come forward to co-develop such discoveries with Indian scientists to transform them into an industrial process," Prof. Mandal said. He added that the present study is also the product of five decades of background work.

The Shenzhen team is already looking forward: "Our immediate goal is to broaden the scope of aluminium redox catalysis and explore additional reaction types beyond alkyne cyclotrimerisation," Prof. Liu said. (Pratik Kashiramka is an independent science journalist.)



12A. Aluminium alternative emerges to costly catalysts in pharma फार्मा में महंगे उत्प्रेरकों के विकल्प के रूप में एल्युमिनियम उभर रहा है

- Research has found **aluminium** can be made to behave in the same way that makes **transition metals** such good catalysts; the stakes are high for India, which currently meets its transition metal needs almost entirely through imports.
शोध में पाया गया है कि **एल्युमिनियम** को इस तरह बनाया जा सकता है कि वह **ट्रांजिशन मेटल्स** की तरह व्यवहार करे, जो अच्छे उत्प्रेरक होते हैं; भारत के लिए यह महत्वपूर्ण है क्योंकि वह इन धातुओं की जरूरत लगभग पूरी तरह आयात से पूरी करता है।
- For more than a century, aluminium has been chemistry's workhorse, albeit limited in its abilities as a **catalyst**.
एक सदी से अधिक समय से एल्युमिनियम रसायन विज्ञान का मुख्य आधार रहा है, हालांकि **उत्प्रेरक** के रूप में इसकी क्षमता सीमित रही है।
- New work reported recently in **Nature** may change that.
हाल ही में **Nature** में प्रकाशित नया शोध इसे बदल सकता है।
- Transition metals such as **palladium, rhodium, and platinum** underpin some of the most important industrial chemical processes in the world.
पैलेडियम, रोडियम और प्लेटिनम जैसे ट्रांजिशन मेटल्स दुनिया की कई महत्वपूर्ण औद्योगिक रासायनिक प्रक्रियाओं का आधार हैं।
- India's pharmaceutical and agrochemical industries also depend on them.
भारत के फार्मास्यूटिकल और एग्रोकेमिकल उद्योग भी इन पर निर्भर हैं।
- But they are rare and expensive.
लेकिन ये दुर्लभ और महंगे हैं।
- The new study, by researchers at the **Southern University of Science and Technology** in Shenzhen, has suggested that aluminium can be made to behave in the same way that makes those metals catalytically powerful, opening a potential path to cheaper alternatives.
शेन्जेन स्थित **Southern University of Science and Technology** के शोधकर्ताओं ने सुझाव दिया है कि एल्युमिनियम को ट्रांजिशन मेटल्स जैसा बनाया जा सकता है, जिससे सस्ते विकल्प का मार्ग खुल सकता है।
- Transition metals are good catalysts because of their **oxidation states** — a measure of how many electrons an atom can give up or take on.
ट्रांजिशन मेटल्स अच्छे उत्प्रेरक होते हैं क्योंकि उनके **ऑक्सीकरण अवस्था** बदल सकते हैं — यानी वे कितने इलेक्ट्रॉन दे या ले सकते हैं।
- They can shift easily between oxidation states, temporarily receiving electrons from one molecule and donating them to another, breaking old chemical bonds and forming new ones in the process.
वे आसानी से ऑक्सीकरण अवस्थाओं के बीच बदल सकते हैं, एक अणु से इलेक्ट्रॉन लेकर दूसरे को देकर पुराने बंध तोड़ते और नए बनाते हैं।
- This shuttling enables a reaction called **redox catalysis**, and helps speed up important processes in industrial chemistry like the **Heck reaction** in modern drug synthesis.
यह प्रक्रिया **रेडॉक्स कैटालिसिस** कहलाती है और **Heck reaction** जैसे महत्वपूर्ण औद्योगिक प्रक्रियाओं को तेज करती है।
- The problem is aluminium's **+3 oxidation state** — the condition in which it surrenders all three of its outer electrons — is so chemically stable that it almost never exists in any other form in nature.
समस्या यह है कि एल्युमिनियम की **+3 ऑक्सीकरण अवस्था** बहुत स्थिर होती है, इसलिए यह अन्य रूपों में लगभग नहीं पाया जाता।
- In the new work, a supporting molecule called a **ligand** was bound to the aluminium atom, altering its chemical behaviour.
नए शोध में एक सहायक अणु **लिगेंड** को एल्युमिनियम से जोड़ा गया, जिससे उसका व्यवहार बदला।
- Liu Leo Liu**, the study's corresponding author, called the idea "simple but ambitious".
अध्ययन के लेखक **लियू लियो लियू** ने इस विचार को "सरल लेकिन महत्वाकांक्षी" बताया।
- The researchers' ligand of choice was a **carbazoyl compound**.
शोधकर्ताओं ने **कार्बाजोलिल यौगिक** को लिगेंड के रूप में चुना।
- They used it in a reaction called **alkyne cyclotrimerisation**.
उन्होंने इसका उपयोग **एल्काइन साइक्लोत्राइमराइजेशन** प्रतिक्रिया में किया।



