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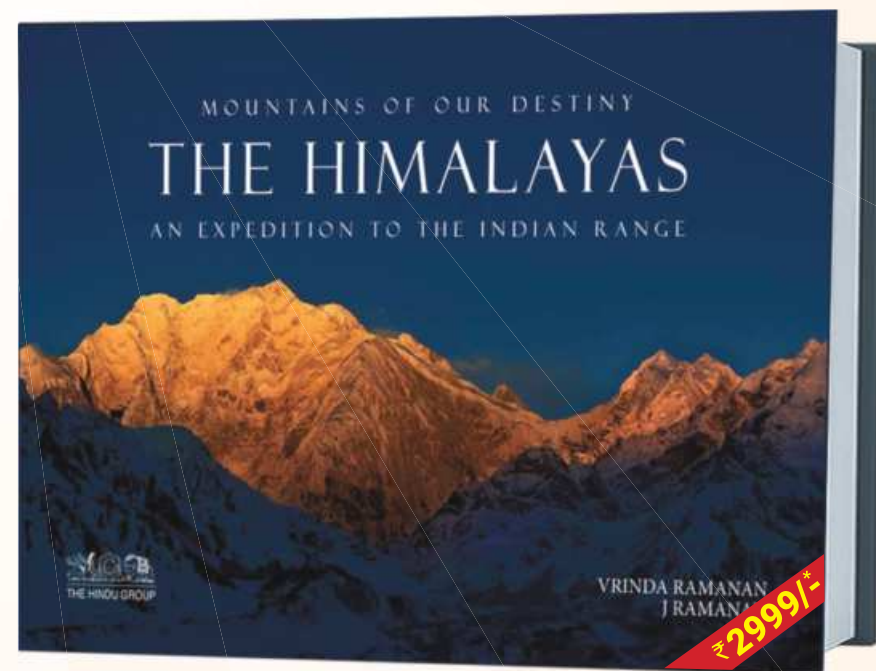
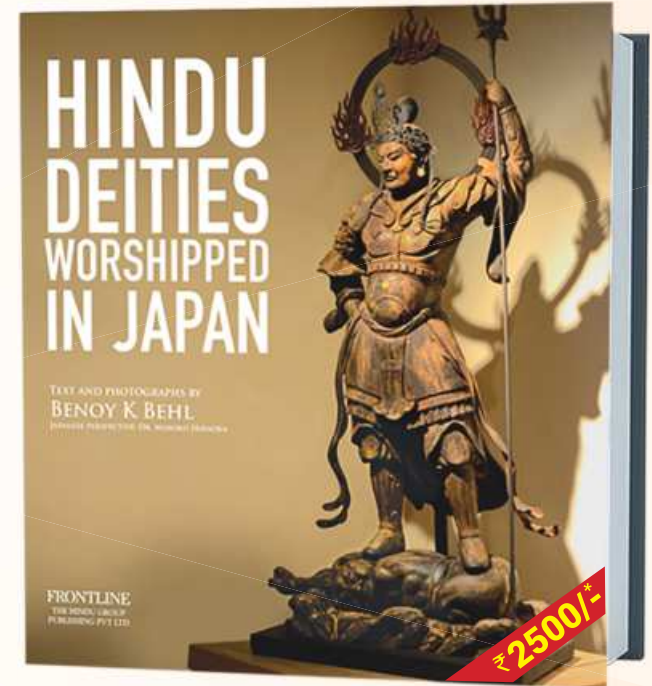
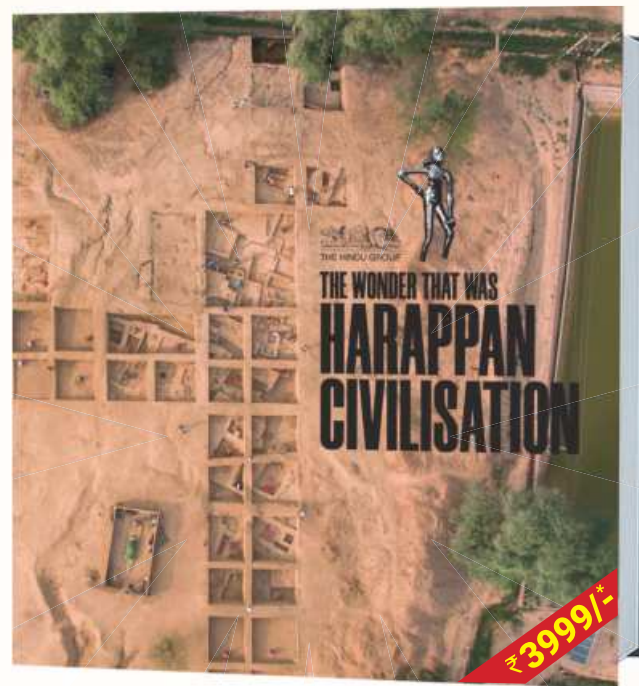
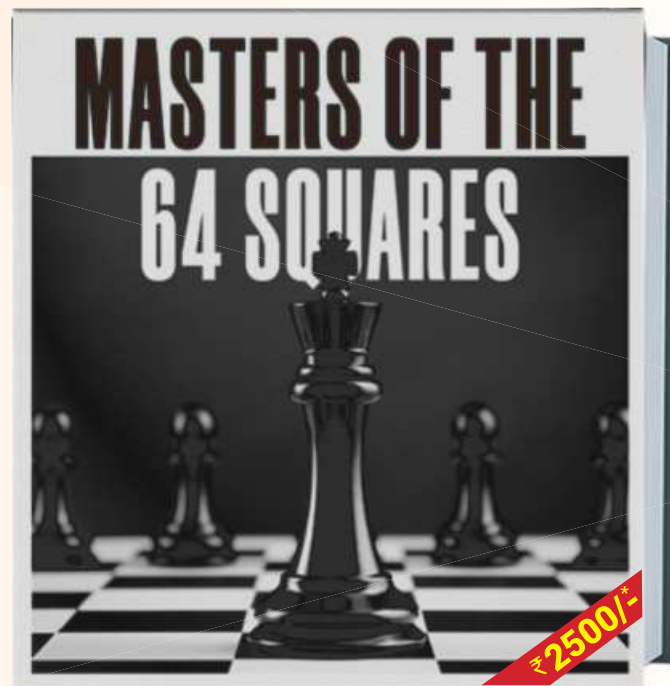
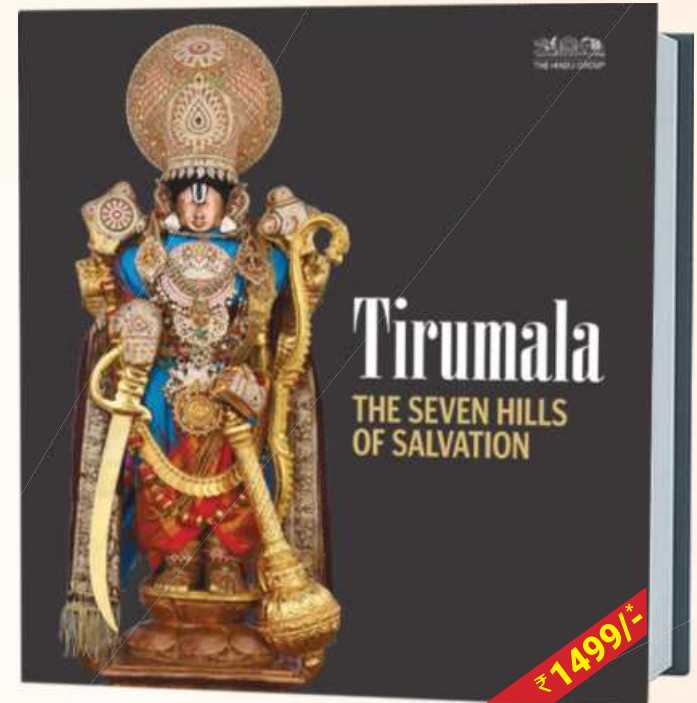
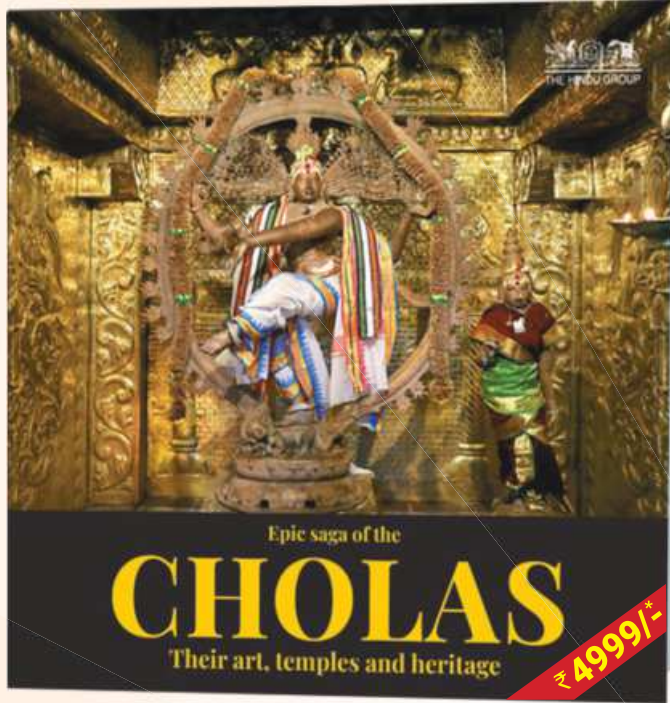




