



## Regulation role

The discovery of microRNA changed the understanding of gene regulation

This year's Nobel Prize in Physiology, or Medicine, awarded to Victor Ambros and Gary Ruvkun, is for their discovery of microRNA, small RNA regulators of gene expression in eukaryotes, and its role in gene regulation after transcription – the process of making an RNA copy (messenger RNA or mRNA) of a gene's DNA sequence – and before cellular machinery is activated for protein production. Before the discovery of microRNAs and their role in gene regulation, it was believed that gene regulation was limited to specialised proteins called transcription factors, which bind to specific regions in DNA and determine which mRNAs are produced. In 1993, using 1 mm long mutant roundworms called *C. elegans*, the winners of this year's Nobel provided proof that gene regulation is not confined to transcription factors. Instead, regulation by microRNAs occurs at a later stage in the process of gene expression, post-transcription. Despite these seminal findings, it was initially thought that this unusual mechanism of gene regulation was peculiar to *C. elegans* and not relevant to more complex organisms, including humans. However, the discovery of another microRNA encoded in a gene present in all organisms indicated that microRNAs' role in gene regulation extends beyond roundworms. By 2001, microRNAs were found to be abundant in invertebrates and vertebrates, with some highly conserved across species, suggesting that "microRNA-mediated post-transcriptional regulation is a general regulatory function". As per current knowledge, the human genome codes for over 1,000 microRNAs.

Cancer, diabetes and autoimmune diseases are associated with dysregulated microRNA expression. In the case of cancer, dysregulation may include amplification or deletion of microRNA genes, abnormal transcriptional control of microRNAs, and defects in the microRNA biogenesis machinery. Studies have shown that dysregulated microRNAs affect the biological capabilities that cancer cells acquire during tumour development, including sustaining proliferative signalling, resisting cell death, and activating processes that allow cancer cells to spread in the body. Preliminary studies have also indicated that certain microRNAs can serve as potential biomarkers for human cancer diagnosis, prognosis, and therapeutic targets. It is now known that beyond perturbing immune responses, disruption and dysfunction of microRNAs can initiate the production of autoantibodies and contribute to the pathogenesis of autoimmune diseases, including rheumatoid arthritis and multiple sclerosis. Several microRNA-associated diagnostic biomarkers have already been developed and used clinically, though they have yet to be commercialised. Likewise, candidate drugs targeting microRNAs are currently being tested in clinical trials.

## Marina mayhem

The deaths at the Chennai air show could have been prevented

Events that draw huge crowds require careful preparations. The loss of five lives during an air show at mid-day on Chennai's Marina beach on October 6, organised by the Indian Air Force (IAF) as part of its 92nd anniversary, could have been avoided with better anticipation of the surge in spectators. The cause of death was attributed to heatstroke, though dehydration and suffocation may also have been factors. More than 200 people reportedly fainted. The IAF had issued advisories urging attendees to be well protected against the heat of around 34°C to 35°C. After the show, many complained of dizziness. Tamil Nadu Health Minister M. Subramanian said 102 individuals were sent to government hospitals nearby. In addition to the medical emergencies, chaos ensued on Chennai's roads for hours. Metro Rail and Mass Rapid Transit System (MRTS) trains were overcrowded. Stations were extremely congested and services were insufficient. Tamil Nadu Chief Minister M.K. Stalin announced a solatium of ₹5 lakh each to the families of those dead. He attributed the traffic congestion to the "overwhelming response", despite multiple departments coordinating preparations.

This is not the first time that Chennai has hosted such an event. An IAF air show on September 6, 2003, drew an estimated 13 lakh people, just 2,00,000 less than this year. Notably, there were no heatstroke fatalities then, although two children went missing. Traffic management and train services were similarly chaotic. Clearly, lessons have not been learnt. The blame should be shared not only by the State government, responsible for logistical support, but also by the railway administration for its inadequate response. Defence officials should have provided more critical inputs than they did, given their experience in conducting such shows nationwide. After the crash of a fighter jet at an air show in New Delhi on October 8, 1989, the IAF seemed to have addressed its weak points to ensure smooth events related to Air Force Day. In a social media post, Mr. M. Subramanian claimed that the government had exceeded the requirements requested by the IAF. However, his assertion about sufficient toilets and drinking water did not align with complaints about inadequacies at the venue. The authorities should not have allowed several lakhs to converge at the Marina. Giant screens could have livestreamed the display and volunteers from higher education institutions could have assisted the police, transport and security to attend to those in distress. Defence officials and host States should critically review their plans. Only then can such mayhem be prevented.

Prime Minister's Narendra Modi's participation in the sixth Quad Leaders' Summit in Wilmington, Delaware, U.S., on September 21, 2024 has raised further hopes of consolidating security cooperation among the "four leading maritime democracies in the Indo-Pacific". Nevertheless, it was India's National Security Adviser (NSA) Ajit Doval's trip to Russia in early September for the BRICS (Brazil, Russia, India, China, South Africa) NSA meeting, which included a high-profile personal meeting with Russian President Vladimir Putin, that needs greater analysis. Mr. Doval also held one-on-one parleys with the Chinese Foreign Minister Wang Yi, which was equally significant since India is leaving no stone unturned to resolve the four-year-old military standoff with China at the Line of Actual Control (LAC).

India is currently busy bargaining with China, and protecting its interests while trying to keep the U.S. engaged in maintaining a rules-based order in the Indo-Pacific. The fundamental idea behind the Quad (Australia, Japan, India and the U.S.) is the creation of a strategic consortium of principles, interests and purposes that would not only strengthen each country individually but would also be capable of jointly countering the revisionist challenge to the existing global order. This is where India's relations with Russia become significant since Moscow is a bitter opponent of the Quad.

### Role of peace maker

It is not easy for India's security managers and diplomats to make this complex game work in New Delhi's interest. However, Mr. Doval has a reputation for being imaginative, nimble and persuasive. The Doval-Putin meet, where Mr. Doval conveyed Mr. Modi's Ukraine peace plan, may be interpreted as India's attempt to cross the psychological Rubicon in great power diplomacy. There is little doubt about India's willingness, as an aspiring global power, to shoulder the responsibility in peace making which may include the meaningful role of a dialoguer, facilitator or an interlocutor, if not mediator. The Doval-Putin meet was after Mr. Modi's first-ever visit to Ukraine in August, and to Moscow in July. In particular, the Russia visit had drawn scathing criticism from Ukraine. But despite its criticism of Indian policies, Ukraine, on many occasions, has asked New India to help resolve the conflict.

Mr. Doval subsequently met French President Emmanuel Macron in Paris, on the sidelines of annual India-France Strategic Dialogue, to apprise him of India's mediatory efforts. Many factors have prompted India to insert itself into global peace-making initiatives, and India's Russia dilemma is the most important of them. While India's strategic relationship with the U.S. is relatively new, India-Russia relations have endured for over six decades, and New Delhi has



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no appetite to relinquish the military advantages that come with this relationship. But since the war in Ukraine has triggered Russia's total break with the West, Moscow's pivot toward China has become even more pronounced. Functioning more or less as the junior partner of China, Russia has been struggling to preserve its partnership with India since its leverage with China has steadily shrunk due to fierce military resistance by Ukraine.

From an Indian perspective, this needs correction because the Russia-China economic-military ties are getting too close to be ignored by New Delhi.

The West may have reconciled itself to India's purchase of Russian oil at discounted rates as well as New Delhi's silence on Russian aggression in Ukraine. Nevertheless, India's demonstration of independent foreign policy comes with a normative cost. The West has come to view India as being blatantly indifferent on issues which are so consequential for the remaking of the global order after the Ukraine conflict shattered the remnants of the post-Cold War status quo. By attempting to play a meaningful role in resolving an intractable conflict of epic global proportions, India can hope to reset the terms of its engagement with the West and Russia. Even though some voices would treat it as an attempt to please Washington, others would sound equally compelling in arguing that India is merely emphasising its strategic autonomy while buttressing its position as 'Vishwa Bandhu', or a friend to the world.

### Russia's China embrace

What has been the hallmark of India's foreign policy under Mr. Modi's leadership during the last one decade is a friendly, cooperative and sometimes transactional relationship with the U.S., and a non-adversarial, non-ideological and dispassionate relationship with Russia. However, Russia's foreign policy under Mr. Putin has been primarily driven by two key objectives: a deepening Moscow-Beijing nexus and the promotion of a multi-polar world order which would counter the hegemonic dominance of the western bloc led by the U.S. Mr. Putin's anti-western strategy includes both China and India as close allies. But India is unwilling to oblige as its strategic priorities do not fully align with those of Russia or China.

Russia's apparent unwillingness to diminish its partnership with India should have been predicated on the preservation of a reasonable balance of power between India and China and the avoidance of any major conflict between them. But the Russians have failed to give the same degree of concentrated attention to India which they have given to China. The reason is not far to seek. If Moscow's pursuit of closer ties with Beijing has been driven by a shared geopolitical contest with Washington, Russia's ties with India

have lacked a similar motivation.

Consequently, New Delhi is increasingly finding Moscow's usefulness largely exhausted due to Russia's deepening China connection. China has not only been engineering many of India's security difficulties on their Himalayan borders but is also trying to profit from them. The most damaging has been the active support to Pakistan in elevating terrorism as a legitimate tool of statecraft. In the Indian world view, Russia's prioritisation of China in its foreign policy has lent Russia diplomacy an exasperating character.

Russia's break in its relations with the U.S. has pushed Moscow into a tighter embrace with Beijing, at a moment when relations between India and China are yet to be normalised. Moreover, Russia's ambitions of posing a serious challenge to American primacy by asserting a leadership role in the Shanghai Cooperation Organisation and BRICS also remain unfulfilled. With the Ukraine war, Russia's task of managing its relationship with India has become considerably more complicated. And that is what makes India concerned about it, leading to rebalancing of India's great power relations.

### From post to present

This hold rebalancing does not necessarily require anything as far reaching as a full-fledged India-U.S. alliance. It requires our collective ability to turn increasingly away from the nostalgic images of Russia protecting India from the machinations of the Pakistan-U.S.-China nexus in the Bangladesh war. There is much scepticism about the merits of India's peace efforts when the war between Russia and Ukraine is showing no signs of de-escalation. The argument is that New Delhi does not really have the leverage to push either side to the negotiating table. Nor has the Indian leadership been accustomed to incur the displeasure of both parties in mediation efforts. But that should not be the justification for not trying to play the game of mediation. Symbolically as well as practically, Mr. Doval's publicly advertised and deft diplomatic interactions with Mr. Putin and Mr. Macron herald a new foreign policy dynamic in which conflict resolution efforts are viewed as a vital component of India's strategic autonomy.

In the end, the U.S.'s desire of seeing a ruined Russia is something India is not able to accept. It is also imperative for New Delhi to preserve the gains of the last two decades by fortifying its strategic partnership with the U.S. While the U.S. is undoubtedly the key player in the Quad, India too understands its underlying agenda, and accepts its fundamental features. New Delhi is aware of the structural impediments that stand in the path of any far-reaching development of India-China relations, and has no emotional commitment to their early impingement at strategically prohibitive cost.

By attempting to play a meaningful role in resolving the Ukraine conflict, India can hope to reset the terms of its engagement with both the West and Russia

# Unpacking the Centre's affidavit on marital rape



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The Marital Rape Exception (MRE), in Section 63, Exception 2 of the Bharatiya Nyaya Sanhita, 2023 (Section 375 Exception 2 of the Indian Penal Code, 1860) states that 'Sexual intercourse or sexual acts by a man with his own wife, the wife not being under eighteen years of age, is not rape'. The provision is under challenge before the Supreme Court of India and the Centre has filed an affidavit in support of MRE which needs unpacking.

### The issue of 'expectation'

Most of the arguments made by the Centre will, by now, be familiar to those acquainted with the debate around marital rape. It is stated that the differential treatment of married and unmarried women by MRE does not violate Article 14 of the Constitution of India (the right to equality) because married and unmarried women are not equally placed. The factum of marriage, it is argued, creates 'a continuing expectation of reasonable sexual access', which is absent in case of stranger or another intimate relationship. This, the affidavit contends, is a sufficient basis for the legislature to make a distinction between an incident of rape within and outside marriage. As a legal argument, this is alarmingly vague. Who gets to define what 'reasonable sexual access' means? And on what parameters? Is it a subjective definition (the person who has the expectation decides) or an objective one (there is one standard for everyone)? Does it encompass questions of different sexual acts or frequency or both?

That marriage creates a continuing expectation of reasonable sexual access is, at the outset, a dubious claim. More importantly, however, it remains to be established that it is a sound legal argument against striking down MRE. Going by traditional gender norms, marriage also creates a

continuing expectation that a husband will 'provide for' his wife. Surely that cannot be grounds for saying that if a wife takes her husband's cars and sells them as scrap metal without his consent (perhaps even by force), she has not committed theft. It is also unclear why marriage creates such an expectation but other intimate relationships (for instance, live-in relationships) do not. Ordinarily, an expectation (a hope or belief that something will happen) is personal. It can arise as much in one kind of relationship as it can in another, depending on the person and the relationship. Perhaps the subtext of this claim is that the expectation of sexual access in a marriage is socially sanctified and acceptable in a way that a similar expectation in a live-in relationship is not. Even if that were the case, it remains to be argued why that ought to be legally relevant in a jurisdiction where individual autonomy (including sexual autonomy) and the dignity of the individual are constitutionally protected.

### 'Institution' and 'misuse'

Other familiar arguments found in the Centre's affidavit are that the recognition of marital rape as a criminal offence would affect the sanctity of the institution of marriage and potentially lead to false allegations of marital rape which would be difficult to disprove. As I have argued in this space, there is no evidence to suggest that the recognition of marital rape has a causal link with the strength of the relationship. In any case, if the institution of marriage is so dependent on the impunity of a husband who rapes his wife, perhaps that is a reason to question its value and consider reforming it. The argument grounded in concerns of 'misuse' is a red herring. Any criminal offence may be misused and the very purpose of a criminal trial

is to determine whether an alleged offence was committed (usually, to a standard beyond reasonable doubt). Moreover, statistics show that sexual offences are generally under-reported, and the real challenge is in proving, rather than disproving, an allegation of rape.