- In which three **alkynes** join to form substituted **benzene rings** that are the building blocks of many pharmaceuticals and agrochemicals.
जिसमें तीन **एल्काइन** मिलकर **बेजीन रिंग** बनाते हैं, जो कई दवाओं और रसायनों के आधार होते हैं।
- The aluminium catalyst first binds to an alkyne molecule, forming a three-membered ring.
एल्युमिनियम उत्प्रेरक पहले एल्काइन से जुड़कर तीन-सदस्यीय रिंग बनाता है।
- A second alkyne then inserts itself into this structure, turning it into a five-membered ring.
दूसरा एल्काइन इसमें जुड़कर इसे पाँच-सदस्यीय रिंग में बदल देता है।
- The catalyst rearranges this intermediate into a more stable configuration before a third alkyne is inserted, creating a seven-membered ring.
फिर यह मध्यवर्ती को स्थिर बनाता है और तीसरा एल्काइन जुड़कर सात-सदस्यीय रिंग बनाता है।
- The catalyst then expels itself, ready to begin again.
इसके बाद उत्प्रेरक खुद को अलग कर लेता है और पुनः उपयोग के लिए तैयार हो जाता है।
- By capturing and studying several stages of this process directly, the researchers found that a single catalyst molecule could help up to **2,290 product molecules** form before it stopped working.
इस प्रक्रिया के विभिन्न चरणों का अध्ययन कर शोधकर्ताओं ने पाया कि एक उत्प्रेरक अणु **2,290 उत्पाद अणुओं** के निर्माण में मदद कर सकता है।
- This measure is called **turnover number (TON)**.
इस माप को **टर्नओवर नंबर (TON)** कहा जाता है।
- “Within the niche of main-group redox catalysis, a TON of 2,290 is exceptionally high,” said **Sakya S. Sen** of the **National Chemical Laboratory, Pune**.
साक्य एस. सेन (नेशनल केमिकल लेबोरेटरी, पुणे) ने कहा कि रेडॉक्स कैटालिसिस में 2,290 का TON बहुत अधिक है।
- “But in industrial applications, transition metal catalysts often achieve much higher TONs,” he added.
लेकिन औद्योगिक उपयोग में ट्रांजिशन मेटल्स इससे कहीं अधिक TON प्राप्त करते हैं।
- He described the work as an **academic milestone** but still a **proof-of-concept**.
उन्होंने इसे **शैक्षणिक उपलब्धि** बताया, लेकिन अभी **प्रूफ-ऑफ-कॉन्सेप्ट** माना।
- Prof. Liu also said it is a **platform discovery** rather than an immediate industrial catalyst.
प्रो. लियू ने भी इसे तत्काल उपयोग के बजाय एक **आधारभूत खोज** बताया।
- The catalyst is sensitive to **air and moisture** and works only in certain solvents.
यह उत्प्रेरक **हवा और नमी** के प्रति संवेदनशील है और केवल कुछ सॉल्वेंट्स में काम करता है।
- It has so far been demonstrated for only one reaction type.
अब तक इसे केवल एक प्रकार की प्रतिक्रिया में दिखाया गया है।
- The near-term goal is expanding generality and simplifying practical handling.
निकट भविष्य का लक्ष्य इसे अधिक सामान्य और उपयोग में आसान बनाना है।
- The stakes of this research are high for **India**.
यह शोध **भारत** के लिए अत्यंत महत्वपूर्ण है।
- **Swadhin Mandal** of **IISER Kolkata** said key elements may be depleted within the next 100 years.
स्वाधीन मंडल (IISER कोलकाता) ने कहा कि आवश्यक तत्व अगले 100 वर्षों में समाप्त हो सकते हैं।
- India meets almost all its demand for **palladium, platinum, and rhodium** through imports.
भारत अपनी जरूरत के **पैलेडियम, प्लेटिनम और रोडियम** लगभग पूरी तरह आयात करता है।
- An aluminium-based alternative could reduce this dependence significantly.
एल्युमिनियम आधारित विकल्प इस निर्भरता को कम कर सकता है।
- Both experts said the transition from lab to industry requires **long-term investment**.
दोनों विशेषज्ञों ने कहा कि प्रयोगशाला से उद्योग तक जाने के लिए **दीर्घकालिक निवेश** जरूरी है।
- “It would be great if Indian industries come forward to co-develop such discoveries,” Prof. Mandal said.
प्रो. मंडल ने कहा कि यदि भारतीय उद्योग सहयोग करें तो यह बेहतर होगा।
- He added that the present study is the product of **five decades of background work**.
उन्होंने कहा कि यह अध्ययन **पांच दशकों के शोध** का परिणाम है।
- The Shenzhen team is now aiming to expand aluminium **redox catalysis** and explore more reaction types.