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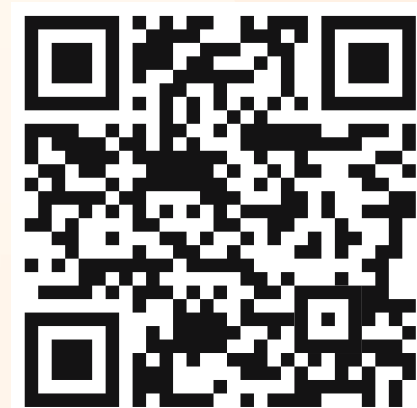
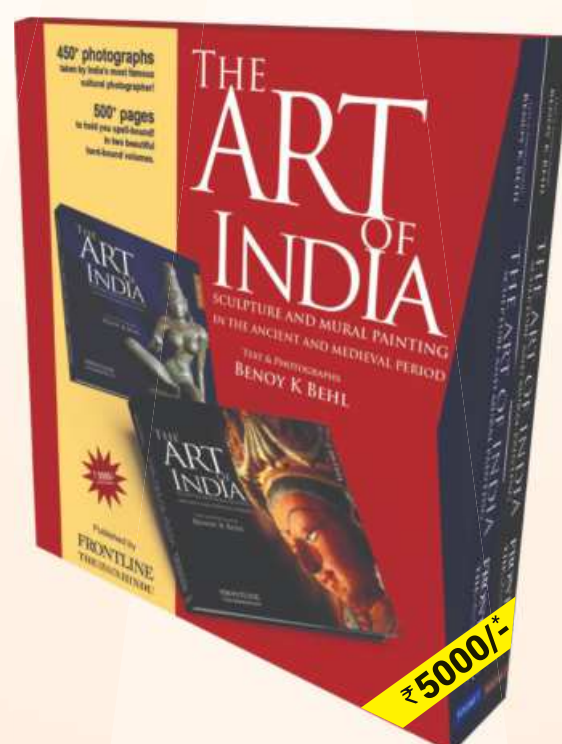
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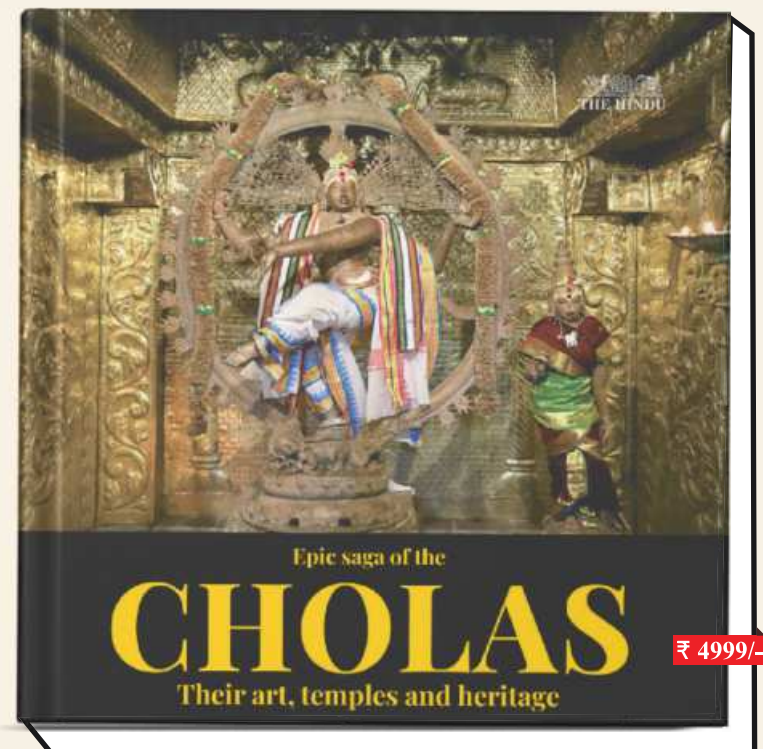
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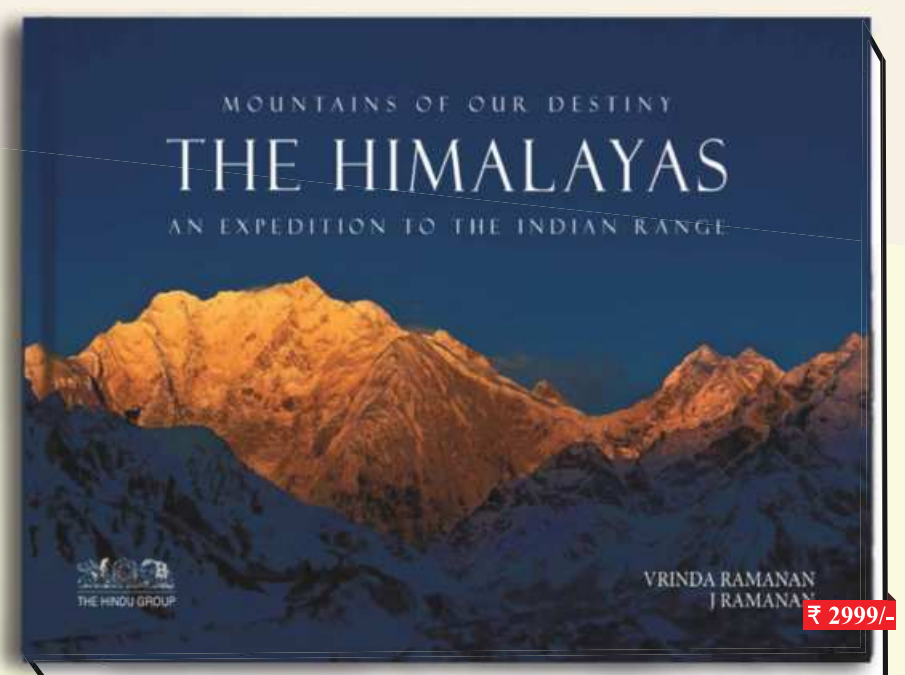
SPECIAL PUBLICATIONS FROM THE HINDU GROUP



Tirumala- The Seven Hills of Salvation is a coffee-table book on the holy shrine of Lord Venkateswara in Tirumala. The book contains articles by well-known writers on Hindu religion and philosophy. The articles cover subjects such as Srinivasa Kalyanam, the significance of Amuktha Malyada written by Krishnadeva Raya on Lord Venkateswara, Sri Ramanuja's important role in establishing the rituals and customs in Tirumala, the story of Ananthalwan and on the importance of Vaikunta Ekadasi. This collector's edition also features rare pictures of Lord Venkateswara, Sri Padmavathi and Tirumala. Apart from the above, there will be articles on TTD and it's excellent work in running the Tirumala temple.



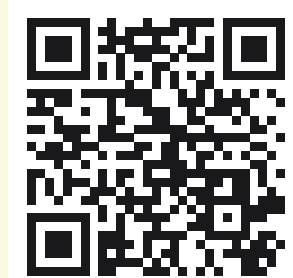
The Epic saga of the Cholas, Their art, temples and heritage - The grandeur and heritage of the Chola dynasty from the Tamil country, which has fascinated scholars and the layman alike, has been brought out in this coffee-table book by The Hindu when the spotlight has been turned on the Cholas.



**** Re-printed edition with QR codes in each chapter for a visual delight**

Mountains of our Destiny - The Himalayas - An expedition to the Indian Range With 300 scintillating photographs (J. Ramanan) and flowing text (Vrinda Ramanan), 'Mountains of Our Destiny...' is a tribute to the Great Himalayan Range from The Hindu Group of Publications. A connoisseur's delight, the contents vouch for the authors' spirit of adventure and deep reverence for the wonders that lie in the snowy lap of the mountains.

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STRATEGIC VISIT
Jaishankar, Doval meet Sri Lankan JVP leader
NEWS » PAGE 10



2024 GRAMMYS
Five Indian musicians bag awards
NEWS » PAGE 12



THUMPING WIN
Bumrah and Ashwin help India pull level
SPORT » PAGE 15

With 47 votes, Champai govt. wins the floor test

Twenty-nine legislators vote against the motion; former Chief Minister Hemant Soren, arrested by ED, says he will quit politics and leave Jharkhand if anyone proved he forged land documents

Amit Bhelari
RANCHI

The new Champai Soren government won the trust vote on the floor of the Jharkhand Assembly on Monday after 47 Jharkhand Mukti Morcha (JMM)-led alliance legislators voted for the motion and 29 against it. Mr. Champai Soren moved the motion on which a debate was held.

During the debate, former Chief Minister Hemant Soren, arrested by the Enforcement Directorate (ED) in the alleged land scam case, accused the Raj Bhavan of being part of his arrest. He said that he would quit politics and leave Jharkhand if anyone proved he forged land documents.

During the voting, 27



Decisive victory: Jharkhand Chief Minister Champai Soren with former CM Hemant Soren and JMM-led coalition MLAs after participating in the floor test at the Assembly in Ranchi on Monday. ANI

MLAs of the JMM, 17 of the Congress and one each of the Rashtriya Janata Dal and the Communist Party of India (Marxist-Leninist) Liberation voted for the motion. The only nominated MLA, Glen Joseph Gal-

staun, who represents the Anglo-Indian community, also voted in favour of the motion, taking the total to 47.

Twenty-five MLAs of the BJP, three of the All Jharkhand Students' Union (AJ-

SU) and one of the Ajit Pawar faction of the Nationalist Congress Party (NCP) voted against the motion.

CONTINUED ON
» PAGE 10

Chandigarh poll incident mockery of democracy: SC

Krishnadas Rajagopal
NEW DELHI

The Supreme Court gave the BJP victory in the Chandigarh mayoral elections a jolt, threatening to order fresh elections after a video played in the open courtroom on Monday showed the Returning Officer "obviously defacing" ballot papers, while taking stealthy glances at the camera overhead like a "fugitive".

"It is obvious that he has defaced the ballot. This man has to be prosecuted... Why is he looking at the camera like a fugitive and then quietly defacing the ballot? This is a mockery of democracy... He is murdering democracy. Is this the way to conduct an election?" Chief Justice of India D.Y. Chandrachud, heading a three-judge Bench, addressed Solicitor-General Tushar Mehta,

It is obvious that he has defaced the ballot. This man has to be prosecuted...



appearing for the Union Territory of Chandigarh, and senior advocate Maninder Singh, for the winning candidates.