### Arguments on jurisdiction

The Centre's affidavit also makes the claim that marital rape is a social, not a legal issue, and, therefore, not within the Court's jurisdiction. Given that law regulates (nearly) every aspect of human life and society, it is not clear whether and how there can be such a watertight distinction between a social and a legal issue. In any case, the fact that the Centre has addressed arguments on Articles 14 and 21 (the right to life) in its affidavit indicates that there is a legal issue at stake here. A related argument is that the decision on what should or should not be a criminal offence is a matter of legislative, rather than judicial, competence. There is some merit to this claim. It may, however, prove largely irrelevant. The Court is not required, in this matter, to declare marital rape a criminal offence (though the issue may colloquially be framed as such), but to assess the constitutionality of an existing law. MRE, being a 'law', is subject to Part III of the Constitution of India. In other words, the Court may not be empowered to decide whether marital rape should be a criminal offence or not, but it is very much within the jurisdiction of the Court to determine whether MRE violates a fundamental right, and to strike it down if it does.

Thus, the Centre's affidavit rebalances many familiar arguments in favour of MRE, but the legal merit of these arguments is questionable.

The views expressed are personal

## LETTERS TO THE EDITOR

### Put an end to this

As a member of a 10-year-old girl, I am unable to even think of the terror that a nine-year-old girl in West Bengal underwent ("HC orders autopsy at AIIMS for Bengal child rape victim", October 7). I urge our legislators to amend the relevant sections in our laws to ensure rigorous punishment. Such brutal incidents are happening time and again and there

needs to be a stop. Nothing can heal the deep wounds inflicted in the minds of the parents.  
**Chithra Joseph,**  
Hyderabad

### Israel's aggression

It is the first anniversary of the October 7 attacks and Israel does not seem to be anywhere near stopping its offensive against non-state actors "threatening" its sovereignty and peace.

International leaders must prevent further escalations. The U.S. needs to reset its ties with Iran.  
**Shivansh Deo,**  
Mothari, Bihar

The assumed legitimacy of Netanyahu's military excesses that is driving him against Hamas and Hezbollah is that these organisations are named as terror outfits. He also has to go on with the wars as the

moment they stop, there will be mind boggling. Unfortunately, the western and poor management were spoilers. We need to adopt best event management practices, leverage technology and data in planning for mass events and have a task force that brings the police, transport, health and civic officials on one platform.  
**R. Sivaraman,**  
Chennai

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Though the event was a proud reminder of India's growing self-reliance in defence, it raises an important question about the need for the Indian Air Force to have aggressively promoted the show as an occasion to set a new record by aiming to mobilise such an enormous crowd, much beyond the manageable level.  
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# The supporting cast in the U.S. elections

As the U.S. presidential elections near, gossip is ironically growing outside the candidates of the Democratic and Republican Party, Kamala Harris and Donald Trump, respectively. The support cast is now more in the news, especially the vice-presidential nominees, Tim Walz (Democrat) and J.D. Vance (Republican). On their margins, other bit players are surfacing too. One is Liz Cheney, daughter of George Bush's Vice President, Dick Cheney, and the other is Melania Trump, wife of Mr. Trump.

### The sudden spotlight

It did not begin that way. While an estimated 58 million watched the 2020 vice presidential debate between Mike Pence and Kamala Harris, this time, on October 1, when Mr. Vance and Mr. Walz squared off, there were just 43 million viewers, a clear 25% drop.

There is good reason for that. With Mr. Trump, there are no waverers. One either loves him or distracts or hates every coiffed hair on his head. Against this backdrop, vice presidents matter little as most of the fences are free of sitters. Mr. Trump's appeal has drummed them out and this further undermines who the vice president will be.

That both the contestants, Mr. Vance and Mr. Walz, were civil to each other made it even more inconsequential. There was no fur flying, nor blood on the floor. That would never have been the case if Mr. Trump had been in the ring. This is why it is surprising that the sequel is now attracting notice, well after the show is over.

Those in the Republican trenches, who are seasoned Trump warriors, are unhappy that Mr. Vance did not protest loudly enough that the Democrats "stole the 2020 elections", as Republicans have been alleging for a long time. To make matters worse, he shook hands with Mr. Walz at the start and end of the debate and chatted amicably for a



**Dipankar Gupta**  
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while with the Democrat. Why not an embrace, Trumpists ask? After all, by the end, the two looked like childhood sweethearts, parting sadly before going off to college.

### An image makeover

Mr. Walz is having a hard time too, and for a similar reason. Democratic workers also view the debate's congeniality negatively. Mr. Walz, they say, did not hit Mr. Vance hard enough for scandalously calling Haitians in Ohio "pet-eating, illegal migrants". This gave Mr. Trump's image a makeover, weakening Ms. Harris's portrayal of him as a rule-breaking win-at-all-cost leader.

When Fred Warner, the 6 foot 3 inch, 230 pound American football linebacker, ran a touchdown late last month, one TV viewer said, without naming a double entendre, "That's my Trump." Linebackers rarely score and are amongst the strongest members in the team. Mr. Trump, like Mr. Warner, is big too and ready to break conventions, if that lets him win. Kid Rock, a rapper, said he supports Mr. Trump because he hates losing and not "because he's a nice guy. I'm not electing the deacon of a Church."

On the other hand, Ms. Harris's running mate, Mr. Walz, radiates a good neighbourly feel; ever ready to mow your lawn or repair a fuse. Great, but can he fight back, if he has to? Americans love a fighter, especially in a politician.

The backstories behind Mr. Walz and Mr. Vance are now getting more attention as if they might tip the scales. As Minnesota Governor, Mr. Walz passed many liberal laws on abortion, affordable housing and LGBTQ rights. That doesn't make him a soft touch, though. Larry Jacobs, a political scientist from Minnesota University, thinks Mr. Walz has "attack dog" skills. But on debate night, he was Mr. Affable.

Mr. Vance's past too is in the news. He is widely acknowledged for his Yale Law School-honed knife sharp intellect. He can run

through flab and pierce your heart clean. Yet, when he faced Mr. Walz, Mr. Vance was not the ripper he is often cast to be. To his credit, his meteoric rise is phenomenal, considering his parents were dysfunctional.

### 'Republicans for Democrats'

The spotlight on Ms. Harris's election trip to Wisconsin last week was to showcase Liz Cheney, rather than herself. A prominent Republican with a Republican heritage, Ms. Cheney now supports Ms. Harris for she fears Mr. Trump will harm democracy. John McCain's son, Jimmy McCain, too is going with Ms. Harris, adding to the numbers of "Republicans for Democrats" — a never-before grouping.

These Republicans are clearly not giving up their ideology but Democrats are temporary measure for the lasting good of democracy. It is doubtful if they can swing voters towards Ms. Harris but it is a cheesy, uplift photo op that can do no harm. Ms. Cheney, if truth be told, was earlier effortlessly pushed to the Republican sidelines by Mr. Trump and nobody in the party stood up for her.

Melania Trump is also getting huge publicity because in her just-released, tell-all memoir, she goes sensationally against her husband and sides with the pro-choice abortionists. This is the hot potato issue in this election and something that Ms. Harris is banking on exploiting to the full. Democrats are waiting in vain for another debate when they could rub salt in Mr. Trump's recently opened wound.

The U.S. is slowly returning to the boredom with elections that was apparent before the Trump-Harris debate. The climatic end is over three weeks away and newscasters are doing their best to keep the nation's interest alive.

That is probably why the supporting cast is centre stage. But before you switch off the lights, take a peek. Mr. Trump can pull out a late-night surprise.

# The complex process of restoring lakes

Policymakers are setting unrealistic expectations for lake restoration efforts

### STATE OF PLAY

**Priyanka Jammal**  
**Hymavathi P.**



A recent report by the Karnataka State Pollution Control Board (KSPCB) stated that not one lake of the 110 lakes it studied in Bengaluru meets potable water quality standards.

Potable water is water that is safe for human consumption — i.e., water that can be used for drinking or cooking. Safe water means it contains no toxins, carcinogens, pathogenic microorganisms, or other health hazards.

Achieving potable water quality in lakes means that the water must meet the highest quality standards. Rainwater, often considered the purest form of water, becomes contaminated once it contacts the atmosphere. As it moves across natural and man-made surfaces, especially in urban areas, it picks up minerals, chemicals, and pollutants. Even if wastewater is prevented from entering water bodies and only runoff is allowed, the lakes will still not meet potable water quality standards. Additionally, the stagnant nature of lake water leads to biochemical processes that further degrade its quality.

Lakes in Bengaluru receive water from three main sources: treated/partially treated wastewater from sewage treatment plants; rainwater mixed with sewage, also known as combined sewer overflows (CSOs) via storm water drains; and raw sewage from open storm water drains. Given the nature of the inflows, it is reasonable to expect potable water in lakes?

Reducing pollutants in wastewater and storm water runoff comes at a significant cost. Treating 1 million litres of wastewater to meet secondary treatment standards costs approximately ₹1 crore with re-occurring operation and maintenance costs. Most restoration projects focus on de-polluting sewage treatment plants and supplementing treatment by channeling secondary treated effluent into constructed wetlands. Additionally, during the rainy season, CSOs are managed through diversion channels that allow excess water to flow into the lakes. To further improve the quality, sedimentation ponds are constructed near the CSO outlets.

The KSPCB study revealed that all the 110 lakes fall only under the categories of D (lake water suitable for wildlife propagation and fisheries) and E (water suitable for irrigation, industrial cooling, or controlled waste disposal). In simpler terms, none of them are fit for swimming (B), nor can they be used as a source of potable water, either with treatment (C) or without (A).

One crucial point to note is that the biological oxygen demand (BOD) level required to move from category E or D to category C is 3mg/L. This means that if the water quality falls under categories D or E, any incremental reduction in BOD levels at the site of restoration efforts may not be reflected in the broad ranges used to categorise lake quality. For instance, if the BOD level

in a lake is 30 mg/L and restoration efforts reduce it to 15 mg/L, the lake will still be in category D or E, which misleadingly suggests no progress. Additionally, the lack of ambient standards for nutrients, such as nitrogen, further limits the ability to evaluate the impact of interventions on surface water quality.

The right way to approach restoration is to therefore set the right expectations with stakeholders. First, we need to identify the nature of the problem. Second, we need to prioritise the issues to be addressed with inputs from stakeholders. Third, we need to conduct comprehensive baseline assessments clearly stating the challenges. Fourth, based on available funds, we need to estimate the levels of improvement that are achievable. Finally, we need to set realistic expectations with the stakeholders and devise an exit strategy to ensure the sustainability of interventions throughout the design period.

The success of restoration efforts should not be assessed based on lakes meeting the potable water standards but by the tangible improvements in water quality, biodiversity, and the livelihoods of local communities. Lake restoration is a complex process. With proper planning, phased targets, and collaboration, we can make progress in rejuvenating lakes in urban landscapes — not necessarily to the point where they provide drinkable water, but where they become vibrant, healthy ecosystems that benefit the environment and the people.

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Why the vice-presidential nominees, Tim Walz and J.D. Vance, are more in the news now

# Nations with mineral reserves needed for energy transition

Reserves are known and assessed mineral deposits that can be mined economically

### DATA POINT

#### Our World In Data

The world's energy system is mainly powered by fossil fuels. The transition to a low-carbon one will shift its underpinnings away from coal, oil, and gas to the minerals needed for solar, wind, nuclear, and other technologies. Which countries have such mineral reserves that can be mined? Below we explain the importance of each mineral. The graphic shows the share of the world's reserves in each country.

**Bauxite:** Primary source of aluminum. Essential for wind turbines, solar panels, batteries, electrolyzers, and transmission cables.

**Chromium:** Key for geothermal and concentrated solar power. Used in wind turbines, and for radiation shielding in nuclear power plants.

**Cobalt:** Used in consumer electronics, catalysts for the oil industry, resistant metal alloys, critical components in many lithium-ion battery technologies.

**Copper:** Critical element in solar photovoltaics, wind power, battery storage, and electricity grids.

**Graphite:** Key component of battery anodes and therefore important for the transition to electric vehicles, and stationary batteries for balancing electricity grids.

**Lithium:** Core component of lithium-ion batteries.

**Manganese:** Widely used in solar and wind power, and in lithium-ion batteries for electric cars.

**Molybdenum:** Has a very high electrical conductivity but expands little when exposed to heat.

**Nickel:** Key component in the cathodes of lithium-ion batteries in electric cars.

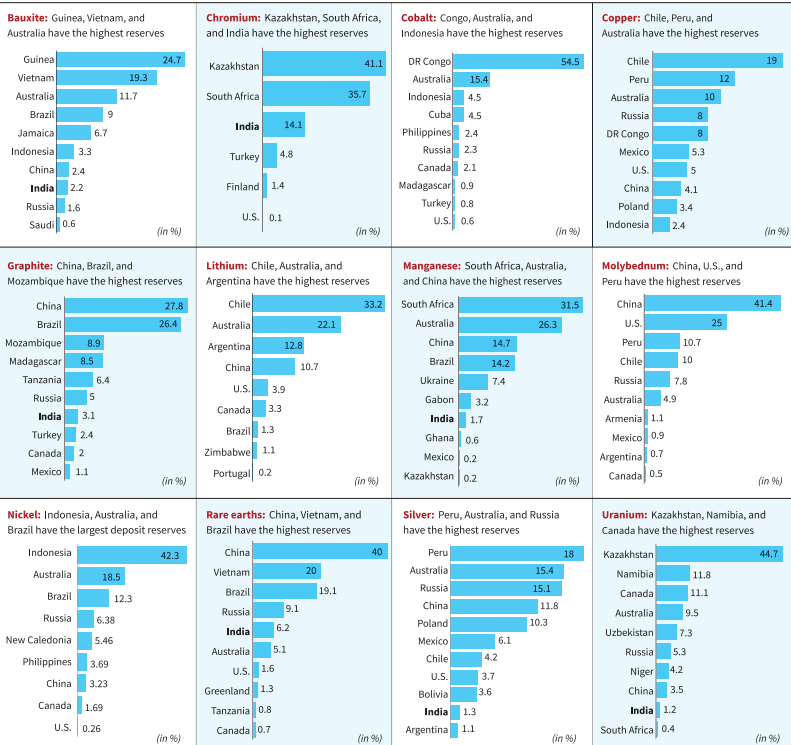
**Rare earths:** Used in wind power for permanent magnets.

