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- **Gene Therapy for sickle cell disease**
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By saurabh Pandey





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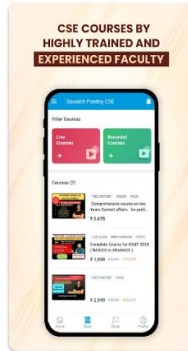
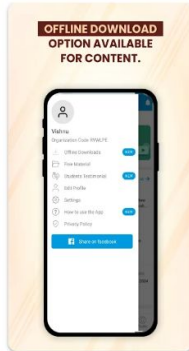
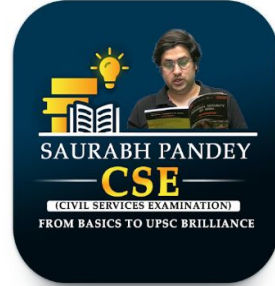
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Walk in the park



A one-horned rhinoceros and its calf wading through flood waters in the Pobitora wildlife sanctuary in Morigaon district of Assam on Wednesday. The monsoon has brought a measure of relief to animals dealing with extreme heat. RITU RAJ KONWAR

Pobitora Wildlife Sanctuary

- Pobitora Wildlife Sanctuary is a **wildlife sanctuary** on the southern bank of the **Brahmaputra** in **Morigaon district** in **Assam, India**.
- It was declared in 1987 and covers 38.85 km² (15.00 sq mi), providing grassland and wetland habitat for the **Indian rhinoceros**.
- It holds one of the largest Indian rhinoceros population in Assam

- It is known for holding the **highest density of Greater One Horned Rhinoceros** in the country.
- Pobitora Wildlife Sanctuary also known as **“Mini Kaziranga”** due to its comparable landscape and notable population of the one-horned rhinoceros.

India eyes breakthrough against sickle cell

Researchers working to develop gene therapy using CRISPR-Cas9, a gene-editing tool, to fight the genetic blood disorder that has a high prevalence rate among the Scheduled Tribes; Tribal Affairs Ministry wants ground-level healthcare workers such as ASHAs trained to screen for the disease

Abhinav Lakshman

NEW DELHI

India is getting closer to developing a gene therapy for sickle cell disease, a genetic blood disorder with a high prevalence rate among the Scheduled Tribes, officials of the Union Tribal Affairs Ministry said on Wednesday.

Vibhu Nayyar, Secretary, Tribal Affairs Ministry, said the government was expecting to hear “good news” by January 2025 on the laboratory tests that are being run.

M. Srinivas, Director of the All India Institute of Medical Sciences (AIIMS), said researchers were working to develop a gene therapy using CRISPR-Cas9, a gene-editing tool.

“We want that in the next six months to one year, we will be able to go forward with using this method for treating sickle

cell disease – making India one of the first countries to do so,” Mr. Srinivas said.

He was speaking at the National Conclave on Generating Awareness on Sickle Cell Disease, organised by the Tribal Affairs Ministry in collaboration with the Birsa Munda Centre at the AIIMS.

Union Tribal Affairs Minister Jual Oram, addressing the opening of the conclave, lauded the efforts but said it was important to involve and coordinate with ground-level healthcare workers such as ASHAs and anganwadi workers for these plans to be implemented properly.

“They will be the ones doing the heavy lifting on the ground,” Mr. Oram said.

Officials of the Tribal Affairs Ministry told *The Hindu* that the “good news” Mr. Nayyar was referring to was related to the tests that



Tribal Affairs Ministry official says the government was expecting to hear “good news” by January 2025 on laboratory tests being run. AP

are currently being run by the Council of Scientific and Industrial Research-Institute of Genomics and Integrative Biology (CSIR-IGIB).

“Following this, the tests will proceed to the next phase and eventually move on to being tested on patients,” a senior official said.

This comes months after the U.S. Food and Drug Administration approved the CRISPR-Cas9 technology for a cell-based gene therapy to treat sickle cell disease in December 2023.

Making it cost-effective

Ministry officials said one of the main challenges for India was to find a way to

make this therapy cost-effective. Developing a gene therapy using CRISPR has been part of India’s mission to eradicate sickle cell disease by 2047.

A government dossier on the mission, which was launched by Prime Minister Narendra Modi in July 2023, said the technology had “the potential to be a single dose cure for blood disorders like sickle cell anaemia”.

Part of this mission is to also conduct over seven crore screenings among vulnerable tribal populations across 17 States and Union Territories, of which three crore screenings have been achieved so far, Ministry officials said.

The CRISPR-Cas9 system consists of an enzyme that behaves like molecular scissors, which can be directed to cut a piece of DNA at a precise location. This will then allow a guide

RNA to insert a changed genetic code at the sites of the incision.