The Supreme Court directed the sequestration of the entire records of the mayoral election under the custody of the Registrar-General of the Punjab and Haryana High Court forthwith by 5 p.m.

CONTINUED ON
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PM slams Congress, says NDA will return to power with over 400 seats

Nistula Hebbar
NEW DELHI

Exuding confidence that his party will return to power in the next Lok Sabha election, Prime Minister Narendra Modi on Monday said that he could "gauge the mood of the nation" and that the BJP alone would get at least 370 seats and the NDA would cross the 400-seat mark in the Lok Sabha.

In a speech that went on for more than an hour and a half, on the Motion of Thanks to the President for her address to both Houses



Prime Minister Narendra Modi replies to the Motion of Thanks to the President in the Lok Sabha on Monday. PTI

of Parliament, Mr. Modi mounted a spirited attack on the Opposition stating that he was convinced that

they (Opposition parties) have "lost the courage to contest elections and have resolved to stay on the Op-

position benches for a long time".

He said the Congress is destined to sit in the Opposition for several more years, and that the third term of the government was not too far.

"At the most 100-125 days are remaining," he said, referring to the upcoming Lok Sabha election.

The Lok Sabha adopted the Motion of Thanks through a voice vote, following Mr. Modi's speech.

CONTINUED ON
» PAGE 10

White Paper on economy this session

Vikas Dhoot
NEW DELHI

The White Paper on the economy's mismanagement prior to 2014 and the transition since then, promised by Finance Minister Nirmala Sitharaman in the interim Budget, is expected to be tabled in this session of Parliament, Finance Secretary T.V. Somanathan said.

Deliberations are on and they had already consulted States and Central government staff associations, he said.

FULL INTERVIEW
» PAGE 11

Despite Delhi court directions, AAP leader Sanjay Singh not called for taking oath in RS

The Hindu Bureau
NEW DELHI

Despite directions from a Delhi court, Aam Aadmi Party leader Sanjay Singh, who was recently elected to the Rajya Sabha for a second term, could not take oath on Monday in the absence of summons from the Rajya Sabha Secretariat.

Mr. Singh was reportedly not called for the ceremony as four cases of breach of privilege are pending against him before the Privileges Committee of the Upper House, said sources in the office of Chairman Jagdeep Dhankhar. The cases pertain to Mr. Singh's previous tenure. He was suspended on July 24, 2023.

On August 11, the House passed a motion continuing his suspension till the



Sanjay Singh

committee submitted its findings. Mr. Singh, who is in judicial custody in the Delhi liquor policy case, did not come to Parliament on Monday.

Special Judge M.K. Nagpal of Rouse Avenue Courts had on Saturday directed the Jail Superintendent to ensure that Mr. Singh was taken to Parliament on Monday to be sworn in, under the condition that he would not address the

press.

Mr. Dhankhar's office said, "Summons [for taking oath] were not issued to Sanjay Singh who had also been elected, as he suffered the directives of the House passed on August 11, 2023, disentitling him from participating in the proceedings of the House till the House takes decision on the report of the committee of privileges as and when presented to it. The fact that this matter pertains to his previous term has no impact on this directive."

Reacting to the incident, RJD MP Manoj K. Jha said in a post on X, "Sanjay Singh was deprived of taking oath today after being elected as MP for the second time and despite the court's instructions. This is the new parliamentary paradigm of the so-called Amrit Kaal."



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The road to a healthy democracy

The prospect of elevating India to the status of a developed nation by 2047, the 100th year of its Independence, is captivating. This vision of a 'Viksit Bharat' (Developed India) has never been as achievable as it is today. Today, India is taking a quantum leap in every sector. There has been a massive expansion in social and economic infrastructure, a boost to entrepreneurship, rural transformation, and a manifold increase in the number of universities and colleges. Chandrayaan has set a new milestone in science and technology and our digital public infrastructure, from Aadhaar to UPI, is the envy of the world. This does not just narrate a story of self-reliance but also showcases to the world what India can do. The Viksit Bharat Mission embodies the spirit of progress and development, aiming to transform our nation into a powerhouse of innovation, economic strength, and social prosperity. Central to this mission is the well-being of our citizens and identifying ways to bring health equity for all. It is in the realm of healthcare that we find the foundation for a healthier, more resilient, and productive society. Over the past two decades, we have emerged as a hub of medical innovation and talent. The explosive evolution of Indian healthcare is a testament to the transformative role the sector can play in our quest for a developed nation and the time to expand its contributions is now.



Prathap C. Reddy

is founder and chairman, Apollo Hospitals Group

and a substantially high economic burden. India bears the dubious distinction of being the diabetes capital with 101 million diabetics and 136 million with prediabetes. Cardiovascular diseases top the mortality charts, and cancer incidence is projected to rise by 57.5% by 2040. Trends over the past decade also indicate a reduction in the average age of people impacted by chronic diseases. It is important to prioritise preventive healthcare to avoid the onset of chronic diseases and equip every individual with the knowledge and action they need to stay one step ahead of it. With technological innovations, scientific research, and a growing understanding of risk factors, preventive healthcare has touched new possibilities. Based on their family history, current lifestyle, genomics data and more, today an individual has the power to know what they are possibly at risk for well in advance and take the steps to reverse its onset. Artificial Intelligence (AI), too, is playing a transformative role in preventive healthcare, from risk stratification, early detection, to creation of personalised prevention plans with targeted behaviour interventions. We need to work towards ensuring every individual has access to necessary preventive care tools that gives them control of their own health. Healthcare professionals, too, should advocate for preventive measures and encourage timely interventions and modifications to their patients at every juncture.

Leading the world by example India's healthcare sector is at the cusp of transformation, potentially giving rise to a new healthcare model for the world to follow. We have already proven our clinical excellence and prowess with success rates that surpass global benchmarks. We are pioneers in redefining healthcare delivery, with the patient at the absolute centre. The effective integration of AI and Machine Learning (ML) is further fuelling the emergence of

these new care models that take care to the patient, enhance their access to services, and ensure a step change in quality of care. Instead of merely expanding hospital capacity, healthcare providers in this new model are expanding patient touch points, ranging from neighbourhood facilities and clinics to every individual's mobile device and wearable. While this will help boost access and reduce the cost of care for every Indian, it also sets an example for the world to follow in the type of health care service every individual deserves. India is also globally famed for a world class healthcare infrastructure and incredible clinical talent that delivers the best in clinical outcomes at scale and at a fraction of the global cost – approximately one-tenth. This establishes India's healthcare industry as a global leader in infrastructure, technology, specialist doctors, and nursing professionals. With patients from over 145 countries choosing India for their treatments, we have emerged as a medical value travel hub, particularly in the highly specialised areas of oncology, cardiology, orthopaedics, transplants, and robotic surgeries. A significant milestone has also been the introduction of Proton Beam Therapy technology, making India a regional leader in cancer treatment. Medical value travel can play a strategic role in creating employment, earning foreign exchange, and bolstering India's position in the global competency scale. India stands at a pivotal moment in its healthcare journey. By re-imagining our healthcare model, we can position ourselves as the global destination for medical value travel, a powerhouse in AI-driven healthcare solutions, and a leader in combating non-communicable diseases. For this to be truly India's century, every individual and institution in the country should resolve to make India's progress their priority.

It is in the realm of healthcare that we find the foundation for a healthier, more resilient, and productive society

Advantage and challenge India's biggest advantage is its demographic dividend. With a population of over 1.4 billion, India is one of the youngest nations with a median age of 29 years. This is an enormous opportunity, likely to last till 2047. Using this dividend well, we can propel India into a Viksit Bharat. Having said that, if this population is not healthy, we are potentially looking at reduced productivity

A protest and a predicament

While the LDF is set to stage a protest in Delhi, the UDF finds itself in a tight spot

STATE OF PLAY

Tiki Rajwi
tiki.rajwi@thehindu.co.in



In India, Centre-State relations have often been characterised by friction. Yet, it is not often that a State government decides to descend in full strength in New Delhi, alleging unfair treatment at the hands of the Union government. The decision by Kerala's Pinarayi Vijayan-led Left Democratic Front (LDF) government to take its running battle against the "crippling" policies of the Bharatiya Janata Party (BJP)-led government at the Centre and its "neglect" towards the State all the way to Jantar Mantar, a place in New Delhi often used for protests, is significant on several levels. The protest is being held just a few months before the Lok Sabha elections. Mr. Vijayan has announced that he will be leading his Cabinet colleagues and elected representatives in the high-profile protest. To add more firepower, the Communist Party of India (Marxist)-led LDF has also invited Chief Ministers and senior leaders of non-BJP States to join the event. While the impact of this strategy on the flagging INDIA alliance at the national level remains to be seen, the Congress-led Opposition in the State, the United Democratic Front (UDF), has refused to join the protest. Financial relations between the BJP-led Union government and the CPI(M)-led LDF regime in Kerala have been far from friendly in recent years. Kerala has repeatedly accused the Centre of being motivated by political considerations in punishing it where it hurts the most, namely, the the money

belt. It blames the Centre for cutting off crucial revenue inflow to a trickle, forcing the State to rely more and more on its own meagre resources. The Kerala Finance Minister, K.N. Balagopal, a vocal critic of Union fiscal policies, alleges that Kerala was deprived of ₹57,400 crore in Central transfers and loan approvals just this year. The LDF government had moved the Supreme Court last December, charging the Centre with interfering in its finances and trimming its borrowing limit. Politically, the CPI(M) hopes to cement its position as a prime mover in the anti-BJP alliance at the national level through the protest. On the fiscal front, the Left has singled out the BJP-led Union government as the source of Kerala's current worries. The LDF has built a narrative around the charge that the Centre has imposed a "financial embargo-like situation" on Kerala. While presenting the 2024-25 State Budget, Mr. Balagopal also mentioned a "Plan B" to preserve the momentum of developmental programmes while "retaining the values of the Kerala Model of development," if the "neglect" persists. But the UDF, while critical of New Delhi's policies, considers them to be only one part of the reason. It believes that Kerala's financial troubles primarily stem from mismanagement and wasteful spend-