**Silver:** It's most important role in clean energy is in solar photovoltaics and electric vehicles.

**Uranium:** Primary fuel for nuclear energy production.

## Minerals for a clean and green future

The data for the charts were sourced from Our World in Data. The data shows the reserves as a share of the global total as of 2023



### FROM THE ARCHIVES

## The Hindu

FIFTY YEARS AGO OCTOBER 8, 1974

## Bulgaria to grant fresh credit to India

New Delhi, Oct. 7: Bulgaria has agreed to further extend unutilised financial credit given to India and also grant fresh credit for developmental purposes on certain terms.

This announcement was made by Mr. Toncho Chakarov, Bulgarian Minister for Machine Building and Metallurgy, at the first meeting of the Indo-Bulgarian Joint Commission which opened here to-day.

Mr. Chakarov said Bulgaria would do its best to increase its economic co-operation with India. Some of the fields where India could cooperate with Bulgaria, he said, were computer technology, agriculture, electronics, wagon building and metal cutting, and chemicals and pharmaceuticals.

The Bulgarian Minister said his country was also prepared to sign a protocol to cooperate with India in the field of science and technology. This subject could provide a good base for the current negotiations.

The Industrial Development Minister, Mr. C. Subramaniam, who led the Indian delegation, announced the establishment of five working groups on food processing, agriculture, pharmaceuticals, machine-building and heavy industry, and electronics. These working groups would identify specific areas of collaboration between the two countries.

Mr. Subramaniam hoped the present exchanges in the field of science and technology would lead to the signing of an agreement on the subject.

A HUNDRED YEARS AGO OCTOBER 8, 1924

## Gandhiji breaks his great fast

Delhi, October 8: Mahatma Gandhi broke his fast at 12:30 punctually. There was a very large gathering including Messrs. Das, Nehru, Azad, Hakinji, the Ali Brothers, Jawaharlal, Mrs. Nehru, Mrs. Mahomed Ali, Swami Shradhdhanandji and others.

After Koranic and Vedic hymns and devotional music, Gandhiji addressed a few words in low voice saying that with his fast his peace was coming to a close.

The fast was broken with orange juice which was very slowly taken in. When water was given afterwards he exclaimed, "A second course." About quarter of an orange was taken.

# Text & Context

THE HINDU

## NEWS IN NUMBERS

**The global catchment area showing abnormal conditions**

**50** In per cent. According to a UN weather agency report, river flows worldwide fell to all-time lows last year amid record heat, endangering water supplies in an era of growing demand. REUTERS

**The death toll from the floods, landslides in Meghalaya**

**15** At least 15 people have been killed in floods and landslides triggered by heavy rainfall in the northeastern State over the last four days. 17,000 people from about 165 villages have been shifted to relief camps. REUTERS

**The U.S. military aid sent to Israel since October 7, 2023**

**17.9** In billion dollars. According to Brown University's Costs of War project, an additional \$4.86 billion has gone into U.S. military operations in the region since the October 7 attacks. AP

**The World Bank Loan secured by Sri Lanka to bolster recovery**

**200** In million dollars. The country's leftist government secured a new loan to bolster economic recovery, the first foreign funding since President Anura Kumara Dissanayake won elections. AP

**The increase in the storage of India's water reservoirs**

**18** In per cent. The country's water reservoirs are experiencing a significant boost in live storage with 155 of them across the country currently at 88% of their total capacity. PTI  
COMPILED BY THE HINDU DATA TEAM

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## On 'casteist' provisions in prison manuals

How do existing prison manuals reinforce colonial-era caste-based discrimination? How do they contravene Article 14 of the Constitution? Why did the Supreme Court flag the Union government's 2016 Model Prison Manual? What does the verdict say? What happens next?

### EXPLAINER

Aaratrika Bhaumik

#### The story so far:

The Supreme Court on October 3 declared that caste-based division of labour in prisons is "unconstitutional". A three-judge Bench headed by Chief Justice of India D.Y. Chandrachud struck down several provisions in State prison manuals, that reinforced caste differences, for being violative of the fundamental rights of prisoners.

#### What was the case?

The court was hearing a Public Interest Litigation (PIL) petition filed by journalist Sukanya Shantha highlighting provisions in prison manuals in States such as Uttar Pradesh, West Bengal, Odisha, Maharashtra, Tamil Nadu, and Kerala that legitimised caste inequalities. For instance, it was pointed out that the separation of Thevars, Nadars, and Pallars in different sections of the Palayamkottai Central Jail in Tamil Nadu constituted a "glaring instance of caste-based segregation of barracks". Similarly, the Rajasthan Prison Rules, 1951, allocated latrine duties to the "Mehtar" caste — a Scheduled Caste community — while Brahmins or "sufficiently high caste Hindu prisoners" were assigned to the kitchens, thereby perpetuating caste-based labour divisions.

#### How do prison manuals reinforce colonial stereotypes?

The now-repealed Criminal Tribes Act, 1871, permitted the British colonial regime to designate certain marginalised communities as "criminal tribes" based on the stereotypical notion that they were "born criminals." Following the revocation of the Act, these groups were reclassified as "denotified tribes" yet prison manuals continued to label them as "habitual offenders" sans any conviction. The court noted that such



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classification perpetuates colonial-era caste-based discrimination, exacerbating the social and economic marginalisation of these communities.

Citing examples from various prison manuals, the court highlighted that Rule 404 of the West Bengal Jail Code stipulates that a convict overseer may be appointed as a night guard only if "he does not belong to any class that may have a strong natural tendency to escape, such as men of wandering tribes." Similarly, prison manuals in Andhra Pradesh, Tamil Nadu, and Kerala define "habitual criminals" as individuals who, by "habit," are "robbers, housebreakers, dacoits, thieves, or receivers of stolen property" or who "habitually commit extortion, cheating, counterfeiting coins, currency notes, stamps, or forgery," even in the absence of any prior convictions. Further, the rules in Andhra Pradesh

equated "a member of a wandering or criminal tribe" with "a bad or dangerous character, or one who has ever escaped or attempted to escape from lawful custody," prohibiting their employment in any labour outside the prison walls.

#### How are fundamental rights of prisoners violated?

Underscoring that caste may be employed as a criterion for classification only when it seeks to benefit victims of caste discrimination, the top court ruled that the prison manuals failed to achieve this objective and instead contravened Article 14 of the Constitution. "Segregating prisoners on the basis of caste would reinforce caste differences or animosity that ought to be prevented in the first place", it reasoned. The judges further opined that differentiating between inmates based on "habit," "custom,"

"superior mode of living," and "natural tendency to escape" offends principles of substantive equality.

"By assigning cleaning and sweeping work to the marginalised castes, while allowing the high castes to do cooking, the Manuals directly discriminate. This is an instance of direct discrimination under Article 15(1)", the Bench asserted. Furthermore, assigning specific tasks to these communities based on their purported "customary" roles, rather than offering "more skilled, dignified, or intellectual work," was deemed to result in indirect discrimination.

Referring to prison rules that require food to be cooked by members of a "suitable caste" or "menial duties" to be exclusively performed by communities "accustomed" to such work, the court noted that these practices constituted untouchability, prohibited under Article 17. "When Prison Manuals restrict the reformation of prisoners from marginalised communities, they violate their right to life. At the same time, such provisions deprive prisoners from marginalised groups of a sense of dignity and the expectation that they should be treated equally", the CJJ underscored.

#### What were the directions issued?

All States and Union Territories were directed to amend their prison manuals and rules within three months to abolish such discriminatory practices.

Several lacunas were also flagged in the Union government's Model Prison Manual, 2016, and the Model Prisons and Correctional Services Act, 2023. The 2016 manual, in particular, faced criticism for offering a vague definition of "habitual offender", allowing States to define the term based on stereotypical assumptions against denotified tribes. Consequently, the court ordered that necessary reforms be implemented in both the 2016 manual and the 2023 Act within three months. To ensure compliance with these directives, district legal services authorities and boards of visitors were tasked with conducting regular inspections.

### THE GIST

The court was hearing a Public Interest Litigation (PIL) petition filed by journalist Sukanya Shantha highlighting provisions in prison manuals in States such as Uttar Pradesh, West Bengal, Odisha, Maharashtra, Tamil Nadu, and Kerala that legitimised caste inequalities.

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All States and Union Territories were directed to amend their prison manuals and rules within three months to abolish such discriminatory practices.

## On the need for a different framework for passive MFs

Why has SEBI relaxed requirements for asset management companies with respect to passive mutual funds?

Saptarpmo Ghosh

#### The story so far:

The Securities and Exchange Board of India (SEBI) on September 30, introduced the liberalised Mutual Funds Lite (MF Lite) framework for passively managed schemes. The framework intends to promote the entry of new players into the MF ecosystem, present diversified investment opportunities for retail investors through less risky schemes and enhance market liquidity.

#### Why a separate framework?

Passively managed mutual fund schemes are generally considered less risky compared to their actively managed peers. They usually track a benchmark index, say BSE Sensex or Nifty50, and try to mimic their performance. In other words, these funds try and deliver returns in tandem with the benchmark they are following. Since the underlying constituents of the benchmark indices are

publicly available, passively managed schemes can be easily tracked and therefore, the associated risks are lower in comparison to their active peers.

SEBI observed that passive funds' investment strategy imbibes on mimicking instruments already bearing established rules. Asset management companies (AMCs) of the fund, thus have "negligible discretion" about asset allocation and the investment objective. Thus, the regulator held that the current framework, intended primarily for active mutual fund operators, may not be relevant for passively managed schemes. Thus, opting to introduce the "relaxed framework". The light touch regulations would include relaxed requirements relating to eligibility criteria for sponsors (the ones who set up and register the mutual fund) including net worth, track record and profitability etc.

#### How does it help new players' entry?

This would be encouraged by two measures — governance structures and

responsibilities) and requirements for net worth holdings. Net worth is the difference between the assets and liabilities of the fund. The framework deems a minimum net worth of ₹35 crore to be appropriate for AMCs operating a passive fund. Emphasising on the need for liquid money, the regulator observed that the fund may require to deploy the entire amount of the net worth in liquid assets on a perpetual basis. Thus, a lower minimum requirement could provide the "desired head start for a cost effective and competitive passive MF industry". According to stockbroker firm AngelOne, the framework would likely attract both existing and new market players.

Further, with respect to governance, SEBI explored that in management of passive funds, the oversight role of trustees (tasked with protecting the investors' interests) also gets considerably reduced. Thus, a case for relaxation. However, it stipulated that the role of trustees in averting conflict of interest and overseeing related party transactions,

undue influence of sponsors, misconduct including market abuse and misuse of information including front running would still be relevant along with AMCs. Important to note here however, that certain oversight measures relating to daily operations would now be entirely with the board of the AMC, the paper held. For example, ensuring fairness in fees and expenses charged and more importantly, maintaining the tracking error and difference within the regulatory limit.

#### What about risks and disclosures?

The success of a passively managed scheme is subject to two factors, namely, TER (refers to the costs associated with running and managing a scheme) and tracking error. Thus, the latest framework moves away from metrics such as strategy and investment avenues, among other things. These would not form part of the scheme information document (SID) that contains all the relevant information for a prospective retail investor. SEBI however sought that the prospective investor be informed about the name of the underlying benchmark, among other things, in the SID. SEBI's consultation paper had also concentrated focus on costs for compliance considering the lowered risks.

It provided that the responsibilities of the risk management committee(s), being limited in the paradigm, could be instead additionally carried out by the audit committee of the AMC.

### THE GIST

Passively managed mutual fund schemes are generally considered less risky compared to their actively managed peers. They usually track a benchmark index, say BSE Sensex or Nifty50, and try to mimic their performance.

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**BUILDING BLOCKS**



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# How high-performance buildings are the next step towards a sustainable future

As urbanisation accelerates, India risks surpassing global benchmarks for energy efficiency and carbon emissions in buildings. In such a scenario, HPBs offer resilience through adaptive, self-sufficient structures. They promote social well-being by nurturing healthier indoor environments

Sandhya Patil

The conversation around sustainability in the buildings sector has often centred on climate change, resource use, and energy efficiency. Buildings are significant contributors to global emissions, especially in fast-growing cities, so improving their energy and carbon efficiency is vital. Failing to act could result in higher energy consumption, greater dependence on fossil fuels, and missed climate targets, all of which will further strain urban infrastructure.

Globally, buildings account for nearly 40% of total final energy consumption over their lifespan, primarily for operational needs such as running HVAC systems and lighting. This significant energy use leads to approximately 28% of energy-related carbon emissions arising from both on-site energy consumption and indirect emissions from power plants and other off-site sources. In India, buildings account for more than 30% of the national energy use and 20% of its carbon emissions, according to the Bureau of Energy Efficiency.

As urbanisation accelerates, India risks surpassing global benchmarks for energy efficiency and carbon emissions in buildings, including standards set by the International Energy Agency, building certification programmes, and the European Union's Energy Performance of Buildings Directive.

With India's urban population expected to reach 600 million by 2030, this challenge is becoming even more urgent. As cities grow, the demand for new construction also increases, and without action the sector's carbon footprint will increase drastically.

Adopting energy-efficient and low-carbon building practices is thus key to meet climate goals and to promote sustainable urban growth.

**What are high-performance buildings?**

Terms like "green buildings" and "high-performance buildings" (HPBs) are often used interchangeably in the field of sustainable construction. Both concepts aim to reduce environmental impact and energy consumption and improve occupant comfort, but differ significantly in their methods and outcomes.

Green buildings are often seen as a foundational step toward sustainable development, with certification programmes playing a crucial role in their creation. These programmes assess the design intent and the final outcomes across various categories, using established benchmarks to ensure the builder is meeting essential sustainability goals. Their key areas of concern are energy efficiency, water conservation, and materials sourcing.

HPBs elevate these ideas by striving for peak efficiency in every aspect of their form and function. From energy and water use to occupant health and comfort, HPBs are designed with specific, measurable goals to achieve results beyond what the local government requires. They use advanced technologies and smart design strategies to continuously track their performance metrics, ideally in real-time. Specifically, HPBs leverage site-specific design approaches, such as natural lighting, ventilation, and terrain water management using sustainable materials, insulation, and low U-value windows to maximise thermal efficiency and reduce energy demand.

Advanced technologies include energy-efficient HVAC systems, greywater recycling, rainwater harvesting, smart lighting controls, and advanced metering. A 'building management system' (BMS) allows operators to monitor an HPB's performance, including sharing real-time analytics to optimise resource use.

Some HPBs already exist in India. One notable example is Unnati in Greater

Noida, which features a facade designed according to the Sun's path in the local sky to improve thermal comfort and reduce glare. This is complemented by high-performance glass with a low solar heat gain coefficient, which improves energy efficiency and indoor environmental quality.