While there are a few ways to effect such changes, the CRISPR system is believed to be fast and the most versatile of all.

Addressing the gathering of doctors, experts, and healthcare professionals, Mr. Oram said the Union government was committed to working on the sickle cell disease eradication mission and called for officials from across Ministries and departments to ensure that grassroots workers were roped in for the implementation process and that they should themselves engage with them.

Following the addresses by senior officials and the Minister, a series of technical panel discussions were also held on recognising and screening for sickle cell disease, managing the disease, and other issues.

Gene Therapy for sickle cell disease

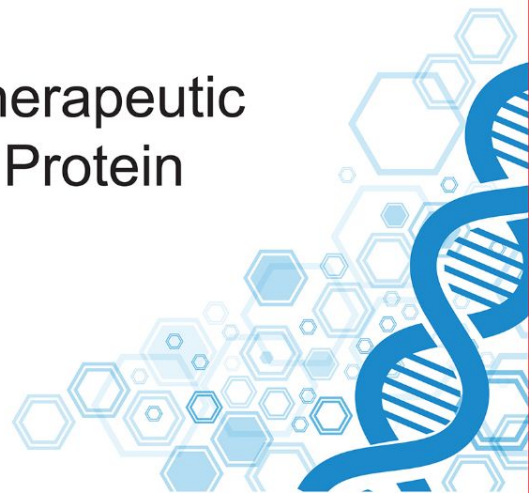
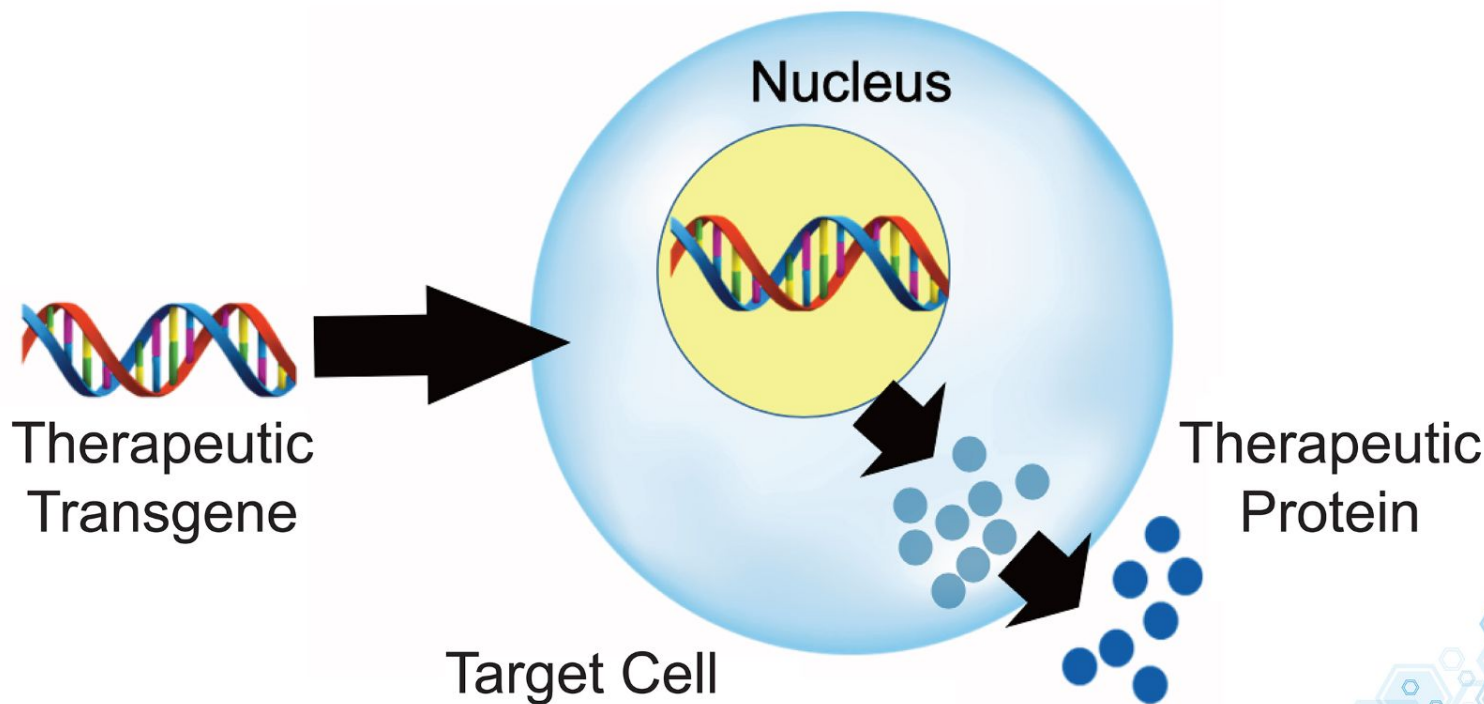