Higher autonomy of panchayats leads to better health outcomes

Panchayats which have a better say over power, people, and money also feature high on health, nutrition and sanitation scores

DATA POINT

The Hindu Data Team

The Data Point published on Monday had highlighted how panchayats earn only 1% of their income through taxes, with the rest being sourced from Central and State grants. The Reserve Bank of India (RBI) study, based on which the report was written, had called for greater autonomy for panchayats and empowerment of local leaders. This Data Point aims to show that greater autonomy of panchayats results in better governance and leads to superior outcomes. Panchayats collaborate with health departments to maintain clinics and dispensaries in rural areas. By encouraging institutional deliveries and ensuring prenatal and postnatal check ups, they help reduce maternal and infant mortality rates (IMR). They also provide clean water and sanitation facilities. All these help improve health outcomes. The RBI study uses two datasets to show that panchayats which scored high on the health, nutrition, and sanitation parameters also had lower rural IMRs. **Chart 1** shows the State-wise average of panchayat-level health, nutrition, and sanitation scores calculated by the Ministry of Panchayati Raj (MoPR) on the vertical axis. The scores of all the panchayats in a State were averaged to present the State's overall score on these parameters. On the horizontal axis, the IMR of the State is presented. Both data were for 2018-19. In general, as shown by the trend line, the higher the score on health, nutrition, and sanitation parameters, the lower the IMR. Major States including Kerala, Tamil Nadu, Himachal Pradesh, Punjab, Jammu and Kashmir (before it became a Union Territory), Karnataka, Maharashtra, and West Bengal all feature on the top left. That is, they have a high score and

a low IMR. Madhya Pradesh, Uttar Pradesh, Assam, Rajasthan, Odisha, and Chhattisgarh can be seen on the bottom right – they have a low score and a high IMR. Given that panchayats play a vital role in health management and as Chart 1 shows that some States outperform others, **Chart 2** checks whether these better-performing States also have greater autonomy at the panchayat level. For this, the RBI study uses the devolution index prepared by MoPR using independent agencies. The devolution index rates a State based on three parameters. First, the transfer of subjects, that is, how many functions including drinking water, rural housing, family welfare, and women and child development are under the control of panchayats. Second, transfer of functionaries, that is, how many positions were filled by panchayats on their own. Third, transfer of finances, that is, what share of funds are raised by panchayats on their own and what share can they spend based on their decisions. These three and some other categories are used to calculate the devolution index. **Chart 2** plots the States' devolution index on the horizontal axis. The States on the right – Kerala, Karnataka, Maharashtra, and Tamil Nadu – have higher devolution scores. The States on the left – Assam, Odisha, Chhattisgarh, Madhya Pradesh and Uttarakhand – have lower devolution scores. Chart 1 and 2 when read together shows that panchayat autonomy plays a vital role in better health outcomes in rural areas. **Map 3** which shows the percentage shortfall of primary health facilities in rural areas also concurs with this conclusion as States which perform better on the index have a surplus, with a few exceptions. Uttar Pradesh, Bihar, Jharkhand, Madhya Pradesh and West Bengal have very high levels of shortage. On the other hand, Kerala, Tamil Nadu, Karnataka and Himachal have none.

More freedom at the grassroots

The charts are based on data collated from the RBI report titled, 'Finances of Panchayati Raj Institutions'



Chart 1: The chart shows the State/UT-wise avg. of panchayat-level health, nutrition and sanitation scores (vertical axis) and infant mortality rate (horizontal axis)

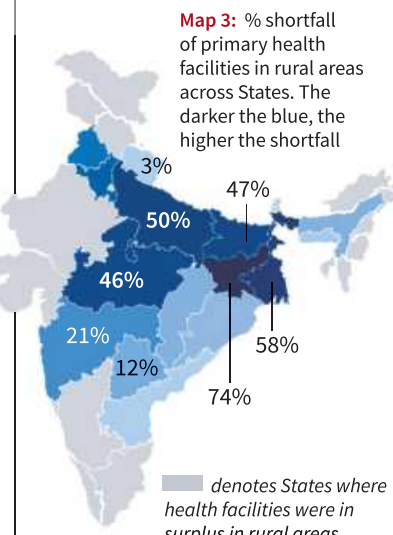
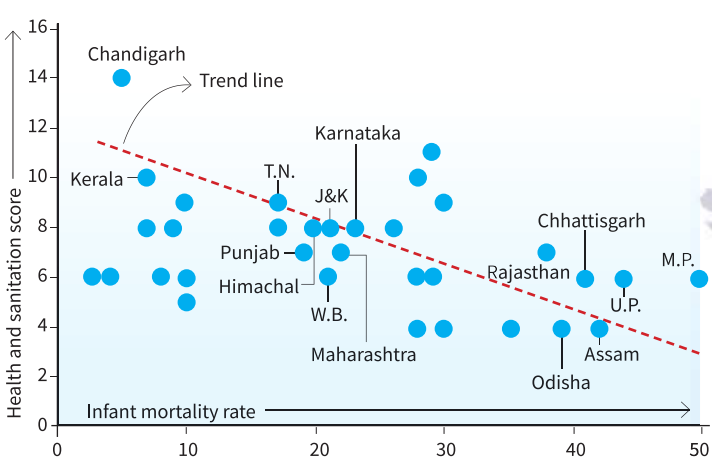
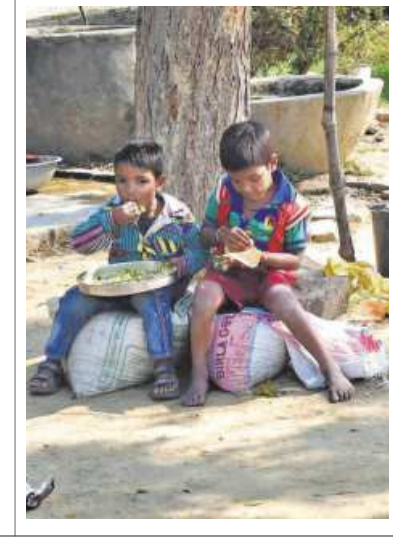
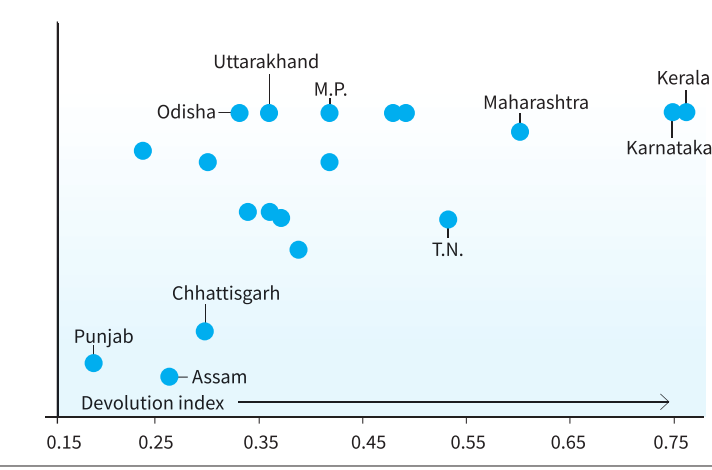


Chart 2: The chart shows the devolution index calculated by the Ministry of Panchayati Raj, across States



FROM THE ARCHIVES

The Hindu

FIFTY YEARS AGO FEBRUARY 6, 1974

U.K. court says Ugandans have no right of entry

London, Feb 5: Three Appeal Court judges ruled yesterday that Britain is not bound under international law to receive "British protected" persons expelled from Uganda, reports DPA. Lord Denning commented on the status of people from British Protectorates: "They were said to be British nationals, but they were not British subjects. They were not born here. They have never lived here. They live thousands of miles away in countries which had no connection with England except that they were once British Protectorates." Posing the question whether by international law everyone has the right, if expelled, to come into these small islands, Lord Denning said: "Surely not. This country would not have room for them for they came, not in single file, but in battalions." Lord Denning said that mass expulsions had never before come within the knowledge of international law. And he did not think there was any rule which affected the issue. The rules of international law, he said, only became part of English law in so far as these had been accepted and adopted by England. The court dismissed an appeal by Mr. Pravinlul Amanhi Thakrar against a decision of Queen's Bench Divisional Court last October that the Home Office had acted unfairly in banning him from entry to the U.K. Mr. Thakrar, who was born in Uganda of Indian parents, had been expelled among thousands by "the sword of General Amin." He had been detained since an immigration officer at the Heathrow Airport refused him admission.

A HUNDRED YEARS AGO FEBRUARY 6, 1924

Bombay labour situation

Bombay, Feb 5: Mill strike situation today is practically unchanged. In pursuance of a notice extending the lock-out period to 15th instant which was put up last week all mills were closed this morning. Strikers today have been peaceful, thanks to the excellent security arrangements. Armed mounted police have been stationed today at Currey Road Bridge which was the storm centre yesterday. Local labour leaders are eagerly awaiting final decision of the Millowners Association.