Similarly, Indira Paryavaran Bhavan in New Delhi utilises an advanced HVAC system featuring a unit where chilled water circulates through beams in the ceiling, taking advantage of natural convection and reducing energy consumption.

These building designs have paved the way for net-zero buildings (structures that generate as much energy and water as they consume) and grid-interactive buildings, which actively participate in energy demand management. Both push the boundaries of sustainability.

**Benefits of HPBs**

HPBs offer environmental benefits and address long-term operational challenges that building owners and occupants often face. Rather than focusing solely on saving energy, HPBs create a holistic environment where technology, design, and sustainability intersect to enhance building performance.

For example, their use of smart systems to dynamically manage resource use ensures building systems last longer and don't need frequent upgrades. The Infosys campus in Bengaluru has a facility that monitors the entire building's performance using a BMS and makes the requisite changes as and when to maintain peak performance. These buildings often achieve higher returns on investment due to higher property value and lower maintenance costs. Similar examples include the Atal Akshay Urja Bhavan in New Delhi and the Infosys campus in Hyderabad.

HPBs that take advantage of automation and artificial intelligence in addition to existing features can even

create intelligent ecosystems. For example, computers in buildings can adjust lighting, temperature, and ventilation based on occupancy patterns or weather conditions to create a more personalised, energy-efficient milieu.

From a market perspective, HPBs are becoming a symbol of forward-thinking development. Beyond their immediate benefits, they signal a shift toward buildings that prioritise the well-being of occupants with superior air filtration systems, maximal natural light, and optimal thermal comfort.

**How can HPBs help India's cities?**

Life in India is guided by resource scarcity, fluctuating energy markets, and rising temperatures. HPBs offer resilience through adaptive, self-sufficient structures. They promote social well-being by nurturing healthier indoor environments, including air quality.

For example, TCS Banyan Park in Mumbai incorporates extensive green spaces and water features and its daytime lighting strategy includes well-placed windows and skylights to reduce artificial lighting. Such projects consume fewer resources while elevating the quality of the workplace.

In India, where rapid urbanisation can and does strain public infrastructure, HPBs offer a proactive solution that positions the built environment as a driver of the country's transition to a low-carbon, more sustainable economy. In sum, in a rapidly changing real-estate landscape, where adaptability is key, HPBs stand out as future-proof investments capable of weathering evolving environmental and economic pressures while delivering value.

Sandhya Patil is a sustainability expert with the Indian Institute for Human Settlements (IIHS) and anchors technical assistance for ASSURE. The author does not have any financial interests vested with any company or organisation that would benefit from this article.



**FROM THE ARCHIVES**

## Know your English

K. Subrahmanian Upendran

"Sorry I'm late, but..."  
"That's a jazzy shirt you're wearing."  
"Jazzy? What does it mean?"  
"Take a look at your shirt. And then, you tell me what you think 'jazzy' means."  
"O.K. Let's see now. The shirt I'm wearing is bright green. It has all kinds of colourful flowers printed on it..."

"Pink, blue, orange, purple..."  
"...and white. It is colourful and it is also... Hey...wait a minute. Does 'jazzy' mean bright, colourful? So can I say the heroes in films wear jazzy suits?"  
"Yes, you can, but..."  
"And the villain usually drives a jazzy sports car!"

"Don't get carried away. You have to be careful when you use this word. You see, when you say that something is jazzy, you mean that though the object is bright and colourful, you yourself don't particularly care for it. You don't like the object because you think it is too flashy."  
"So the word 'jazzy' has a negative connotation?"  
"Yes, it does. So be very careful. Now tell me, why are you late?"  
"I went to see the old museum and..."  
"They've really jazzed it up, haven't they?"

"Jazzed it up?"  
"'Jazz up' means to make something interesting, colourful or exciting. The new editor tried to jazz up the magazine."  
"We need good music and good food to jazz up a party."

"I agree with you 100 per cent. What did you like in the museum?"  
"Nothing."

"What?"  
"You see, I never got a chance to go inside. As I was climbing the steps, I bumped into Raju."

"Raju! I thought he'd gone to Delhi!"  
"He came back the day before. He told me about all the places he had seen - the Red Fort, the Qutab Minar, Raj Chat..."  
"And all that jazz."

"Oh no! Not another expression with the word jazz in it! What have you been doing? Listening to a lot of jazz music?"

"No. By the way the 'a' in jazz is pronounced, like the 'a' in 'man', 'fan',..."  
"I see, tell me what 'and all that jazz' means."

"I'll use the expression in a sentence and you tell me what it means. The new captain talked about the need for hard work, discipline and all that jazz."

"Hmm. You know, sometimes when we don't want to go into great detail about something, we complete the sentence very abruptly by saying 'etc.', etc. The expression 'and all that jazz' seems to be doing the same thing."

"Excellent. When we use the expression 'and all that jazz', we expect the listener to fill in the details. We don't want to go into the details because they are not that important. So if somebody asks you what you saw at the beach, you could say 'sand...'

"Shells, crabs, people and all that jazz. Hey, what are you doing?"  
"Cleaning up the room."

Published in *The Hindu* on August 10, 1993.

**THE DAILY QUIZ**

Please send in your answers to [dailyquiz@thehindu.co.in](mailto:dailyquiz@thehindu.co.in)

## Jammu and Kashmir is awaiting the results of its first Assembly election in a decade. Here is a quiz on the legislature of the erstwhile State

Vighnesh P. Venkitesh

**QUESTION 1**  
In which year did the post of Chief Minister come into existence in the erstwhile State? Which post did it replace?

**QUESTION 2**  
Who was the first Chief Minister of the erstwhile State, who was also the last person to hold the preceding post?

**QUESTION 3**  
What was the first general election in post-independence Jammu and Kashmir?

**QUESTION 4**  
Mehbooba Mufti is the first woman to be Chief Minister in the erstwhile State. Who is the first woman to be a Cabinet Minister in Jammu and Kashmir?

**QUESTION 5**  
How many seats are reserved for Pakistan-occupied regions in Kashmir, which are currently left vacant and not contested for?

**QUESTION 6**  
How many times was the Governor's rule imposed, suspending the elected Assembly in Jammu and Kashmir while it was a State?



**Visual question:** Identify the person on the left. His family has been prominent in the erstwhile State's legislative history.

**Questions and Answers to the previous day's daily quiz:** 1. Mithun's first released film and the legendary director who made it. **Ans: Mrigaya and Mrinal Sen**  
2. The film that fans identify him most with. **Ans: Disco Dancer**  
3. The Indian mystic Mithun essayed for the National Award. **Ans: Ramakrishna Paramahansa in Swami Vivekananda**  
4. Name the chain of hotels that Mithun owns in places like Ooty. **Ans: Monarch**  
5. This African country issued a stamp in his honour in 2010. **Ans: Guinea-Bissau**  
6. The character which was based on Mithun in this 2008 comic book. **Ans: Jimmy Zhingchak - Agent of D.I.S.C.O.**  
7. Mithun turned down the offer to play the lead in this Mani Ratnam film. **Ans: Iruvar**  
**Visual:** This party nominated him to the Rajya Sabha in 2014. **Ans: All India Trinamool Congress**  
**Early Birds:** Tamal Biswas| Tito Shildhal| Rajib Ganguly| Piyali Tulji| Sumana Dutta

## Word of the day

**Berate:**  
censure severely or angrily

**Synonyms:** trounce, lambaste, dress down, scold, take to task, rebuke, remonstrate, reprimand, lecture, chide

**Usage:** He has often berated him about his lack of vision.

**Pronunciation:** newsth.live/beratepro

**International Phonetic Alphabet:** /bɪr'eɪt/

For feedback and suggestions for Text & Context, please write to [letters@thehindu.co.in](mailto:letters@thehindu.co.in) with the subject 'Text & Context'

# Genome editing is bringing clarity to the study of hereditary cancers

CRISPR screens have transformed the study of BRCA genes by enabling high-throughput functional genetic analysis. That is, using CRISPR-Cas9, researchers can target the BRCA genes and create specific mutations in them to study their effects on DNA repair and cancer development

Sridhar Sivasubbu  
Vinod Scaria

**T**he International Agency for Research on Cancer's estimates of the burden of 36 cancers in 185 countries suggest one in five individuals has a lifetime risk of developing cancer. The agency also estimated that one in nine males and one in 12 females will die of cancer. In all, the agency counted 20 million new cancer cases and 9.74 million cancer-related deaths in 2022, which it said could rise to a whopping 32 million new cases and 16 million deaths by 2045. By then, Asia alone may account for almost half of all cases worldwide.

All cancers occur due to genetic mutations in the body's genome, and a subset of these cancers are the result of inherited mutations. Researchers have estimated that around 10% of all individuals with any cancer could have inherited a genetic mutation implicated in the cancer; they have also found the prevalence of inherited mutations to be higher among individuals with ovarian cancer (20%). It is 10% among those with breast, colorectal, lung, or prostate cancers, and a lower 6% among those with cervical cancer.

## The BRCA genes

Scientists have exhaustively documented hereditary cancers. We know there are more than 50 genetic syndromes (collections of symptoms) that predispose individuals to cancer and are caused by genetic variants that humans are capable of inheriting.

In fact, the discovery of the BRCA1 and the BRCA2 DNA-repair genes in 1994 and 1995, by Mary-Claire King et al. and Mark Skolnick et al., respectively, bolstered our understanding of hereditary cancer syndromes.

Hereditary breast-ovarian cancer syndrome is a relatively common cancer predisposition syndrome caused by mutations in the BRCA1 and the BRCA2 genes (or BRCA). In women, genetic mutations in BRCA primarily increase the risk of cancers of the breasts, ovaries, and fallopian tube. In men, they make prostate cancer and male breast cancer more likely. Many studies have also shown variations in the make-up of BRCA genes could increase the risk of pancreatic, colorectal, uterine, and some other cancers.

By some estimates, BRCA1 and BRCA2 mutations are present in around one in every 400 individuals, and therefore have an elevated risk of developing cancer. Researchers have also documented a higher than average prevalence in certain populations by virtue of these groups carrying specific variants of these genes. For example, among the Ashkenazi Jews that emerged in Central Europe and their descendants, around one in 40 individuals carry mutations in the BRCA genes – about 10-times more common than in the general population.

This higher prevalence has been attributed to some genetic bottlenecks and founder effects within the community. A genetic bottleneck is when the genetic diversity in a population drops (due to various factors), leaving their gene pool ill-equipped to fend off diseases and other threats that require adaptation. When a small group of individuals with a



All cancers occur due to genetic mutations in the body's genome, and a subset of these cancers are the result of inherited mutations. ISTOCK

genetic bottleneck found a new population, the bottleneck's effects became pronounced in this group – a phenomenon called the founder effect.

Testing for mutations in the BRCA gene is crucial because it helps individuals and clinicians identify higher risk sooner and develop personalised prevention strategies, including increased surveillance, preventive surgery, and/or targeted therapies. In a May 17 paper in the *Journal of Clinical Oncology*, the American Society of Clinical Oncology recommended 15 genes in all to ascertain an individual's risk of developing breast and ovarian cancers.

There are targeted therapies available today for individuals who develop cancer due to mutations in the BRCA genes or in genes implicated in other DNA-repair pathways. One such involves poly (ADP-ribose) polymerase (PARP) inhibitors, a new class of chemotherapy drugs. Investigators have reported promising results from recent clinical trials of PARP inhibitors, particularly in combination with platinum-based chemotherapy, offering hope for millions of people facing or experiencing hereditary cancers associated with specific mutations.

Our understanding of cancer genes and the mutations that cause cancer has improved significantly of late. One reason is tools like CRISPR screens, which have transformed the way researchers study the BRCA genes by enabling high-throughput functional genetic analysis. That is, using CRISPR-Cas9 technology, researchers can target the BRCA genes and create specific mutations in them in order to study their effects on DNA repair and cancer development.

Researchers have also used such CRISPR-based methods to explore an

**Scientists have documented hereditary cancers. There are more than 50 syndromes that predispose individuals to cancer, caused by genetic variants that humans are capable of inheriting**

individual's propensity to resist targeted therapies. For example, cancers involving mutated BRCA genes are sensitive to PARP inhibitors. But studies have shown many mutations in other genes involved in DNA repair could also influence the response to PARP inhibitors, and there doesn't yet exist a consistent method to predict it in clinical settings. So last year, a study published in the journal *Nature Communications* used genome-wide CRISPR-Cas9 screens to identify specific mutations that increase the sensitivity to PARP inhibitors.

## Risk is a spectrum

In another, more recent paper, researchers at the Wellcome Sanger Institute in the UK, reported identifying more than 3,000 genetic changes in the *RAD51C* gene, which is also crucial for DNA repair, that may significantly increase the risk of breast and ovarian cancer. After they mapped the structure of the protein encoded by this gene, the researchers were able to pinpoint the portions they determined to be critical for repairing DNA. So drugs targeting this portion could pave the way for new therapeutic strategies.

The researchers used a technique called saturation genome editing to examine 9,188 variants, revealing that 3,094 could disrupt the gene's function and increase ovarian cancer risk six-fold and aggressive breast cancer risk four-fold. They also discovered variants that partially impaired *RAD51C* function,

suggesting a broader spectrum of risk for breast and ovarian cancers than previously understood.

The findings, published in *Cell* on September 18, offer novel insights that clinicians can use to clarify the effects of *RAD51C* mutations.

Importantly, the study confirmed genetic risk lies on a spectrum influenced by the extent to which genetic changes affect protein function while emphasising the value of large-scale variant analysis for better personalised medicine and cancer prevention strategies. The researchers are preparing to apply similar techniques to other genes, with plans to eventually cover the entire human genome.

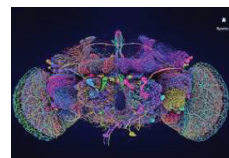
## Cancer discovered early

Population prevalence studies play an important role in identifying the spread of certain hereditary cancers in different groups. These studies help uncover genetic risk factors that may be more common in certain populations due to founder events. In tandem, at-risk individuals need to undergo genetic screening at regular intervals.

The result will potentially be a cancer discovered early, which will help the individual make more informed healthcare decisions, alert their family members to risk for them as well, and adopt therapies likely to be more effective, including preventive treatment and lifestyle changes.