- **India is getting closer to developing a gene therapy for sickle cell disease, a genetic blood disorder with a high prevalence rate among the Scheduled Tribes.**
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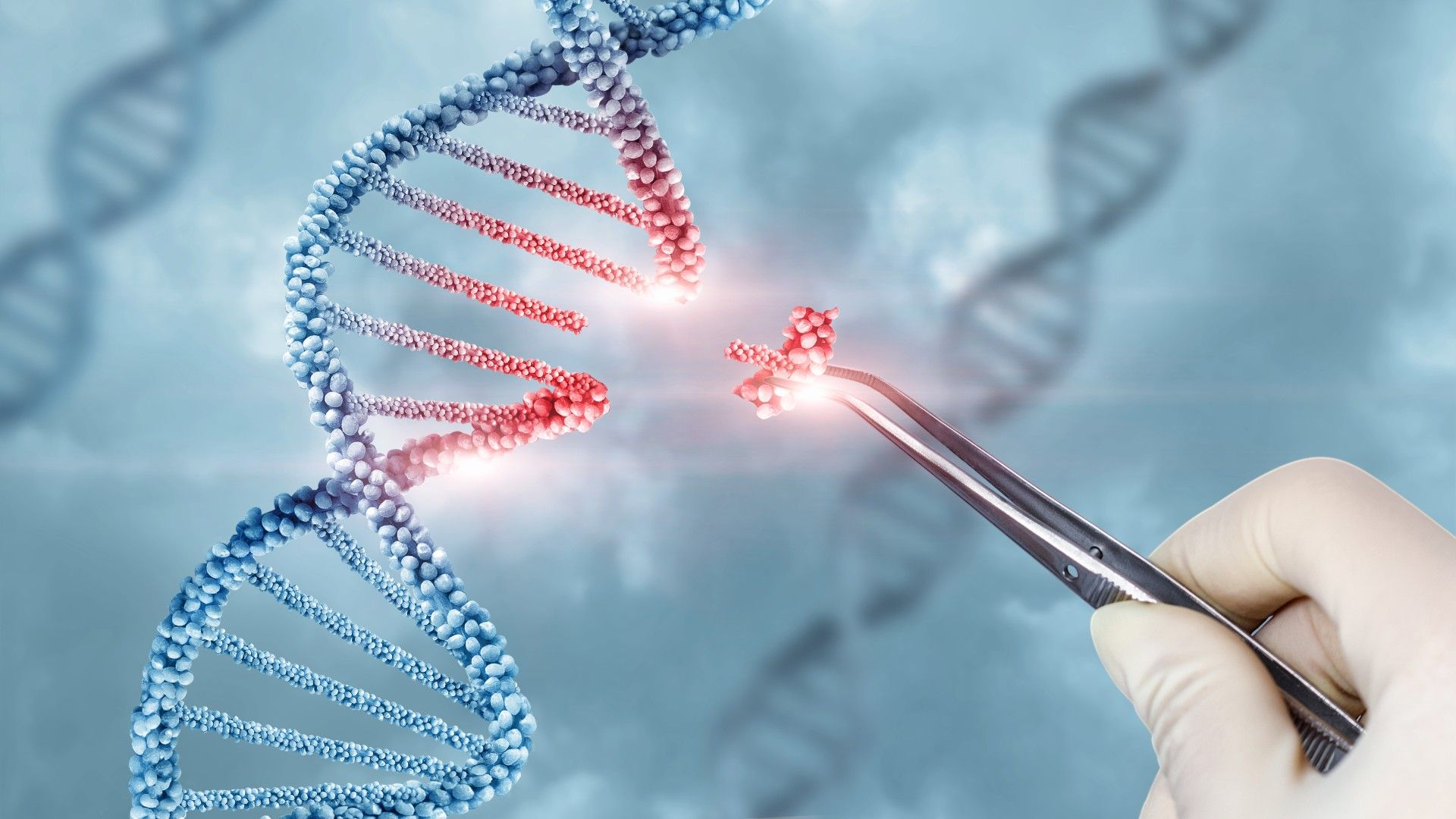
What is Gene Therapy??

- **Gene therapy aims to fix a faulty gene or replace it with a healthy gene to try to cure disease or make the body better able to fight disease.**
- **It holds promise as a treatment for a wide range of diseases, such as cancer, cystic fibrosis, heart disease, diabetes, hemophilia and AIDS.**



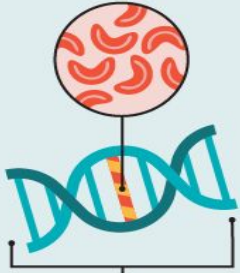
The Principle of Gene Therapy





Gene therapy to cure sickle cell anemia

1.
Extract stem cells
from patient's bone
marrow



2.
Infuse stem cells
with normal gene
for hemoglobin



3.
Condition
patient's bone
marrow to receive
new stem cells



4.
Insert treated
stem cells into
patient



What are Sickle Cell Disorders?