Text & Context

THE HINDU

NEWS IN NUMBERS

The number of tax evasion cases from April-December 2023

14,597 GST officers are using data analytics and artificial intelligence tools to identify risky taxpayers suspected of availing fake input tax credits, Minister of State for Finance informed Parliament. PTI

The rise in mustard crop acreage in the Rabi season of 2023-24

5 in percentage. Mustard crop acreage is estimated to have risen to over 100 lakh hectares in the rabi season of the 2023-24 crop year, according to Solvent Extractors' Association of India (SEA). Last year, the acreage was estimated as 95.76 lakh hectares. PTI

The number of Asiatic lions that died in the last five years

555 The Union Minister of State for Environment Ashwini Kumar Choubey informed Parliament that 113 lions died in 2019, 124 in 2020, 105 in 2021, 110 in 2022 and 103 in 2023. Gujarat's Gir forest is the only natural habitat of the Asiatic lion. PTI

The number of antiquities returned to India since 2014

344 A total of 115 antiquities were returned to India in 2023, Union Minister of Culture G. Kishan Reddy said. In the last five years, 262 such items were repatriated from the U.S, 15 from the U.K., 35 from Australia and one from Italy. PTI

Amount collected as penalty for delay in PAN-Aadhaar linking

600 in ₹ crore. Minister of State for Finance Pankaj Chaudhary informed that as on January 29, 2024, about 11.48 crore PAN cards are still not linked with Aadhaar. PTI

COMPILED BY THE HINDU DATA TEAM

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Myanmar's civil war and India's interests

While security agencies will constantly evaluate the modalities of engaging with armed groups on India's borders, there is a need to scale up humanitarian and development assistance in coordination with a broader spectrum of ethnic organisations and local people to expedite Indian investments in the region

WORLD INSIGHT

Sanjay Pulipaka

In February 2021, when the Myanmar military leaders ousted the elected government of Aung San Suu Kyi, they anticipated a resistance movement that would subside in a few months. Three years later, the opposition to military rule gains in strength. Ethnic Armed Organisations (EAOs) and the People's Defence Forces control many towns in different parts of the country. A few weeks ago, the Arakan Army captured Paletwa in the Chin State which lies on Myanmar's western borders with Bangladesh and India.

A conflict within a conflict
The fall of the town of Paletwa has altered the dynamic between the Chin and the Arakan ethnic groups. A majority of Paletwa's residents belong to the Chin ethnic community, and they see their town as an integral part of their homeland. On the other hand, some in the Rakhine State, previously known as Arakan, contend that the township was historically part of the Arakan Hill Tracts during colonial rule and should have been part of their province. There have been instances, prior to the coup, when Chin ethnic organisations expressed displeasure with the Arakan Army's operations in Paletwa.

In the recent past, ever since the Chin armed groups and the Arakan army have been fighting the Myanmar military, they have refrained from forcefully ascertaining their respective views of provincial borders. Nonetheless, to maintain peace and order, it is imperative that the Chin and Arakan groups agree on an inclusive framework for the governance of Paletwa and adjoining areas. For an effective fight against the military, the EAOs need to improve inter-ethnic solidarity by creatively accommodating each other's perspectives on ethnic boundaries. Finding an inter-ethnic compromise on settlements such as Paletwa can be particularly challenging. Paletwa's location on the western border makes it a good launchpad for the Arakan Army to conduct its operations against the military. Paletwa is a commercial town on the Kaladan River, and therefore, any armed group with a significant presence in the town would benefit from the economic activity in the region.

India's stake

The developments in Paletwa will also impact the Indian government's Kaladan Multimodal Transit Transport Project (KMTP) in Myanmar, which has already faced significant delays. The Kaladan project was aimed at addressing the geo-economic and geo-political challenges of northeast India. The partition of the subcontinent and the subsequent hardening of borders converted northeast India into a landlocked region. Transporting goods to and from northeast India via the narrow Siliguri corridor is an expensive affair, and in a worst-case scenario with China, there is a possibility of movement along the corridor being adversely affected. Therefore, the Kaladan project was conceptualised as an alternative route that gives northeast India access to the sea.

India and Myanmar signed the framework agreement on the Kaladan project in 2008. The operationalisation of the project was delayed because of rugged terrain, inadequate inter-departmental coordination, political instability and security challenges in



Across borders: A bullet, allegedly shot from Myanmar during fighting between Myanmar security forces and Arakan Army, in Bangladesh, on February 5. AP

Myanmar. While the Sittwe port and inland water terminal at Paletwa have been completed in the past few years, road construction is facing challenges due to the prevailing security situation in Myanmar. For expeditious implementation, the attitudes of the local ethnic organisations towards the Kaladan project should be factored in. The people of Mizoram and their co-ethnics across the border in Chin State are interested in the expedited completion of the Kaladan project, as it will spur economic activity in the region.

However, there is a perception in India that the Arakan Army is not favourably disposed to the Kaladan project. Prior to the coup, numerous reports indicated that India and Myanmar have launched coordinated operations against Arakan Army units that were operating close to India's borders near Mizoram and threatening the Kaladan project. In 2019, five Indian workers working on the project were kidnapped, reportedly by the Arakan Army. While all the workers were released, one Indian national died in the custody of kidnapers due to a cardiac arrest.

China's investments in the region

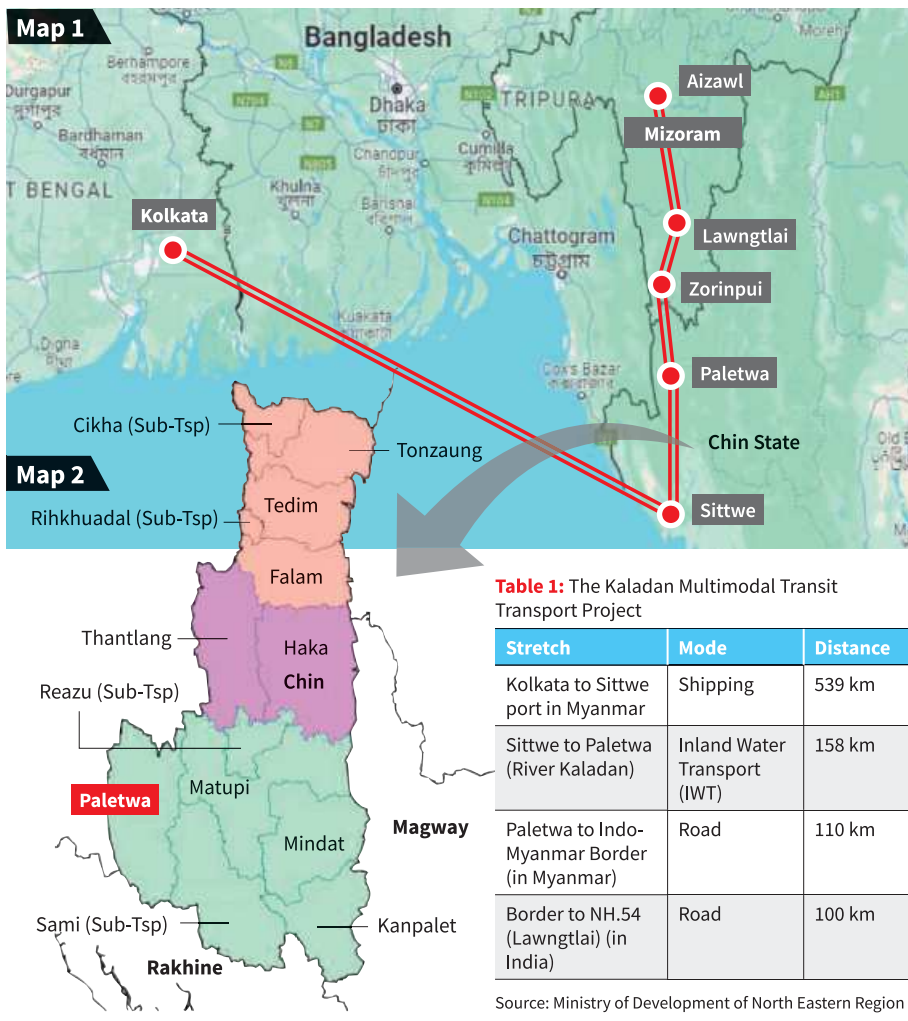
The Arakan Army, along with the Myanmar National Democratic Alliance Army and the Ta'ang National Liberation Army, is part of the Three Brotherhood alliance, which some claim has China's support. The alliance has pledged to protect Chinese investments in Myanmar. There are reports which suggest that the Arakan Army receives considerable funding and military equipment from China. If such reports are true, there will be concerns in Delhi that Beijing is using armed groups to slow down India's connectivity projects in Myanmar.

Meanwhile, the Chinese economic presence along Myanmar's Bay of Bengal coast has substantially increased. Beijing has operationalised oil and natural gas pipelines from the Shwe gas fields near Kyaukpyu in the Rakhine State to Yunnan province in China. Two months ago, China signed supplementary agreements with the Myanmar military to operationalise the deep sea port and a special economic zone near Kyaukpyu. Reportedly, there were renewed efforts to construct a railway line from China's Yunnan to Kyaukpyu via Mandalay as part of the China-Myanmar Economic Corridor (CMEC).

Unlike India, China is a permanent member of the United Nations Security Council, which prompts many state and non-state actors in need of international support to be relatively more

Myanmar's border State and India's strategic interests

Map 1 shows the route of India's proposed Kaladan Multimodal Transit Transport Project, with Map 2 showing Chin State where current tensions are playing out. Chin State abuts Mizoram and Manipur in India. Table 1 outlines details of the Kaladan project



accommodating of China's concerns. Consequently, China is in a position to extend political and military support to various ethnic armed groups as well as to the Myanmar military to protect its economic interests.

There are important takeaways from the progress of the Kaladan project. Since India is a liberal democracy, its external engagement will be closely monitored for its impact on sectarian/identity-based violence in its neighbourhood. While security agencies will constantly evaluate the modalities of engaging with armed groups on India's borders, there is a need to scale up humanitarian and development assistance in coordination with a broader spectrum of ethnic organisations and local people to expedite

projects such as Kaladan.

The successful completion of the Kaladan not only requires competent technical personnel but also experts who can diligently monitor the fluid Chin-Arakan ethnic relations, the changing contours of military-EAO contestation, sectarian violence in the Rakhine state, and the growing Chinese footprint in Myanmar, specifically in the Rakhine state. The Kaladan experience suggests that perhaps it is time to bring such experts under one roof to expedite the implementation of various other connectivity and development assistance projects in India's immediate neighbourhood.

Sanjay Pulipaka is the Chairperson of Politeia Research Foundation

THE GIST

Ethnic Armed Organisations and the People's Defence Forces control many towns in different parts of Myanmar. A few weeks ago, the Arakan Army captured Paletwa in the Chin State which lies on Myanmar's western borders with Bangladesh and India.