The ultimate outcome is for cancer morbidity and mortality to drop and, beyond, for everyone to have healthier lives.

*(The authors work at Karkinos Healthcare and are adjunct professors at IIT Kanpur and the Dr. D.Y. Patil Medical College and Research Centre. sridhar.sivasubbu@gmail.com, vinod.scaria@karkinos.in)*



This image released last week by Princeton University shows the largest neurons of the fruit fly brain connectome. AFP

## Scientists map fruit fly brain in neurobio milestone

Reuters

Scientists have announced a milestone in neurobiological research with the mapping of the entire brain of an adult fruit fly, a feat that may provide insight into brains across the animal kingdom, including people.

The research detailed more than 50 million connections between more than 139,000 neurons in the insect, a species whose scientific name is *Drosophila melanogaster* and is often used in neurobiological studies. The research sought to decipher how brains are wired and the signals underlying healthy brain functions.

"You might be asking why we should care about the brain of a fruit fly. My simple answer is that if we can truly understand how any brain functions, it's bound to tell us something about all brains," said Princeton University professor of neuroscience and computer science Sebastian Seung, one of the co-leaders of the work published in a series of studies in the journal *Nature*.

The fruit fly brain is less than 1 mm wide. "It's beautiful," said University of Cambridge neuroscientist and research co-leader Gregory Jefferis.

The map devised by the researchers provided a wiring diagram, known as a connectome, for the brain of an adult fruit fly. Similar research previously was conducted with simpler organisms, such as the worm *Caenorhabditis elegans* and the fruit fly's larval stage. The adult fruit fly presented more complicated

**More than 50 million connections between more than 139,000 neurons in the insect were detailed. The research aims to decipher how brains are wired and how to establish if the brain is healthy**

behaviours to study through its brain wiring.

"One of the major questions we're addressing is how the wiring in the brain, its neurons and connections, can give rise to animal behaviour," said Princeton neuroscientist Mala Murthy, another of the co-leaders of the research.

"And flies are an important model system for neurosciences. Their brains solve many of the same problems we do... They're capable of sophisticated behaviours like the execution of walking and flying, learning and memory behaviours, navigation, feeding, and even social interactions, which is a behaviour that we studied in my lab at Princeton," Murthy added.

One of the studies analysed brain circuits underlying walking and discovered how flies halt. Another analysed the fly's taste network and grooming circuits behind behaviour such as when it uses a leg to remove dirt from its antennae. Another looked at the visual system, including how the fly's eyes process motion and colour information. Still another one analysed connectivity through the brain, discovering a large assemblage of "hub neurons" that may speed up information flow.

The researchers fashioned a map tracking the organisation of the hemispheres and behavioural circuits inside the fly's brain. They also identified the full set of cell classes in its brain, pinpointing different varieties of neurons and chemical connections – synapses – between these nerve cells, and looked at the types of chemicals secreted by the neurons.

The work was conducted by a large international collaboration of scientists known as the FlyWire Consortium.

**For feedback and suggestions for 'Science', please write to science@thehindu.co.in with the subject 'Daily page'**

## THE SCIENCE QUIZ

Siva Shakthi A.

### QUESTION 1

\_\_\_\_\_ radar boosts the accuracy with which a computer can predict rain by transmitting and receiving pulses in vertical and horizontal directions. This allows returning signals to convey information about both dimensions of a target (like a cloud). Fill in the blank.

### QUESTION 2

Wind currents across the northern hemisphere rotate counter-clockwise, and those in the southern hemisphere rotate

clockwise in low pressure. This occurrence, together with the \_\_\_\_\_ force, leads to cyclones. Fill in the blank.

### QUESTION 3

What is the name for the closed loops of air created when convection nears the equator in both hemispheres rises at the equator and sinks at around 30 degrees latitude? These loops are responsible for the 'trade winds'.

### QUESTION 4

Daniel Fahrenheit constructed the first mercury thermometer by refining Ole Rømer's concept. He used the freezing point of a

solution containing an equal mixture of \_\_\_\_\_ and \_\_\_\_\_ as the zero point of the mercury thermometer. Fill in the blanks.

### QUESTION 5

The name of this cloud comes from the Latin for "heap." Strong updrafts of warm, humid air help form these clouds, which may ascend to heights of up to 12 km.

### QUESTION 6

Renaissance innovator Leon Battista Alberti invented one of the earliest wind speed metres in the 15th century. It included a rotating vane that cycled in response to wind pressure. What

is the name of this device?

### Answers to October 3 quiz:

1. Light-emitting compounds in fireflies – **Ans: Luciferins**
  2. Symbiotic root fungi crucial for nutrient exchange – **Ans: Ectomycorrhizal fungi**
  3. Ethnomycologist who introduced psilocybin mushrooms to the West – **Ans: Gordon Wasson**
  4. Halophilic fungi manage this to minimise water loss – **Ans: Osmotic pressure**
  5. Mycologist who applied immunologic principles for taxonomy in 1931 – **Ans: Rhoda Williams Benham**
- Visual: **Beatrix Potter**  
First contact: K.N. Viswanathan | Dalbeer Pharswan | Anmol Agrawal

### Answers to October 4 quiz:

1. Molecules the body uses for energy during extended fasting – **Ans: Ketones**
  2. Hormone secreted in the stomach to signal hunger – **Ans: Ghrelin**
  3. Longevity-related proteins activated by fasting – **Ans: Sirtuins**
  4. Idea that storing fat was evolutionarily advantageous – **Ans: Thrifty gene hypothesis**
  5. Metabolic condition often improved by fasting – **Ans: Diabetes**
- Visual: **Insulin**  
First contact: P.N. Moorthy | K.N. Viswanathan | Nischal Anand | Dalbeer Pharswan | Khadeja Misriya

Please send in your answers to  
science@thehindu.co.in

## Tools of the weatherman's trade: keeping us high and dry





# THE EDITORIAL PAGE

## The Indian EXPRESS

FOUNDED BY  
RAMNATH GOENKA

BECAUSE THE TRUTH INVOLVES US ALL

# The republic of languages

### Why broadening the list of Classical Languages could result in a vertical fragmentation of society



G N DEVY

THE COLONIAL BRITISH regime controlled India by using a "divide and rule" policy, inducing alienation between apparently dissimilar social segments. The colonial policy resulted primarily in a horizontal fragmentation of culture, geography and society. In post-colonial times, we seem to be invoking the age-old Indian practice of vertically dividing society, not in the name of pseudo-metaphysics, but electoral politics. Varna and caste had been the pre-colonial methods of vertical divide and rule. Added to these in the post-colonial times are religion and language. The recent decision of the Union Cabinet to inscribe Bangla, Assamiya and Marathi as classical languages illustrates the method.

"Classical" is not, as is often thought, a linguistic feature of a given language; it is an ex-post-facto historical description. Linguists and historians dealing with the ancient world mainly count Chinese, Sanskrit, Arabic, Greek and Latin as "classical". These are mainly the languages that offer root words or affixes to form new words in contemporary languages; for instance, the ancient "er" suffix in a modern word like "computer", and the ancient Latin "intelligent" in a modern compound noun like "artificial intelligence". The term "classical" came to be used in English during the 16th century, to refer to the bygone literary eras of Greek and Latin. It acquired wider currency after John Dryden wrote his celebrated *Essay on Dramatic Poesy* in 1668, setting the modern against the classical. Since then, scholars have added different historical phases of Coptic, Egyptian, Sumerian, Babylonian, Assyrian, Hebrew, Persian, Tamil, Pali and Syriac to the universally accepted list of classical languages.

The concept "classical" indicates not just the longevity of an ancient language; it is, at the same time, a social class marker. In the context in which Latin was described as "classical", there was a perception that the non-Latin languages of the Roman Empire were either "barbaric" or "vernacular". The term gained currency against the background of the rising international aspirations of France, Prussia and England. The unstated initial logic later became manifest when these European nations started justifying plunder in the name of "civilising"

other nations. The stated intent may have been pious, but not so the content imposed. Adjectives are rarely innocent; "classical" is no exception. Were that so, as Indians, we would be justified in adding to the universally accepted list of "classical languages" those in India that have not got well-deserved attention. The term "classical" holds a long history of discrimination.

Sanskrit, Pali and Tamil are universally accepted by historians as classical languages. They produced, in ancient times, a wealth of philosophical and literary texts, although Pali was perhaps a language designed to primarily be only textual. As against these, "Prakrit" — as a singular — cannot lay that claim with equal ease. Prakrits were of many hues, being somewhat like a basket of regional languages, such as Gandhari, Maharashtri, Shauraseni, Paishachi and Kanrupi, or wide-spread speech varieties, such as the Apabhramshs and Ardhamagadhi. Often, Pali too gets listed among the Prakrits. The term Prakrit denotes an earlier phase of several of India's modern languages, such as Gujarati, Bangla, Marathi and Odia. It also indicates the last remnants of the pre-Sanskrit languages in use for millennia in the Indian subcontinent. The literary and philosophic production of Prakrits has been noteworthy, but not as phenomenal as of Sanskrit, Pali and Tamil. Placing Prakrit in India's official list of "classical languages" is anomalous and insufficiently justified.

The question is not whether the list is scientifically compiled, but whether such a list should be prepared at all for recognition. As a proven historical fact, there were numerous predecessors of the many languages of India in the millennia before Sanskrit emerged as a major language, soon followed by the First Holocene migration to India took place some 9,000 to 8,000 years ago. Human settlements, along with domestication of cattle, around elevated areas, would have formed the foundation of the villages in India. The ability to acquire language was one of the factors that made prehistoric migrations possible. Though we have neither written nor oral evidence as to the characteristics of the languages used by the pre-

Sanskrit groups in India, it won't be illogical to assume that they created a profusion of nature- and agriculture-related terminologies. Most of these survived in Prakrits which are known as the languages contemporary to Sanskrit. But they were not a "single" language; they could not have been.

Let me explain why broadening the list of Classical Languages results in a vertical fragmentation of Indian society. During the 1961 Census, Indian people had returned the names of 1,652 "mother tongues". That figure had sunk to 1,369 in the 2011 Census. Besides these, there were other "mother tongues", but they were filtered by the Census office. In 2011, the Census office rejected 1,474 such other mother tongues. Of the 1,369 accepted names, the Census positioned 121 as "languages", a category positioned as "superior" to "mother tongue". Of these, 22 languages have so far been included in the 8th Schedule of the Constitution. Of these, nine are now "classical": Assamiya, Bangla, Kannada, Malayalam, Marathi, Odia, Sanskrit, Tamil and Telugu. Pali and the Prakrit(s) are designated "classical" but not included in the 8th Schedule. So the language pyramid in the Indian Republic has over a thousand "mother tongues", a little over a hundred "languages", over a score of "scheduled languages" and 11 "classical languages". The four-fold administrative division of languages, reminiscent of the *varna-varna*, has come into being when every passing year dozens of mother tongues are getting closer to extinction. Bolstering majoritarian language pride may be a useful electoral tool; but it is as harmful as dividing people on the lines of religion or caste. The language of the majority is often said: Every language is a unique worldview. Every language deserves respect from its speaker as well as the state. If only some are inscribed for a cosmetic honour, India will soon become, as in George Orwell's *Animal Farm*, a republic of languages where all are equal but some are more equal. Or, as the Romans would have said, some are classical — all the others are merely plebeian.

Devy is the author of India: A Linguistic Civilization (2024)

## A LONG ROAD AHEAD

### Given continuing Pak support for cross-border terrorism, Minister Jaishankar's SCO visit can only be a small forward step

THERE IS A frisson of anticipation ahead of External Affairs Minister Jaishankar's visit to Pakistan on October 15-16 for the summit-level meeting of the Shanghai Cooperation Organisation (SCO). After all, the last time an Indian Foreign Minister was in the country was nine years ago when Sushma Swaraj visited Islamabad for the Heart of Asia Conference on Afghanistan in December 2015. Her trip was followed by Prime Minister Narendra Modi going to Lahore to meet then-Prime Minister of Pakistan Nawaz Sharif. Since then, however, the bilateral relationship has been on a downward trajectory. A thaw in ties seems unlikely in the near term.

The elephant in the room remains Pakistan's use of cross-border terror as a part of its security and strategic calculus. Despite the fact that its support for extremist groups has had grave consequences domestically, Rawalpindi continues to support separatist elements across the border. As Minister Jaishankar said at an event in New Delhi on Saturday, "if you're all sitting together and cooperating, and at the same time, you know this kind of terrorism go(ing) on openly... in which case, you are normalising it, you are accepting that this is a legitimate tool of statecraft." It is for this reason that the SAARC has become nearly defunct. Islamabad, for its part, is stuck with the maximalist position it took in the aftermath of the abrogation of Article 370 in Kashmir. Its stand that Delhi must undo the change in Jammu & Kashmir's constitutional status as a precursor for dialogue cannot now be softened without political consequences domestically.

Jaishankar has made it clear that the visit is for the multilateral SCO summit and not to discuss India-Pakistan ties. When the then Foreign Minister of Pakistan, Bilawal Bhutto Zardari, visited India for the SCO meet last year, he exchanged barbs with Jaishankar, who had reacted sharply to Bhutto's comments on Kashmir. A similar script could well play out in Islamabad this month. It is possible, of course, that Jaishankar interacts with leaders in Pakistan who have in the past hinted at less hostile ties with India. Such an engagement is important in itself, given the volatile nature of Pakistan's politics, a hedge for the future. At the current moment, however, Pakistan's domestic political turmoil and uncertainty mean that it is not just a question of whether the SCO meeting is an appropriate forum to build bridges but also of who to build those bridges with. Jailed former PM Imran Khan's party, Pakistan Tehreek-e-Insaf (PTI), has been protesting alleged delays in implementing the judicial verdict recognising its legislators and allowing the PTI to nominate women and minority members to the country's National Assembly. The timing of the protests also casts a shadow over the SCO meeting. The PTI under Khan has directly challenged the Pakistan Army. Given this political uncertainty and continuing disagreements on core issues, the visit can, at best, be the first step in a long road to better ties between the two countries.

## THE KIDS ARE ONLINE

### Difficulties of protecting children's digital rights while keeping them safe online should not stall a much-needed conversation

NOW THAT the digital genie is out of the bottle, can restrictions on smartphone and/or social media usage for children put it back in, at least until they attain the emotional maturity to navigate the online world? This is the question at the heart of the worldwide debate on how much access children should have to digital devices, even as the clamour grows to protect them from the worst of the internet. In the UK, a parent-led movement called *Smartphone Free Childhood* is striving to keep devices out of the hands of children till the age of 14, while in Australia, the Anthony Albanese government is working on legislation that will ban social media usage for children under a certain age. Even Big Tech, under pressure from governments and parents, has been forced to act: Last month, Meta introduced new "teen accounts" for Instagram, which would enable parents to have greater control over their children's activities on the platform.