शेन्जेन की टीम अब एल्युमिनियम रेडॉक्स कैटालिसिस को आगे बढ़ाने और नई प्रतिक्रियाओं का अध्ययन करने की योजना बना रही है।

GS Paper III: Environment		12 April 2026
TOPICS COVERED		
12A	Indian-born cheetah gives birth to four cubs at Kuno भारत में जन्मी चीता ने कुनो में चार शावकों को जन्म दिया	



GS III: Environment

Indian-born cheetah gives birth to four cubs at Kuno

Four cubs have been born to an Indian-born cheetah in Kuno National Park in Madhya Pradesh, Union Minister Bhupender Yadav said on Saturday. The fresh litter takes India's total population of cheetahs to 57. Mr. Yadav said this is the first recorded cheetah birth in the open forest since India's reintroduction programme for the big cat species, Project Cheetah, was launched in 2022, as all previous births have taken place inside enclosures. The cubs have been born to a daughter of South African cheetah Gamini, aged 25 months.

African cheetah Gamini, aged 25 months.

ये शावक दक्षिण अफ्रीकी चीता गामिनी की 25 महीने की बेटि से जन्मे हैं।

12A. Indian-born cheetah gives birth to four cubs at Kuno

भारत में जन्मी चीता ने कुनो में चार शावकों को जन्म दिया

- Four cubs have been born to an **Indian-born cheetah** in **Kuno National Park** in **Madhya Pradesh**, Union Minister **Bhupender Yadav** said on Saturday. मध्य प्रदेश के **कुनो नेशनल पार्क** में एक **भारतीय मूल की चीता** ने चार शावकों को जन्म दिया है, केंद्रीय मंत्री **भूपेंद्र यादव** ने शनिवार को कहा।

- The fresh litter takes India's total population of **cheetahs** to 57.

इस नए जन्म के साथ भारत में **चीतों** की कुल संख्या 57 हो गई है।

- Mr. Yadav said this is the first recorded **cheetah birth in the open forest** since India's reintroduction programme for the big cat species, **Project Cheetah**, was launched in 2022, as all previous births have taken place inside enclosures.

श्री यादव ने कहा कि यह 2022 में शुरू किए गए **प्रोजेक्ट चीता** के बाद पहली बार **खुले जंगल में चीता का जन्म** दर्ज किया गया है, क्योंकि इससे पहले सभी जन्म बाड़ों के अंदर हुए थे।

- The cubs have been born to a daughter of **South**