The developments in Paletwa will impact the Indian government's Kaladan Multimodal Transit Transport Project (KMTP) in Myanmar, which has already faced significant delays. The Kaladan project was aimed at addressing the geo-economic and geo-political challenges of northeast India.

The Arakan Army, along with the Myanmar National Democratic Alliance Army and the Ta'ang National Liberation Army, is part of the Three Brotherhood alliance, which some claim has China's support.

INBRIEF



Patna Pirates overcomes Jaipur Pink Panthers

Patna Pirates edged past Jaipur Pink Panthers 36-33 in the Pro Kabaddi League in Delhi on Monday. Arjun Deshwai of Pink Panthers and M. Sudhakar of Pirates earned Super 10s. Pirates continued its unbeaten run to six matches.

Atletico Madrid holds rival Real in a thriller

Marcos Llorente's header in the 93rd minute helped Atletico Madrid snatch a 1-1 draw against Real Madrid on Sunday.

The results: LaLiga: Real Madrid 1 (Diaz 20) drew with Atletico Madrid 1 (Llorente 90+3).
Serie A: Inter Milan 1 (Gatti 37-og) bt Juventus 0; Napoli 2 (Ngongne 79, Kvaratskhelia 87) bt Verona 1 (Coppola 72).

Deepthi on the prowl as TN beats Maharashtra

Deepthi (37 points) powered Tamil Nadu to a 93-84 win over Maharashtra in the 73rd Junior National basketball at Bhubaneswar on Monday.

The results: Men: MP 69 bt Kerala 67; AP 76 bt Karnataka 74; Rajasthan 87 bt Chandigarh 64; UP 105 bt Mizoram 49.
Women: Karnataka 80 bt Chandigarh 79; Punjab 87 bt Haryana 51; Chhattisgarh 77 bt UP 56; TN 93 bt Maharashtra 86.

Odisha FC eases past Hyderabad FC

Hyderabad FC lost 0-3 to Odisha FC in the ISL in Hyderabad on Monday. Diego Mauricio bulged the net in the 27th and 75th minutes and Roy Krishna struck in first half extra time for Odisha.

The result: Hyderabad FC 0 lost to Odisha FC 3 (Mauricio 27, 75, Krishna 45+1).



Putting his head down: Dhull ensured there were no alarms for Delhi in the second essay.
SHIV KUMAR PUSHPAKAR

Baroda wins three points, consolidates top spot

The visitors force Delhi to follow-on before the match ends in a draw; the host is out of contention for a knockout spot

RANJI TROPHY

Rakesh Rao
NEW DELHI

Baroda forced Delhi to follow on before their Ranji Trophy match ended in a draw here on Monday. The result helped Baroda consolidate its position at the top of Group-D with 23 points.

Delhi gained one point and with eight in its kitty and two more matches to go, Delhi is out of contention for a place in the knockout phase. Delhi resumed its second innings on the final day at 113 for four and was bowled out for 177.

Baroda, by virtue of a

massive first innings lead of 258 runs, enforced the follow-on.

Good response

But this time, Delhi responded better with openers Yash Dhull and Arpit Rana raising 64 runs to thwart Baroda's plans of putting the host under early pressure.

Soon after the fall of Rana, the captains agreed to an early end to the match.

The scores:

Baroda — 1st innings: 435
Delhi — 1st innings: Arpit Rana b Sopariya 8, Shivank Vashisht c Mitesh b Sheth 9, Jonty Sidhu b Bhatt 40, Himmat Singh b Sheth 5, Ayush Badoni c Shivalik b Sheth 44, Lakshay Thareja c Rawat b Sopariya 6, Pranshu

Vijayraj lbw b Pathan 7, Hrithik Shokeen c Mitesh b Bhatt 17, Yash Dhull c Solanki b Pathan 17, Ishant Sharma c Jyotsnil b Hatt 0, Himanshu Chauhan (not out) 0; Extras (b-21, lb-1, nb-2): 24; Total (in 56.2 overs): 177.

Fall of wickets: 1-12, 2-35, 3-48, 4-108, 5-120, 6-138, 7-138, 8-173, 9-173.

Baroda bowling: Atit Sheth 14-3-39-3, Soyeb Sopariya 15-0-2-38-2, Mahesh Pithiya 9-3-20-0, Babashafi Pathan 11.2-2-40-2, Bhargav Bhatt 7-3-18-3.

Delhi — 2nd innings: Yash Dhull (not out) 39, Arpit Rana b Pithiya 28, Jonty Sidhu (not out) 1; Total (for one wkt. in 34 overs): 68.

Fall of wicket: 1-64.

Baroda bowling: Sheth 3-0-9-0, Bhatt 10-5-8-0, Sopariya 3-1-5-0, Pathan 6-1-16-0, Pithiya 11-5-23-1, Shivalik Sharma 1-0-7-0.

RANJI TROPHY SCORES ROUND 5, DAY 4

Elite: Group A: At Jamshepur: Manipur 170 & 232 in 93.3 overs (Ronald Longjam 41, L.M. Keishangbam 88) lost to Jharkhand 504/5 decl.
Jharkhand 7(10), **Manipur** 0.
Jaipur: Rajasthan 432 drew with Vidarbha 391 in 125.3 overs (Yash Rathod 81, Karun Nair 112, Mohit Kale 48, Akshay Wadkar 59, Manav Suthar 5/133). **Rajasthan** 3(19), **Vidarbha** 1(20).
Group B: Patna: Bihar 182 & 124 in 51.1 overs (Lalith Mohan 4/35) lost to Andhra 463.
Andhra 7(22), **Bihar** 0(5).
Raipur: Kerala 350 & 251/5 decl. in 52.2 overs (Sachin Baby 94, Mohammed Azharudeen 50 n.o.)

drew with Chattisgarh 312 & 79/1 in 22 overs. **Kerala** 3(8), **Chattisgarh** 1(12).
Kanpur: UP 548/8 decl. drew with Assam 316/2 in 113 overs. (No play). **UP** 1(12), **Assam** 1(2).
Group C: Chandigarh: Punjab 477/2 drew with Chandigarh. (No play). **Punjab** 1(9), **Chandigarh** 1(4).
Porvorum: Goa 241 & 168 lost to Tamil Nadu 273 & 142/3 in 49.5 overs (S. Lokeshwar 52, Pradosh Ranjan Paul 65). **Tamil Nadu** 6(21), **Goa** 0(4).
Group D: Cuttack: Odisha 322 & 201 in 68 overs (Govinda Poddar 46, Sagar Udeshi 4/45) drew with Pondicherry 284 in 86.2 overs (K.B.

Arun Karthik 110, Krishna Pandey 42) & 175/8 in 56 overs (Paras Ratnaparkhe 72, Arun Karthik 58 n.o.). **Odisha** 3(12), **Pondicherry** 1(13).
Delhi: Baroda 435/9 decl. drew with Delhi 177 in 56.2 overs (Jonty Sidhu 40, Ayush Badoni 44) & 68/1 in 34 overs. **Baroda** 3(23), **Delhi** 1(8).
Dharamshala: Himachal 169 & 42/5 in 23 overs (Anubhav Agarwal 4/6) drew with MP 217 in 71.4 overs (Venkatesh Iyer 72, Rishab Chouhan 57, Vaibhav Arora 4/83). **MP** 3(19), **Himachal** 1(4).
Jammu: J&K 168/2 in 39 overs drew with Uttarakhand. (No Play).
J&K 1(12), **Uttarakhand** 1(8).

Lakshya Sen focused on Olympic qualification

N. Sudarshan
BENGALURU

The last two years have been bittersweet for Lakshya Sen. In 2022, he was the toast of the nation, after winning gold medals at Thomas Cup, Commonwealth Games and India Open, and reaching the final at the prestigious All England. In contrast, 2023 was a near-washout, with the only successes being the title at the Canadian Open and the historic team silver at the Asian Games.

One month into the 2024 season, the 22-year-old is hoping that his capricious fortune finally settles. Recently, at the Indonesia Masters, he won his first competitive match since beating World No.2 Shi Yu Qi at the Asian Games (September 2023).

"It was a relief," Lakshya told *The Hindu*, during an interview arranged by *Red Bull*, about snapping the six-match losing streak.

"It was a close match against a tough opponent



Lakshya.

(Weng Hong Yang). I felt more confident to play the next round as well.

"I played a good match against [Anders] Antonsen and later on he went on to win the tournament. It was just a matter of two, three points. So lots of positives to take," he added.

After breaking out of the rut, Lakshya's eyes are now firmly set on the Paris Olympics. With the qualification window set to end on April 28, he has just a handful of tournaments to secure his place.

In the 'Race to Paris' rankings, he is 19th; only the top 16 will qualify.

"There has been a lot of pressure but as an athlete you have to face it," Lakshya said. "It's my first Olympic qualification experience. I too made mistakes and I'm learning."

"Now, I see it as a challenge. When people are not expecting that much, you can play freely but at the same time, a lot is at stake. I have to be really focused and sharp for the next three months."

For inspiration, he needs to look no further than P.V. Sindhu, who has moved to the Padukone-Dravid Centre for Sports Excellence here to train under the Prakash Padukone and Vimal Kumar, also Lakshya's coach.

"Something to learn from her is how focused and how passionate she is even after two Olympic medals. She is going out there [on to the court] even harder to get the third one. It's really motivating."

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'Son' rises for South Korea with hopes of ending 64-year-old drought in AFC Asian Cup

Son Heung Min, the talisman who had left Qatar as a boy in 2011, is proving to be the country's main man in 2024, steering it to the semifinals



AFP

Neeladri Bhattacharjee

South Korea has drawn 2-2 with Japan in the AFC Asian Cup semifinal. An air of tense trepidation surrounds Qatar as both sides take spot-kicks. Japan scores thrice in its four attempts while Korea fails to convert a single opportunity.

In a few moments, the game is done and dusted. The Taeguk Warriors sink to the ground, with an 18-year-old weeping profusely at the Thani bin Jassim Stadium. His and the country's continental dreams are shattered. Korea is out.