From a certain "tech-positive" perspective, it might seem that restricting children's usage of technology violates their rights — to equality of opportunity, information, privacy, among others. In a world run by handheld devices, to try and firewall the young in this way could very well be a losing game. It is also true that there isn't conclusive evidence yet of a connection between smartphones, social media, and shortening attention spans, poor mental health indicators and a growing problem of loneliness among the young, all of which can be equally linked to factors such as poor nutrition, poverty and lack of social safety nets. Yet, the difficulty of safeguarding children from the harms of the digital world should not be used as an excuse to evade the responsibility to do so. Children are uniquely vulnerable to the threats posed by smartphones and social media because of their greater neuroplasticity, which makes it easier for them to adapt to these new technologies without necessarily having the emotional and mental tools to navigate them.

How, then, to ensure that children can continue to reap the benefits of the information and resources that the internet offers, while staying safe and healthy? Digital bans are easier on paper than in practice, as any parent of a teenager under the influence of FOMO (fear of missing out) would know. And in countries like India, where there is a deep digital divide, such actions only end up cutting off the already vulnerable, such as girls and children from marginalised communities, from the benefits of the tech revolution. The key is a wider conversation that is not bogged down by the seeming difficulty of the project, and shared responsibility — parents, schools and governments must work together to ensure safer and more fulfilled childhoods.

## RETURN OF THE LEAGUE

### It can only be good news for hockey, domestically and globally.

#### The game's stakeholders need to learn from their mistakes

IN 2023, in the aftermath of India's early exit from the hockey World Cup on home soil, legendary Aussie coach Ric Charlesworth pointed to the key reason for the debacle — the dissolution of the Hockey India League (HIL). The game's foremost thinker, while listing the benefits of having a world class league, had underlined that it was HIL that made the young Indian players realise that the international players too had "two arms and two legs" and they could compete against them as equals. After a seven-year absence, the competition is set to return in December.

The HIL's return can only be good news for the sport. It isn't a coincidence that the architects of three major Indian milestones in the last decade — the 2016 Junior World Cup title and the bronze medals at the Tokyo and Paris Olympics — were players who were a part of the HIL. The post-HIL generation has seen a drop in the quality of players because the domestic structure lacks competition and coaching methods are archaic. HIL could be an important catalyst in India's ambition to convert the Olympics bronze into gold.

The financial impact of the HIL, not just for Indian players but for global stars too, is significant. That the International Hockey Federation created an exclusive space in its calendar for the next 10 years shows how crucial HIL is. In the past, hockey has made three attempts to start a league but those ventures couldn't be sustained. The game's stakeholders need to learn from their mistakes. An unclear business model and financial burden on the team owners was why the league became defunct. The onus is also on the investors who must realise they need to be in this for the long haul. Rather than chasing IPL's heights, it'll be prudent to create a niche for the HIL to thrive and not just survive.



ABHISHEK ACHARYA, RAJASREE RAY, SUTANUKA SARKAR

## ON WAY TO CLIMATE RESILIENCE

### India and other countries must urgently bolster adaptive strategies

WITH THE SEVERITY of climate impacts evident worldwide, the urgency for adaptation strategies has gained momentum. The first global stocktake at COP28 highlighted the fragmented and unequally distributed adaptation process and that "significant adaptation gaps still exist across sectors and regions". The importance of the global goal on adaptation (GGA) — to enhance adaptive capacity, strengthen resilience and reduce vulnerability to climate change — was reflected in the decision on planning and implementation efforts by all parties.

The GGA is a framework to ensure an adequate response guiding countries in their efforts. It is crucial for developing nations like India that are at the frontline of climate impacts. The UAE Framework for Global Climate Resilience is expected to guide and strengthen efforts. This includes: impact, vulnerability and risk assessment; a country driven planning process; implementation of adaptation plans, policies and strategies by 2030; and establishing and operationalising a system for monitoring, evaluation and learning. The framework outlines targets for 2030, like reducing climate-induced water scarcity, attaining climate-resilient food production, enhancing health services to mitigate climate-related impacts. However, an ostensible lack of "Means of Implementation" is an issue.

The first global stocktake called for increased ambition and support, particularly in adaptation finance. The 2023 Adaptation Gap Report reveals a growing gap, currently estimated at \$366 billion per year.

The June 2024 negotiations exemplified the need for collaboration and compromise. The consensus on the modalities of the work programme allows for the commencement of indicator development. However, the underlying tensions between developed and developing nations regarding finances persist.

The upcoming negotiations at COP 29 in Baku will be crucial in resolving these issues.

Negotiations in Bonn in 2024 provided a flavour of the intense divergence between developed and developing countries especially on the Means of Implementation (MoI), the principle of common but differentiated responsibilities and the role of the adaptation committee. Developing countries emphasised the critical need for public finance, technology transfer, and capacity building to support their adaptation efforts. Implementing GGA within the adaptation strategies of developing countries presents challenges and opportunities. Among challenges, the deficiency of MoI is the biggest. Developed countries need to fulfil their climate finance obligations, recognising the scope, scale and speed of climate finance required. The principle of institutional governance will be critical. This needs to be supplemented with data and predictive models. Successful implementation can bolster a country's resilience to climate impacts, while robust participation of the private sector and investment in adaptation can drive economic growth by creating jobs and protecting livelihoods.

GGA can serve as a unifying objective that aligns national and international efforts towards a resilient future. India faces a range of climate-related challenges, including extreme weather events, rising sea levels, and fluctuating agricultural yields, which threaten the livelihoods of millions. By utilising the GGA, India and other developing countries can bolster their adaptive strategies, safeguarding their populations and economies. India has advocated for strong policy frameworks, ca-

capacity building, and enhanced financial support from developed nations. The development of indicators for progress on GGA targets is a critical task under the UAE-Baleim work programme. These must reflect the diverse realities of developing countries.

Effective implementation of GGA requires strengthening the policy framework with clear guidelines to develop and disseminate consistent and sustainable practices. Besides, capacity building for government officials, community leaders, and other stakeholders to build expertise will help in institutional strengthening. Dedicated resources through domestic sources, including innovative financing mechanisms and transfer of finance and climate-resilient technologies from developed to developing countries require due emphasis.

The June 2024 negotiations exemplified the need for collaboration and compromise. The consensus on the modalities of the work programme allows for the commencement of indicator development. However, the underlying tensions between developed and developing nations regarding finances persist. The upcoming negotiations at COP 29 in Baku will be crucial in resolving these issues.

India's commitment to the GGA and active participation in international climate negotiations underscore its dedication to building a sustainable and resilient future. The journey is challenging, but with collaboration and robust policies, a sustainable future is within reach.

The writers are with the Ministry of Environment, Forest and Climate Change



## OCTOBER 8, 1984, FORTY YEARS AGO

### PM ON GOVERNANCE

THE PRIME MINISTER, Mrs Indira Gandhi, said she was not in favour of a presidential form of government. In Jaipur conference, she said there were other pressing problems at the moment which demanded more attention. But she was not against the debate continuing on the merits and demerits of the presidential form of government. She ruled out the possibility of a referendum being held on the issue.

### AKALI DEMANDS

THE AKALI DAL demanded that the government implement in full the agreement arrived

at between the Sikh head priests and the government on September 29 and said it would be "compelled to take strong steps" if this was not done. The meeting alleged that the government had backed out of its agreement in not handing over the Golden Temple complex to SGPC.

### FOOD POISONING

NEARLY 100 PERSONS were taken ill in Faridabad after they consumed sweets distributed at a Ramilla function. On the first night, about 50 had been admitted to the Faridabad district hospital and more were coming in. However, the district administra-

tion has taken no note of the incident.

### THAR SUICIDE

THE CASE OF Chander Pal, the convict who hanged himself in the jail last week, was the third case of suicide in the jail this year. All these suicides have taken place under suspicious conditions. It is alleged that the jail authorities are trying to hide facts. One of these suicides occurred after the victim had protested in vain for proper medical attention. The circumstances in all cases point to the state of negligence inside the jail. Chander Pal was found hanging in barrack No. 2, which has come to be known as the Akali barrack.

# THE IDEAS PAGE

## Middle path in Middle East

Success of moderate Arab states is critical for India's interests in the region. Delhi must join hands with them in trying to prevent total war between Iran and Israel



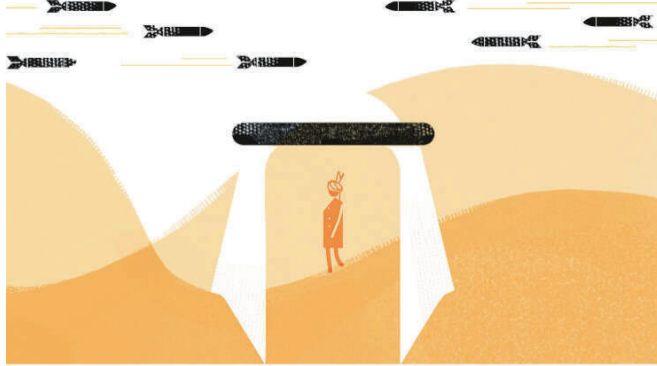
RAJA-MANDALA  
BY C RAJA MOHAN

AS IRAN AND Israel threaten to plunge the Middle East into a dangerous regional war, India must stand by its Arab partners that are being squeezed by the conflict between the two countries. Unfortunately, there has been little appreciation of their concerns in the Indian discourse on the current phase of the conflict. The lack of public sensitivity to Arab perceptions of the conflict between Iran and Israel stands in contrast to the elevation of the engagement with the Arab world to the highest levels under the government of Narendra Modi over the last decade. Today, Iran and Israel attract significant and often passionate political support from India. Although they occupy much of India's mind space, neither country matches the depth of India's interests in the Arabian Peninsula.

There is no question that Delhi must necessarily pursue good relations with all the key actors in the Middle East. Each of these partners brings a unique set of benefits. But any objective construction of a hierarchy of Indian interests in the Middle East will easily demonstrate the superior salience of Delhi's ties to the Arabs. Consider the simple metric of population. With nearly 500 million people spread across 23 states, the Arab world stands apart from Israel (about 10 million) and Iran (90 million) as a major commercial, technological, political, and diplomatic market.

Within the Arab world, the Arabian peninsula stands out in its strategic importance for India. With historic civilisational ties to India, a deep religious connection, massive financial clout, growing trade ties, role in energy security, embrace of a large Indian diaspora, Arabia overshadows Iran and Israel. Arabia's attempts to promote moderate Islam have the potential to contribute positively to the Indian Subcontinent's domestic and regional politics. To be sure, India's ties with Iran are as ancient and civilisational as those of Arabia. In fact, geographically, Iran is a little bit closer to the Subcontinent than Arabia. Its borders with Afghanistan and Pakistan make it a dynamic part of South Asian geopolitics. Iran's geographic potential to act as an Asian bridge to inner Asian regions and bypass the political barrier that Pakistan has become, has seen Delhi devote significant diplomatic energies in cultivating Tehran. Iran is a hydrocarbon superpower with massive reserves of oil and natural gas. Above all, it has the natural resources and the potential to become a dominant regional power. But Iran's ambitions have also produced problems of their own.

India's ability to realise the full potential of cooperation with Iran is constrained by the prolonged confrontation with the West that Tehran is locked in, and the massive number of resulting sanctions. Worse still, Tehran's regional claims and its revolution-



CR Sasikumar

ary religious ideology have put it at odds with its Arab neighbours. India too has often been at the receiving end of Iran's Islamist internationalism.

The overthrow of the monarchy and the establishment of the Islamic Republic of Iran in 1979 has had a lasting impact on the Arabian peninsula. Tehran's quest to reorder the Middle East in consonance with its ideology makes it an existential challenge in the threat perceptions of the Gulf regimes.

Iran's pursuit of regional primacy has seen the creation of proxies in the Arab world to promote Tehran's influence. If India has been trenchant in criticising Pakistan for similar policies, it has remained silent on Iran's negative role and supra-national claims in the Arab world. The question is not about hypocrisy or double standards in Delhi. Governments have their compulsions in what they say and don't say. That should not preclude our foreign policy community and the political class from an objective discussion of Iran's regional role.

Since India normalised relations with Israel at the turn of the 1990s, there has been a steady expansion of engagement between the two nations. Unlike the Congress governments, the NDA government has owned the relationship with Israel and given it greater substance. Israel has emerged as an important partner for India in a variety of fields, especially in the security and technological domains.

As Delhi has grown closer to Tel Aviv, Israel has lost much goodwill around the world, including in the West, thanks to its harsh policies in Gaza and the West Bank and a refusal to yield on the question of Palestinian statehood. Its disproportionate response to the October 7 terror attacks and the demand for absolute security have seen Israel lose more political ground in the region and beyond. Its massive use of military force is not leading to any significant political gains for the Jewish state.

This in turn, has lent greater legitimacy to Tehran's confrontation with Israel, its claim to regional leadership and has weakened the Arab states looking for reasonable solutions

for the regional crises. Threatened by Iran's growing regional clout, the prospect of its nuclear weapon capabilities, and the volatility in US policies, some Gulf Arab states have normalised political ties with Israel and expanded economic, technological, and military cooperation with it. The Abraham Accords of 2020 were premised on the hope that in return for deeper engagement with Israel, Tel Aviv would accommodate Palestine's political aspirations. That has not materialised despite the best efforts of the Biden Administration over the last couple of years.

To ameliorate their precarious security condition, the Gulf Arabs have also sought to find common ground with Iran. That too has not gone too far, despite the recent agreement between Iran and Saudi Arabia to resume diplomatic relations. As a senior official of the Gulf Cooperation Council put it recently, "Iran's open support for designated terrorist groups, sectarian militias and other armed rebels acting outside the law in regional states has posed an impediment for normalising relations with the GCC."

The differences between Arabia and Persia today are deep, ideological, and structural and unlikely to dissipate any time soon. The divergence between Arabia and Israel on the Palestine question has seemed more amenable to bridging in recent years. But that grand bargain on statehood for Palestine and a final Arab-Israeli reconciliation has remained elusive. On its part, Delhi must extend full political support for the normalisation of Arab ties with both Iran and Israel.

India's prosperity is tied deeply to a Middle East that is at peace with itself, economically integrated, secure in its religious moderation, and free from a power vacuum in the Subcontinent, on the one hand, and Central Asia, Africa and Europe, on the other. If the success of the moderate Arab states is critical for the realisation of this vision, Delhi must join hands with them in preventing the disastrous alternative of a total war between Iran and Israel.

The writer is the contributing editor on international affairs for The Indian Express

## WHAT THE OTHERS SAY

"Along with highlighting Israeli barbarity, the post-Oct 7 scenario has exposed the hypocrisy of the Western bloc, and the paralysis of Muslim states. The West loves to hold forth on protecting human rights, but perhaps to these states the people of Gaza and Lebanon are sub-human."  
— DAWN, PAKISTAN

## Harnessing the power of AI

Indian AI ecosystem can position itself not just as a participant but as a trailblazer, driving inclusive economic growth and innovation



AMITABH KANT

AS THE WORLD adapts to the rapid ascendancy of artificial intelligence (AI), the Indian industry stands at the brink of a transformative era. With robust economic growth on the horizon, India is poised for unprecedented progress and innovation. Nomura projects the Indian economy to surge at an average rate of 7 per cent over the next five years, significantly outpacing the International Monetary Fund's global growth forecast of 3.2 per cent for 2024. India's hosting of G20 and the Global Partnership on AI annual meetings in 2023 has solidified a favourable geopolitical climate. India Inc stands in an advantageous position.

India's AI market is projected to reach \$17 billion by 2027, growing at an annualised rate of 25-35 per cent between 2024 and 2027, according to Nasscom. Deloitte's report, "Generative AI in Asia Pacific: Young Executives Lead as Employers Play Catch-Up," underscores India's exceptional response to Generative AI (GenAI). With a large number of students and employees actively engaging with GenAI, India leads among 13 Asia Pacific countries in both use and adoption. The report positions India as a frontrunner in embracing the GenAI wave. Recognising this, the government has committed a five-year budget of Rs 10,372 crore for the India AI Mission.

Just as General Electric led the transformation of the electricity and power industry in the early 20th century, and companies like Ford and General Motors spearheaded the automobile industry's revolution, India Inc holds the potential to drive significant transformation across sectors. By embracing these imperatives, the Indian AI ecosystem can position itself not just as a participant but as a trailblazer, driving inclusive economic growth and innovation for the benefit of its domestic economy and the world.

Indian industries require a tailored approach that aligns AI capabilities with specific sectoral needs. First, it is imperative to develop robust AI governance frameworks with companies that address ethical concerns, data security, and bias. Second, transparency in AI algorithms and decision-making processes must remain a priority for each firm. Third, promoting inclusive AI development by engaging diverse perspectives should be prioritised. Finally, investing in ethical AI research through collaborations with academic and research institutions should be institutionalised.

Today, a commitment to strategic vision, robust investment, and adherence to own AI practices is imperative. The convergence of government support and industry involvement has set the stage for India to not just participate but lead in the global AI arena. This is India's moment to harness the success of the West by inspiring a new era of economic prosperity.

The writer is G20 Sherpa for India. Views are personal

## Election & a self-styled godman

Deras improve access to public services. They also raise accountability concerns



KARTIKEYA BATRA AND AVANTIKA PRABHAKAR

WITH THE ELECTION season returning to north India, the controversial self-styled godman, Gurmeet Ram Rahim, was once again out on parole, sparking fierce debates about ties between religious leaders and the country's political structures. While figures like Ram Rahim and organisations like Dera Sacha Sauda dominate headlines, there is little understanding of the broader, localised culture of religious leaders operating in India's villages. In contrast to the grand scale of leaders like Ram Rahim, our research across Punjab reveals a vast network of smaller, lesser-known spiritual leaders and deras influencing thousands of villages. These local institutions, though less visible in the media, significantly shape the lives of the communities they serve.

Unrecognised by Sikhism and often seen as "deviant" movements, deras are alternative religious organisations following their own doctrines and traditions. A typical rural dera is a highly localised institution whose core identity is tied to a living spiritual leader. Contrary to the image of deras as massive institutions with large followings, most rural deras are far more modest. Our survey of 670 villages revealed that three-quarters of these deras are stand-alone entities. While larger deras like Dera Sacha Sauda boast expansive networks across India and abroad, most smaller deras limit their influence to a single village or a cluster of nearby villages. Historically, the roots of many of these deras can be traced back to the development of Sikhism which was accompanied by the rise of alternative religious sects. Some deras even draw inspiration from traditions predating Sikhism, and over time, many have aligned

themselves with marginalised communities. However, our research focuses less on these historical aspects and more on the contemporary role of deras in local governance.

Once established, religious institutions like deras naturally seek to retain and grow their social influence. Beyond boosting their own status, this influence helps them attract donors and sustain their operations. One key way they maintain this influence is by offering non-religious services in addition to spiritual guidance. Several studies have documented how religious institutions can transcend their spiritual origins and play a broader role in community welfare. Anecdotally, deras, through their services like in healthcare, education and social support, have become important local actors.

Our research aims to understand how deras influence public service provision by the state. In our view, this interaction can occur through three distinct pathways. First, in regions with weak state capacity, deras may step in to provide necessary services. However, this can undermine the state's role in governance, as deras take over the state's responsibilities. Second, as witnessed during the pandemic, deras can work alongside the government to complement and enhance the delivery of public services, thus strengthening the state's capacity. Third, the mere presence of organisations like deras might influence governance, even if they are not directly involved in service provision. Their existence could make local politicians feel insecure about their standing, prompting them to be more proactive in delivering services. Additionally, deras may stimulate local eco-

economic activity, attracting more public services and investment.

To explore some of these dynamics, we conducted a study in Punjab, documenting the presence of small deras across nearly half of the state's 13,000 villages. This study, complemented by telephonic surveys with village officials in 10-15 per cent of the surveyed villages, provided us with quantitative and qualitative insights into the role of these institutions.

We find that, on average, the presence of a dera in a village is associated with improved access to public goods in that village. Interestingly, their impact is most pronounced on services managed by state and district governments, while their influence on services overseen by local panchayats appears negligible. While this may seem puzzling at first, it is not entirely surprising. One possible explanation is that deras and their leaders may focus on issues that require coordination with higher levels of government, allowing them to appear more influential than local village politicians and officials. Additionally, deras might find greater incentives in intervening in resource-heavy sectors such as healthcare and education, which typically fall under the jurisdiction of state governments.

The next question is how deras achieve this position of influence. Our research highlights two potential explanations. First, deras appear to engage in informal financial arrangements with the state, providing resources to support public services. Second, they often act as intermediaries, coordinating with state actors to communicate local needs. For instance, a wealthier dera might contribute partial funding to

build a school, while a smaller dera may focus on conveying the community's needs to state officials, effectively serving as an aggregator of local preferences.

What do these findings mean for governance and democracy? The answer is not straightforward. Religious organisations and alternative movements like deras undeniably play a significant role in society, often beyond just the realm of spirituality. However, there are risks involved. While deras seem to improve access to public services, their influence raises concerns about accountability. Their positive impact largely stems from informal, opaque arrangements with governments, which are not governed by formal contracts or legal obligations. This engagement can easily blur the line between the institutions of the state and religion. As such organisations become more influential, it becomes difficult to fix accountability in case of wrongdoings.

While the positive contributions of these organisations are commendable, a more ideal scenario might be one where the efficacy of governance does not depend on interventions by religious institutions. This shift would not necessarily erode the role of such organisations, but could encourage them to focus on areas where they can make a meaningful impact without undermining the state's functions. For instance, efforts by deras to combat substance abuse in Punjab represent a valuable contribution.

Batra is a postdoc researcher, Centre for Effective Governance of Indian States and Prabhakar is PhD scholar, University of Virginia

## LETTERS TO THE EDITOR

### A YEAR OF VIOLENCE

THIS REFERS TO the editorial, 'The tinderbox' (IE, October 7). The Israel-Hamas conflict has escalated to dangerous levels, drawing other nations into it. While Israel is stubborn in its refusal to heed international calls for peace, it is its awe-inspiring act of decimating Hamas is fulfilled, Iran and its proxies are also equally determined not to let Israel have its way for fear of yielding Tel Aviv military dominance, and territorial control. A year has passed since Hamas's audacious attack, and Israel's relentless retributive offensive shows no signs of abating, dragging the Middle East deeper into a vortex of instability. As for India, it will be particularly anxious about disruptions to oil supplies and the safety of its expatriates in the region.

much worse. Over 40,000 Palestinians have lost their lives and the rest are on the brink of famine. Good sense should prevail and for both sides, an immediate ceasefire is must to avoid further devastation and destruction of human lives.

Subhash Vaid, New Delhi

### KEEP THE FAITH

THIS REFERS TO the article, 'The laddu trap' (IE, October 7). It is high time that the Supreme Court adheres to its own principles and upholds the Constitution. This absence of strictness, fortitude and impartiality has left a substantial gap in the fabric of our law and order, which is the very backbone of any coherent social system. Over the decades, the apex court has repeatedly crossed the lines of faith and religion, despite secularism being deeply ingrained in the core and spirit of our exhaustive Constitution. However, partisan influences and agendas have successfully compromised pluralism leading to divisive and polarising politics. These tactics have swayed a majority of Hindu voters, overshadowed crucial issues and contributed to a state of mass delusion, which has been detrimental so far and could lead to severe repercussions going ahead.

Shaswat Jena, Ghaziabad

### Vijai Pant, Hampur

THIS REFERS TO the editorial, 'The tinderbox' (IE, October 7). In response to the brutal attack of Hamas in which over 1,200 Israeli were killed in Jenin, Netanyahu vowed to destroy Hamas completely. Many groups like Hezbollah and those in Lebanon, Syria and Yemen jumped into the war with the backing of Iran. The conflict is spiralling with no end in sight. The United Nations is unable to stop both, America and Russia have made the already complicated situation



# MicroRNA: tiny RNAs that hold key to how organisms develop

**KAUNAIN SHERIFF M**  
NEW DELHI, OCTOBER 7

The Nobel Prize for Medicine this year has been awarded to scientists Victor Ambros and Gary Ruvkun for their discovery of microRNA — tiny molecules which play a crucial role in how genes function.

"Gene regulation by microRNA, first revealed by Ambros and Ruvkun, has been at work for hundreds of millions of years. This mechanism has enabled the evolution of increasingly complex organisms," the Nobel press release for the announcement stated.

ent tool to enable movement.

The key to these differences is gene regulation, a process that helps each cell pick the right tools for its specific tasks. In other words, while the appropriate set of genes is activated in each type of cell, Ambros and Ruvkun were curious about how gene regulation works. Their research led them to the discovery of microRNA, which provided a whole new way of understanding how bodies of complex organisms such as humans function.

**THE NOBEL PRIZES 2024**

**Why did Ambros and Ruvkun study microRNA?**

According to the press release, the scientists were honoured for their "discovery of a fundamental principle governing how gene activity is regulated". Here is an illustration to explain just what this means.

Think of chromosomes, which carry genetic information in the form of DNA, as a large toolbox. Every cell in the body has the same toolbox, containing identical tools (or genes). But different cells need to use different tools depending on their job — while a nerve cell might grab a tool that helps send signals, a muscle cell might choose a differ-

**Why is understanding gene regulation significant?**

Genetic information is stored in DNA inside the nucleus of each cell. This information is copied to the mRNA, a molecule that contains the instructions that direct cells to synthesise appropriate proteins. Proteins handle all kinds of important jobs in the body, such as making muscles contract or helping nerves communicate.

Different tissues in the body create different proteins, depending on their specific functions. This differentiation among cells is governed by gene regulation, which effectively turns on or off specific genes in a cell in order to allow it to carry its specific task.

Faults in gene regulation can result in se-

**NOBEL PRIZE IN PHYSIOLOGY OR MEDICINE FOR DISCOVERY OF MICRORNA & ITS ROLE IN POST-TRANSCRIPTIONAL GENE REGULATION**



**ON TUESDAY: Nobel Prize in Physics**  
IN 2023: Awarded to Drew Weissman and Katalin Karikó for enabling development of mRNA vaccines for Covid; changed the understanding of how mRNA interacts with our immune system.

**VICTOR AMBROS, 70**  
Silverman Professor of Natural Science at the University of Massachusetts Medical School, PhD from MIT.

**GARY RUVKUN, 72**  
Professor of Genetics at Harvard Medical School; PhD from Harvard; postdoctoral fellow at MIT.

factors were identified, and it appeared that the scientific community had figured out the key to how cells control the flow of genetic information.

Then, in 1993, this year's Nobel winners published findings that revealed an entirely new process by which genes are regulated, one which no one had anticipated.

**How was microRNA discovered?**

In the late 1980s, Ambros and Ruvkun were working under Nobel Prize-winning researcher Robert Horvitz, studying a tiny roundworm called *C. elegans*. Despite being just 1 millimetre long, this worm had many of the same cell types found in larger animals, making it an ideal candidate for understanding how tissues develop.

Ambros and Ruvkun were particularly interested in two genes in these worms: lin-4 and lin-14. These genes played important roles in determining when different cells matured. The scientists' curiosity was piqued when they noticed that certain mutant worms had problems with this timing. Ambros discovered that lin-4 seemed to inhibit lin-14, but the scientific process behind this was unclear.

After setting up his lab at Harvard, Ambros began further investigating the lin-4 gene. To his surprise, he found that lin-4 produced a tiny RNA molecule that did not

code for proteins like most genes do. Instead, this "micro" RNA simply blocked the activity of lin-14.

Meanwhile, Ruvkun, in his own lab, was closely examining the lin-14 gene when he discovered that lin-4 was not stopping the production of lin-14's mRNA which carried genetic instructions for making its protein. Rather, it was preventing lin-14 from making the protein itself. As Ambros and Ruvkun compared their findings, a breakthrough emerged — the short RNA from lin-4 matched a specific part of lin-14's mRNA, allowing it to latch on and effectively turn off lin-14's protein production.

This discovery revealed a fascinating new way in which genes could be controlled through tiny RNA molecules now called microRNAs. Initially published in 1993, the discovery got little notice as most scientists believed that this peculiar process was limited to *C. elegans*.