Thirteen years later, on a cold Friday night in the same country, that youngster, now a Premier League star with the captain's armband on him, stood with the score 1-1 in a quarterfinal. Korea - playing 30 kilometres off that field where Japan knocked it out - had got a free-kick against Australia just outside the penalty box.

He placed the ball, looked up and then lashed in a right-footed curler which rattled the net after a touch off Mathew Ryan. Australia one, South Korea two.

When the full-time whistle blew, he dropped to the ground again - his eyes, full of tears. But this time, he stood on the other side of the cruel game, known otherwise as football.

Son Heung Min, the talisman who left Qatar as a boy in 2011, proved to be the man in 2024, to rescue his side and steer it to the semifinals.

He earned a penalty, three minutes into

the second half injury time, which was converted by Hwang Hee-Chan and then netted the winner.

"He was having difficulty in keeping his opponent's movements in check initially (in the tournament). Perhaps due to the pressure on him, he has not been able to leave a solid impact like Tottenham matches," Do-Yong Kim, a Korean journalist from Doha, told *Sportstar*.

"But tonight, he proved to be an ace by playing a decisive role in the match. Now I can see why he is attracting a lot of fans' attention at this tournament."

The goal was iconic in a number of ways. In the 2015 Asian Cup final, Son forced the match into extra-time with a stoppage-time equaliser and his team went on to lose the match 1-2 in extra-time. The opponent - Australia. Its coach? Ange Postecoglou, his current club manager.

Like Father like Son

Son's winner in the last moment brought flashes of a rather low-profile game played 40 years ago between Myongji University and Sangmu FC (now known as Gimcheon Sangmu FC) at the President's Cup National Football Tournament.

Trailing 0-2 at one point, Myongji made a comeback, winning the match 3-2. The scorer of the winning goal - Son Woong-Jung, the father of the current Tottenham and Korean skipper.

Though Woong-Jung could play only till the second team of South Korea, it was under his tutelage that Son grew up to

arguably become the best player in Asia.

"When I was 10 or 12, he came in to coach my school team and we were training, 15 or 20 players. The programme was for us all to keep the balls up for 40 minutes," Son told *The Guardian*.

"When someone dropped the ball, my father would not say anything. But as soon as I dropped it, he made us all start over from the beginning. The players understood, because I was his son and, yeah, it was tough. But when you think about it now, this was the right way."

Son went on to shine at the 2009 FIFA U-17 World Cup, scoring three goals and taking his side to the quarterfinals. Eventually, Europe came calling.

The forward moved to Hamburg, honing his attacking skills with Dutch great Ruud Van Nistelrooy.

But it was at Tottenham Hotspur that he became a star - a figure beyond the stature of Cha Bum-kun and Park Ji-Sung, both being legends in their own right.

In over eight years, he has become the highest Asian goalscorer in the Premier League and the Champions League, has won the Premier League Golden Boot as the only Asian footballer and has more assists than any Tottenham player in the club's history.

Tottenham became 'Son's team' in Korea and not the other way around.

"He is like David Beckham. Men and women of all ages like him," Do-Yong said, "Thanks to Son, Tottenham has become a popular club in Korea. Expectations are

high always for him in the national team games."

Despite individual accolades, Son's quest for success with the national team remains a fly in the ointment. His three World Cup appearances yielded only a single Round-of-16 berth in 2022.

The Asian Cup hasn't been much kinder, with the closest achievement being a runners-up finish in 2015 when the Socceroos sealed the title.

But at 31, with the next Asian Cup potentially marking his twilight, this edition carries immense weight.

It's the perfect opportunity for the gifted forward to clinch the title which has eluded his country for over six decades.

Inspired by Lionel Messi's World Cup triumph in Qatar, Son, with three goals scored, two penalties earned and eight chances created, looks to try his luck on the same promised land to get his hands on the AFC Asian Cup.

And he, like Messi, has the whole team fired up with the same agenda.

"Everyone in the locker room and people back home are waiting for us to win this tournament. We have not won it for the last 64 years," Lee Kang-In said.

"We are hungry and motivated for the tournament. All of us, the coach, the players and the entire staff."

The 'Son' has risen beyond South Korea. And the Asian Cup, with his worldies, is now shining brighter in his light.

THE GIST

▼ Son forced the 2015 Asian Cup final into extra-time with a stoppage-time equaliser and his team went on to lose the match 1-2 in extra-time against Australia

▼ The opposition was coached by Ange Postecoglou, his current club manager

▼ He has become the highest Asian goalscorer in the Premier League and the Champions League, has won the Premier League Golden Boot as the only Asian footballer and has more assists than any Tottenham player in the club's history

Sunil targets Asian qualifying event

Y. B. Sarangi
JAIPUR

Asian Games bronze medallist Greco Roman wrestler Sunil Kumar has been consistently winning medals at the continental level and is eager to make his mark in the Paris Olympics.

Sunil, who has won a gold and silver apiece and two bronze medals in the Asian championships in the last few years and earned a podium finish in the Hangzhou Asian Games to end the country's 13-year-old medal drought, asserted his supremacy once again at the domestic level by claiming the 87kg title in the National wrestling championships at the Railway Stadium here.

Now, Sunil wants to shift gears for the upcoming Asian qualifying event for the Olympics in April. "My target is to qualify (for the Olympics) in the Asian qualifying event. To prepare for that, I will travel with a training partner to Azerbaijan to train there for 25 days. The Sports Authority of India (SAI) is supporting me in this," Sunil told *The Hindu*.

"In our country, it is hard to find



Sunil Kumar. Y.B. SARANGI

good sparring partners. In Greco Roman wrestling, ground wrestling is important. It is easier to find good sparring partners in Azerbaijan. They conduct camps in which wrestlers from various countries participate. I keep in touch with the coaches over there and one such interaction helped me find this opportunity," said Sunil, who would leave for his overseas camp on Thursday.

Following a memorable 2023, in which he won an Asian Games medal and bagged the prestigious Arjuna award, the 25-year-old Sunil is motivated to raise his performance. "I was delighted that I could win an Asian Games medal for the country after 13 years. This will inspire other wrestlers to work hard and bring laurels. I will also try to win more medals for the country in upcoming major events."

Nurturing a winner's attitude has also boosted Sunil. "Before a bout, I tell myself that when the bout ends my hand should go up. The scores can be up and down during a fight, but I focus on winning the bout. I begin slowly and don't get aggressive from the very start. My stamina is my strength."

Sharing his success mantra which has enabled him to be consistent, Sunil said, "An athlete has to set his own targets and do a lot of sacrifices and work with dedication in order to achieve something significant. I keep on doing that. The countrymen's love and goodwill also inspire me," said Sunil.

'Opportunity for youngsters to get familiar with style of best teams'

Press Trust of India
BHUBANESWAR

Captain Harmanpreet Singh wants the young Indian hockey players to get familiar with the playing styles of the best teams in the world during the FIH Pro League, and hoped the country would seal a direct qualification for the 2026 World Cup with a title-winning run here.

The Indian men's hockey team arrived on Monday to participate in the Pro League scheduled at the Kalinga Hockey Stadium from February 10 to 16 and Birsamunda Hockey Stadium in Rourkela from February 19 to 25.

India narrowly missed out on a podium finish in the previous season, finishing fourth behind the Netherlands, Great Britain, and Belgium.

"We have just come back from a successful tour in South Africa where we played against France, South Africa, and the Netherlands to begin the Pro League in the best shape possible," Harmanpreet said in a Hockey



Harmanpreet. FILE PHOTO: B. JOTHI RAMALINGAM

India (HI) release.

"A few young players have been included in the squad this time and this

will be a great opportunity for them to familiarise themselves with the play style of some of the best teams in the world."

Five national teams - Ireland, the Netherlands, India, Spain and Australia - will participate in the India leg of the Pro League, facing each other once in Bhubaneswar and once in Rourkela.

"We are taking the Pro League very seriously as winning it would not only mean direct qualification for the FIH Hockey World Cup 2026 but these games will also be crucial in the build-up to the Paris 2024 Olympics," Harmanpreet said.

India will take on Spain in their first match of the season on February 10, followed by a clash with the best-ranked team in the world, the Netherlands, on February 11.

After a brief break, the hosts will take on Australia on February 15, before they face Ireland in the last match of the Bhubaneswar leg on February 16.

The unusual cabbage mutation that could boost crop yield

Forty-four years ago, people found a plant that couldn't make pollen. All the seeds from these plants were the result of their eggs being fertilised by pollen from plants of other strains; none came from the same strain. The former seeds germinated to produce more robust plants

D.P. Kasbekar

The males of plants as diverse as cabbage, cauliflower, broccoli, tomato, and rice can be made sterile by deleting a very small part of their genome's DNA. This is the take-home message of a paper published in the journal *Nature Communications* in October by researchers at the State Key Laboratory of Vegetable Biobreeding of the Chinese Academy of Agricultural Sciences, Beijing.

The simple deletion resulting in such a drastic outcome brings to mind the story of a kingdom that was lost for want of a horseshoe nail. But here, instead of loss, the researchers assure us of a gain: that the deletion could lead to an abundant harvest of these plants, thanks to a process called heterosis.

Genes and promoters

The DNA molecule consists of two long strands. Each strand is composed of four compounds called nucleotide bases. They are designated A, C, G, and T for simplicity (for adenine, cytosine, guanine, and thymine respectively). An A on one strand makes chemical bonds, called hydrogen bonds, with a T on the other and a C on one strand makes hydrogen bonds with a G on the other.

The bonds between As and Ts and the bonds between Gs and Cs hold the two DNA strands together. A base-pair, or bp for short, is a single A-T or G-C pair between the two strands, with the dash denoting the bond.

The genome of the cabbage plant (*Brassica oleracea*) consists of around 1.06 billion base-pairs organised in 18 chromosomes, which every cell holds in nine pairs of two each. In each pair of two chromosomes, one chromosome comes from the pollen and the other comes from the egg. The DNA (which is all the base-pairs together) in every chromosome pair share a mostly identical sequence of base-pairs.