However, everything changed in 2000 when Ruvkun's team discovered another microRNA, called let-7, which was found across many species, including humans. This finding sparked widespread interest, leading to the identification of hundreds of microRNAs. Today, we know that microRNAs play a crucial role in gene regulation for nearly all multicellular organisms, including humans.

**THIS WORD MEANS**

**MARBURG VIRUS**

One of the deadliest pathogens known to infect humans; causes deadly haemorrhagic fever

THE DEADLY Marburg virus could overwhelm Rwanda's fragile healthcare system. Since the east African country reported the first Marburg case late last month, at least 46 individuals have been infected and 12 Marburg deaths reported. About 80% of infections are among medical workers. For a nation with only 1,500 doctors to cater to a population of over 13 million, the outbreak threatens to significantly strain the healthcare system.



Casket of a person who died of Marburg virus in Angola in 2005. NIT

**What is Marburg virus?**

Marburg is among the deadliest pathogens known to humans, with Marburg virus disease (MVD) case fatality rates ranging from 24% to 88% in past outbreaks, depending on virus strain and case management. The first outbreak occurred in Marburg, Germany, in 1967. Since then, subsequent outbreaks have been mostly reported across Africa.

Marburg belongs to the filovirus family, like Ebola. Both pathogens are clinically similar, and although rare, can cause outbreaks with high fatality rates.

**How does MVD spread?**

Initially, human MVD infections were caused by prolonged exposure to mines or caves inhabited by colonies of Rousettus bats, most notably the Egyptian fruit bat. However, according to the World Health Organization (WHO), Marburg also spreads through human-to-human transmission both directly (through contact with blood and other bodily fluids of infected people) and indirectly (through surfaces and materials like bedding, clothing, etc. contaminated with these fluids).

Medical workers treating confirmed or suspected MVD cases have been frequently infected in outbreaks, especially when wearing gloves and precautions are lax.

**What are the symptoms of MVD?**

The interval between infection and onset of symptoms varies from 2 to 21 days.

Initial symptoms, according to the WHO, include high fever, severe headache, muscle aches, severe watery diarrhoea, abdominal pain and cramping, and vomiting.

Many patients develop haemorrhagic symptoms (bleeding), often in many places including the digestive system (faeces and vomit often come with fresh blood), the nose, gums, and vagina. Haemorrhage leads to most MVD fatalities, with death in fatal cases occurring 8 to 9 days after the onset of symptoms, usually of severe blood loss and shock.

**How can MVD be prevented, treated?**

Currently, there are no approved vaccines or specific treatments for MVD. However, according to WHO, supportive care — rehydration with oral or intravenous fluids — and treatment of specific symptoms, improves survival.

Some treatments are currently in the works. Rwanda Health Minister Sabine Nanzimana has said the country is seeking experimental vaccines and treatments, and hopes to address the outbreak with candidate drugs and shots — those in preclinical or clinical trial phases. The US-based Sabon Vaccine Institute has provided Rwanda with 700 doses of its experimental Marburg vaccine, which will be administered to healthcare professionals at the frontlines. ENS



HARISH DAMODARAN

INDIA'S FARM sector has registered improved growth performance over the last two decades relative to the preceding period, and even more so during the 10 years of the Narendra Modi government — according to a recent NITI Aayog paper.

The annual growth rate for agriculture, based on gross value added (GVA) by the sector (crop, livestock, fishing, and forestry) at constant prices, averaged 2.9% during 1984-85 to 1993-94, and also 1994-95 to 2003-04.

The paper, by NITI Aayog member Ramesh Chand and consultant Jaspal Singh, says growth picked up significantly thereafter, both under the UPA (2004-05 to 2013-14) and NDA governments (2014-15 to 2023-24).

The average year-on-year increase in agriculture GVA (the total value of output generated by the sector minus that of inputs consumed) was 3.5% during the UPA period. The 10 years ended 2023-24 witnessed further acceleration to 3.7%, owing to the general perception of a sector steeped in crisis.

**Interpreting the numbers**

So, has Indian agriculture actually fared well in recent times, as the numbers suggest? The answer, it may not be that straightforward.

To begin with, there are questions on the output estimates itself.

Government estimates show production of cereals rose from 185.2 million tonnes (mt) to 303.6 mt between 2004-05 and 2022-23. But household cereal consumption, estimated from the National Sample Survey Office (NSSO) data, was flat at 153-156 mt over this period.

The gap between officially reported cereal production and household consumption has widened from a mere 29.5 mt in 2004-05 to 84 mt in 2011-12 and 151 mt in 2022-23.

Similar questions have been raised on the two-and-a-half times jump in the country's estimated milk production (from 92.5 mt in 2004-05 to 230.6 mt in 2022-23), with no commensurate increase in consumption as per the NSSO's household surveys.

**EXPLAINED ECONOMICS**

# Agri sector report card

Has agriculture performed better under the Narendra Modi government? Yes, says a new study by NITI Aayog — but the growth has come more from livestock, horticulture and fisheries than from crops

**TABLE 1**  
AVERAGE ANNUAL GROWTH IN VALUE OF OUTPUT\* (2014-15 TO 2022-23, %)

1. Fishing & Aquaculture	9.08
2. Livestock	5.76
(a) Milk	5.78
(b) Poultry meat	9.22
(c) Eggs	6.58
3. Crops	2.34
(a) Horticultural crops**	3.94
(b) Non-horticultural crops	1.64
Foodgrains	2.63
Cereals	2.40
Pulses	4.67
Oilseeds	2.96
Sugarcane	4.33
Cotton	0.11
Jute	-2.00
Tea & Coffee	1.29
Tobacco	-3.21

**TABLE 2**  
TOP AGRICULTURAL GROWTH STATES: 2014-15 TO 2022-23\*

State	Agriculture Crops				Livestock	Fishing
	Crops	Livestock	Fishing	Total		
Andhra Pradesh	7.97	3.65	8.41	18.45		
Madhya Pradesh	6.9	5.96	12.6	15.31		
Karnataka	6.32	4.53	11.49	11.74		
Telangana	5.63	5.13	8.22	7.58		
Tamil Nadu	5.39	2.72	9.73	3.65		
Chhattisgarh	5.2	3.47	7.28	9.73		
Odisha	5.11	4.45	5.16	11.79		
Rajasthan	4.83	1.9	10.9	10.04		
Jharkhand	4.73	3.59	6.18	11.88		
Uttar Pradesh	4.64	4.44	5.17	7.98		
Maharashtra	4.54	3.58	6.95	2.08		
Bihar	4.3	1.83	8.28	7.84		
Gujarat	4	2.44	5.59	5.75		
<b>ALL-INDIA</b>	<b>3.94</b>	<b>1.98</b>	<b>7.39</b>	<b>8.98</b>		

\*At 2011-12 prices. \*\*Includes Fruits & Vegetables and Contributes to Spices

\*Average annual % growth in Gross Value Added at 2011-12 prices.

But these incongruities notwithstanding, the NITI paper, published in the *Economic & Political Weekly* (September 28), has some key findings with implications for policymaking, and helping identify both pockets of excellence as well as pain points in Indian agriculture.

**Disaggregated divergence**

The first is the large variation in the performance of the subsectors within agriculture.

The crop subsector — which is normally associated with farming — recorded only 2.3% average annual growth in output value (at 2011-12 prices) to adjust for inflation) during 2014-15 to 2022-23. This was lower than the 3.4% during the 10 years of UPA rule.

On the other hand, the livestock and fisheries subsectors posted average year-on-year production growth of 5.8% and 9.2% respectively during 2014-15 to 2022-23, higher than their corresponding rates of 4.5% and 4.3% for the 10 years ended 2013-14.

Simply put, the farm sector's overall better growth performance during the Modi years compared to that under the UPA has

been primarily due to animal and aqua, and not conventional crop agriculture.

Table 1 gives a break-up of subsector production growth (i.e. in the value of output at constant prices) during the NDA period. The highest average annual growth rates have come from horticulture (9.1%), fishing & aquaculture (9.1%), eggs (6.6%), and milk (5.8%). Within crops, horticulture output has grown at a relatively impressive 3.9% per annum.

Non-horticulture, i.e. regular field crops, has experienced a meagre growth of just over 1.6%. Cotton, jute, tobacco, tea, and coffee have been the laggards.

Table 2 shows 13 states whose annual agriculture growth during 2014-15 to 2022-23 has averaged 4% or more. These notable absentees in this list are Punjab, Haryana, and West Bengal. The average year-on-year rise in their GVA from agriculture for this period was 2%, 3.4%, and 2.8%, and from crops only 0.5%, 0.7%, and 1.9% respectively.

The growth in the 13 states was largely powered by livestock and fisheries. The crop subsector's growth topped 5% for only two

states: Madhya Pradesh and Telangana.

**Policy takeaways**

It links up with the second major finding. The accelerated agricultural growth during the last two decades, a result of the diversification towards horticulture crops, livestock and fisheries, has also been market-led — driven by the growing demand for vegetables, fruits, milk, meat, eggs, and fish.

Diversification in farms has been accompanied by diet diversification, with a shift in the composition of household consumption expenditures from foods that deliver calories to those rich in proteins and micronutrients.

This has been additionally enabled by new technologies, be it hybrids in vegetables and maize, drip irrigation and high-density tissue culture planting in bananas, or high-yielding broiler and layer breeds in poultry.

But as Chand and Singh note, not all Indian farmers engage in livestock, fisheries, and horticulture activities. According to the NSSO's 2018-19 Situation Assessment Survey for Agricultural Households, only 53% of them derived income from livestock rearing, and just 6.5% cultivated horticulture crops.

The main earning source for 44.2% of agricultural households was the farming of cereals, pulses, oilseeds, sugarcane, cotton, and other non-horticulture crops. Some of these have seen decent production growth, on the back of rising demand (oilseeds and pulses) or non-food use (sugarcane for ethanol production).

However, the benefits of diversification and new production technologies have not percolated to field crops the way they have for horticulture and livestock.

Oilseeds and pulses yields remain low, leading to a substantial share of demand being met by imports. In cotton, there has been no breakthrough after genetically modified Bt hybrids; average domestic production of 325 lakh bales in the last three years is below the 370-400 lakh bales during 2012-13 to 2014-15.

The crop subsector showing low growth despite being covered under the MSP regime underlines the importance of demand-side factors. These, along with improvements in production technology, are more effective in promoting agricultural growth than government output price or input subsidy interventions, the paper has concluded.

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707 Dr. Mahendra Nagar, New Delhi

# What is the alleged 'land for jobs' case against Lalu Prasad and his family?

**NIRBHAY THAKUR**  
NEW DELHI, OCTOBER 7

RASHTRIYA JANATA DAL (RJD) chief Lalu Prasad and his sons Tejashwi and Tej Pratap were granted bail by a Delhi court in a money laundering case linked to the alleged "land for jobs scam" being investigated by both the CBI and ED. The matter will now be heard on October 23 and 24.

**The purported 'scam'**

**CBI'S CORRUPTION CASE:** The CBI case pertains to the alleged transfer of land at cheap rates to Lalu and his family in return for appointments made in Group-D substitute jobs in Central Railway between 2004 and 2009, when Lalu was Union Railway Minister.

According to the CBI, Lalu "influenced two officers of Central Railway...and got appointed (to Railway jobs) the owners and family members of owners of the land parcels wherein he was having interest". The CBI alleged that three land parcels in Patna were transferred to Lalu and his family either by candidates (who wanted the jobs) or their family members. Lalu got nine persons appointed in Central Railway, CBI said.

"As a kind of bribe, the candidates directly or through their relatives/family members, sold land to Lalu Prasad Yadav at highly discounted rates up to 1/4th to 1/5th of the prevailing market rates," the CBI's charge sheet said. In all, Lalu's family acquired more than 1 lakh sq ft of land for only Rs 25 lakh as against the circle rate of over Rs 4.39 crore, CBI said.

According to CBI, there were glaring discrepancies in the documents supplied by those who were given the jobs. Some candidates had sequential roll numbers on their caste and residence certificates, which suggested that they had obtained these certificates "altogether and for a common purpose", the CBI said.

The CBI's first chargesheet named Lalu, his wife Rabri Devi, and their daughter Misa Bhatti as accused along with 13 others. The supplementary chargesheet added Tejashwi's name to the list of the accused. The CBI has filed five chargesheets in the case so far.

**ED'S MONEY LAUNDERING CASE:** The Enforcement Directorate, in its more than 4,700-page chargesheet, has alleged that a company was incorporated solely to buy land

parcels from jobseekers. In its case, the agency has named Rabri Devi, her daughters Misa Bhatti and Hema Yadav, companies AK Infosystems and AB Exports Pvt. Ltd (ABEPL), former Railway employee Hridaynand Chaudhary, and Amit Katal, director of AK Infosystems, as accused. Last year, it attached immovable properties worth Rs 6.02 crore in this case, and arrested Katal.

According to the chargesheet, Katal "in connivance with Lalu hatched a conspiracy" to incorporate a company in Delhi to buy land parcels in Bihar from the job seekers. The ED alleged that Rabri was a beneficiary of the proceeds of crime, and that through a shell company, she helped in transferring funds to her son Tejashwi Yadav, which

**EXPLAINED CASE FILE**

were allegedly used in the construction of a property in Delhi's New Friends Colony.

According to the ED, several parcels of land were acquired by Katal in "return for giving undue favours to Lalu". After acquiring these lands, the shares of AK Infosystems were transferred to Lalu's family members in 2014 for just Rs 1 lakh, even though the company allegedly owned land worth Rs 1.77 crore. AK Infosystems, thus, served as a tool for Lalu to conceal the proceeds of crime, the agency said in court.

ED has also alleged that A B Exports Pvt. Ltd (ABEPL), a shell company created by Lalu's family members with Katal, served to hold the property at D-1088, New Friends Colony. This, the agency alleged, was used to integrate the proceeds of crime into the mainstream economy.

**Lalu Prasad's response**

Tejashwi Yadav told reporters on Monday that the allegations were "entirely political" and "a conspiracy against us".

The RJD has previously referred to the ED's actions in the case as a "sheer act of political vendetta" and an attempt to "weaken" the Opposition. "It is a malicious intention to target and tarnish the image of Lalu Prasad, Rabri Devi and Tejashwi Prasad Yadav", RJD national spokesperson Subodh Kumar Mehta had told *The Indian Express* earlier.

Lalu's lawyers will formally respond to these allegations in court only when the charges are being framed. Currently, the case is at the stage of scrutiny of documents, and the investigation has not yet concluded.

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