A *gene* is a well-defined sequence of typically a few thousand base-pairs, or a few kilo base-pairs (kbp), in the DNA molecule. When a gene is expressed, it means a segment of the base sequence on one of its strands is copied into the sequence of bases in a related molecule, called RNA.

DNA and RNA are the master and working copies of a gene. The RNA is loaded into a cellular machinery called the ribosome. The ribosome uses the base sequence of RNA to specify the sequence in which amino acids are linked together to create the protein encoded by the gene.

In short, a gene's DNA sequence defines the amino acid sequence of its encoded protein and the protein's structure. The cell uses the RNA and the ribosome to manufacture this entity.

Pollen loss promotes heterosis

Around 44 years ago, people found a cabbage plant that contained a natural mutation. As a result of this mutation,



Males of many plants can be made sterile by deleting a small part of their DNA. SCOTT WEBB/UNSPLASH

they found that the plant had lost the ability to make pollen.

At first, scientists didn't know which particular gene in the plant had been mutated. They only named the altered gene, whichever it was, *Ms-cd1*.

The mutation's effect was to make the plant male-sterile, but they had no other defects. In fact, the eggs of the mutant plant could be fertilised by pollen from a normal plant, and the fertilised eggs would go on to make normal seeds.

In other words, all the seeds from the mutant plants were the result of the plants' eggs being fertilised by pollen from plants of other strains - a process called out-crossing. None of their seeds came from self-crossing. (In a self-cross, an egg is fertilised by pollen of the same strain.)

Out-cross seeds - which are also called hybrid seeds - germinate to produce more robust plants than self-cross seeds. This is because of a phenomenon called hybrid vigour or, in technical terms, *heterosis*.

The missing base-pair

The researchers who conducted the new study showed that seeds from the male-sterile plant consistently made bigger cabbages.

Specifically, they found that the *Ms-cd1* mutation was dominant - meaning that if the mutant gene was present in only one of the chromosomes of the pair, the plant wouldn't be able to make pollen. It didn't matter if the other chromosome had a non-mutated gene.

Dominant mutations are relatively rare. Mutations are commonly recessive, meaning the same gene has to be mutated



Researchers who conducted the new study showed that seeds from the male-sterile plant consistently made bigger cabbages

in both chromosomes for its effects to be expressed. Fortunately for us, it is easier to scale up the production of hybrid seeds using dominant male-sterile mutations. One part of this process has to do with fine-tuning protein levels when making pollen.

As it happens, it's not necessary that all of a gene's DNA sequence is copied into RNA. Some sequences aren't copied, and one of them is the *promoter*. This sequence binds to regulatory proteins that determine when and in which cells a DNA sequence is copied to RNA.

The *Ms-cd1* gene of cabbage is about 6 kbp long. Its promoter binds to a regulatory protein called ERF. This binding keeps the *Ms-cd1* gene from being expressed.

Using an approach called genetic mapping, the researchers found that the only difference between a mutated *Ms-cd1* gene and a non-mutated *Ms-cd1* gene was that the promoter in the former was missing one DNA base-pair. This minuscule absence destroyed its ability to bind to ERF. As a result, the *Ms-cd1* protein continued to be expressed when in fact it should have been repressed.

The eventual outcome: the plant couldn't produce pollen and became

male-sterile.

A fine balance

The researchers also induced mutations of their own in mutated and non-mutated copies of the *Ms-cd1* genes, and in both cases the mutant became recessive. That is, plants with one (additionally) mutated copy and one normal copy were male-fertile.

The team also found that the dominant and the recessive mutations derailed pollen development in different ways - which was an indication that the plant makes pollen properly only if it can make the *Ms-cd1* protein in copious amounts at some stages, while in other stages its levels are repressed by ERF binding to the gene's promoter.

If either the protein is not made at all or isn't repressed in a timely manner, the plant loses the ability to make pollen and becomes male-sterile. So as such, proper pollen development depends on a fine balance of the *Ms-cd1* protein's levels.

The researchers also introduced the (dominant) mutant gene into other plant species, such as rice, tomato, and *Arabidopsis thaliana*, a favourite of plant biologists for research. In every case the recipient plants failed to make pollen. This showed that the pollen development pathway, along with the ways in which a plant can fine-tune it, works similarly across plant species.

So deleting the base-pair offers us a new tool to produce hybrid seeds in these and other crops.

That's one small deletion for a genome, one giant cornucopia for humankind. (The author is a retired scientist.)

THE SCIENCE QUIZ

On this day last year, deadly earthquakes struck Turkey and Syria

Vasudevan Mukunth

QUESTION 1

The region where the major earthquakes occurred - straddling a part of Turkey's south and a part of northwest Syria - is at the junction of three tectonic plates: the _____, the Arabian, and the Anatolian. This is called the Maraş Triple Junction. Fill in the blank.

QUESTION 2

Name the fault that goes from the Maraş Triple Junction to the Karlova Triple Junction (where the Anatolian, Arabian, and the Eurasian tectonic plates meet). The two deadly earthquakes on February 6 occurred along this fault.

QUESTION 3

Both the major earthquakes were transcurrent-fault quakes, with hypocentres 5-10 km and 5-13 km underground. What is the more common name for a transcurrent fault?

QUESTION 4

The two earthquakes triggered separate aftershock sequences. The second earthquake, measuring 7.7 on the moment magnitude (M_w) scale, had two aftershocks that measured up to 6 on the mB scale. What does mB stand for?

Question 5
On the _____ scale, the Turkey-Syria earthquakes had a maximum intensity of "XII. Extreme" - the highest. This scale is named for a volcanologist and Catholic priest. Fill in the blanks.

Answers to February 1 quiz:

- Origin of insulating foam whose displacement led to the Columbia disaster - **Ans: External fuel tank**
- Israel's first astronaut who was onboard Columbia - **Ans: Ilan Ramon**
- Statistician whom NASA consulted to prevent similar disasters - **Ans: Edward Tufte**
- Place to which shuttle crew had to move while waiting for rescue mission - **Ans: International Space Station**
- First Space Shuttle mission after Columbia, on July 26, 2005 - **Ans:**

Discovery

Visual: **Ravi Shankar**; on day 7 of the mission, Mission Control awakened Kalpana Chawla in the morning with the song 'Prabhati' played by him
First contact: Kiran Gadakar | K.N. Viswanathan | Isha Joshi | Muhammed Shahid Suri

Answers to February 2 quiz:

- Major cause of lung cancer in India - **Ans: Air pollution**
- Two Asian countries apart from India recording high cancer burden - **Ans: China and Japan**
- Cancer which is among the top five that affects women in Asia and vaccine India approved to prevent it - **Ans: Cervical cancer, CERVAVAC**
- State with highest cancer rate in India - **Ans: Mizoram**
- Cancer known by two names, thought to be caused by cloth tied around the waist - **Ans: Dhoti/saree cancer**

Visual: V. Shanta

First contact: Viswanathan Neelakantan | Muhammad Shahi Suri | Vikas Singh



Houses destroyed by last year's earthquake, in Hatay, Turkey. The magnitude 7.8 tremor levelled towns in the country's southeast. It killed more than 53,000 people in Turkey and nearly 6,000 in neighbouring Syria. REUTERS



China has taken the open source route to evade sanctions. REUTERS

China bets on open-source chips to evade sanctions

Reuters

When a Beijing-based military institute in September published a patent for a new high-performance chip, it offered a glimpse of China's bid to remake the half-trillion dollar global chip market and withstand U.S. sanctions.

The People's Liberation Army's (PLA) Academy of Military Sciences had used an open-source standard known as RISC-V to reduce malfunctions in chips for cloud computing and smart cars, the patent filing shows.

RISC-V is an instruction set architecture, a computer language used to design anything from smartphone chips to advanced processors for artificial intelligence.

The most common standards are controlled by Western companies: x86, dominated by U.S. firms Intel and Advanced Micro Devices, and Arm, developed by Britain's Arm Holdings, owned by SoftBank Group.

Beijing and dozens of Chinese state entities and research institutes, many sanctioned by Washington, invested at least \$50 million in projects involving RISC-V between 2018 and 2023

U.S. and UK export controls prevent the sale of only the most advanced x86 and Arm designs - which produce the highest-performance chips - to clients in China.

But as the U.S. widens restrictions on China's access to advanced semiconductors and chip-making equipment, the open-source nature of RISC-V has made it part of Beijing's plan to curb its dependence on Western technology, although the emerging architecture accounts for a fraction of the chip market.

"The biggest advantage of the RISC-V architecture is that it is geopolitically neutral," the Shanghai government's Science and Technology Commission said in a report published in April.

Beijing and dozens of Chinese state entities and research institutes, many sanctioned by Washington, invested at least \$50 million in projects involving RISC-V between 2018 and 2023, according to a Reuters review of over 100 Chinese-language academic articles, patents, government documents and tenders, as well as statements from research groups and companies.

While the figure is modest, recent RISC-V breakthroughs and applications in China, many with government funding, have raised Beijing's hopes that the open-source standard could one day threaten the x86-Arm duopoly, according to state media. Intel and AMD did not respond to questions about the matter, while Arm declined to comment.

RISC-V chips made by Chinese firms and research institutes can now power self-driving cars, artificial-intelligence models and data-storage centres, according to two industry figures and the previously unreported documents.

The military science academy did not respond to a request for comment sent via China's State Council.

Arm and x86 are closed architectures, meaning they are proprietary and charge users a license fee. Their outlines are thousands of pages long, with complex instructions and numerous incompatible versions that can only be modified by their developers.

RISC-V is free to use and has a simpler outline, often leading to more energy-efficient chips, and users can build atop the framework to suit their needs.

Half of the more than 10 billion RISC-V chips shipped globally by 2022 were made in China, the state-run *China Daily* reported in August.

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