- A group of disorders that cause red blood cells to become misshapen and break down.
- The cells die early, leaving a short age of healthy red blood cells and can block blood flow causing pain.



Types:

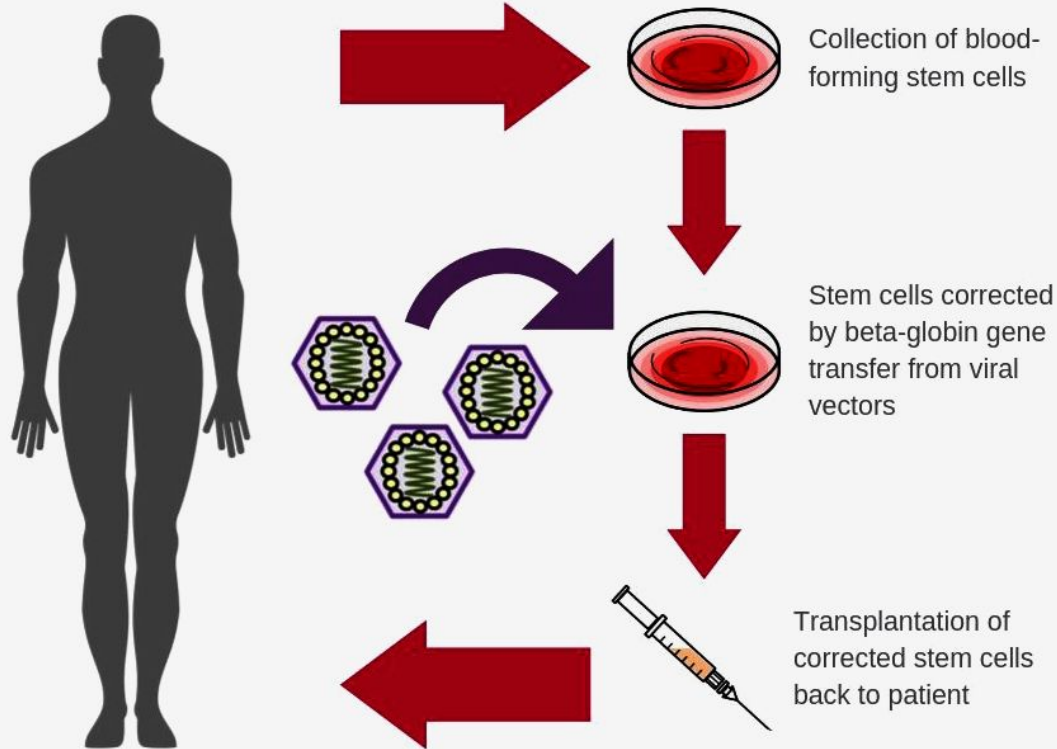
Sickle Cell Anaemia

Dysfunctional red cells due to abnormal haemoglobin

Sickle Cell Crisis

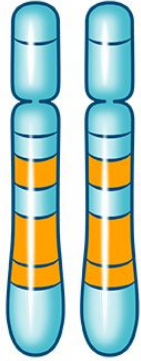
Blockage of blood vessels causing severe pain or organ damage

Gene therapy for sickle cell disease



What is Sick Cell Disease (SCD)?

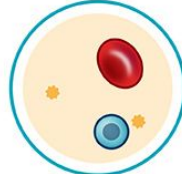
Chromosome 11



Two copies of a mutated Hemoglobin Subunit Beta (HBB) gene



Pain crises due to ischemia



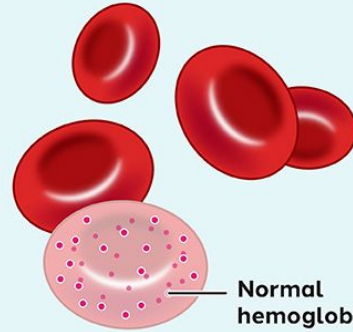
Anemia



Susceptibility to infections

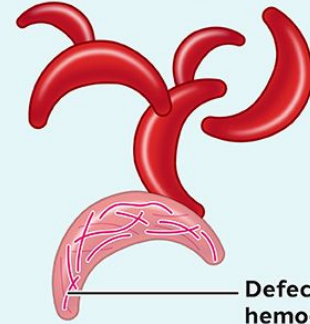


Normal red blood cells



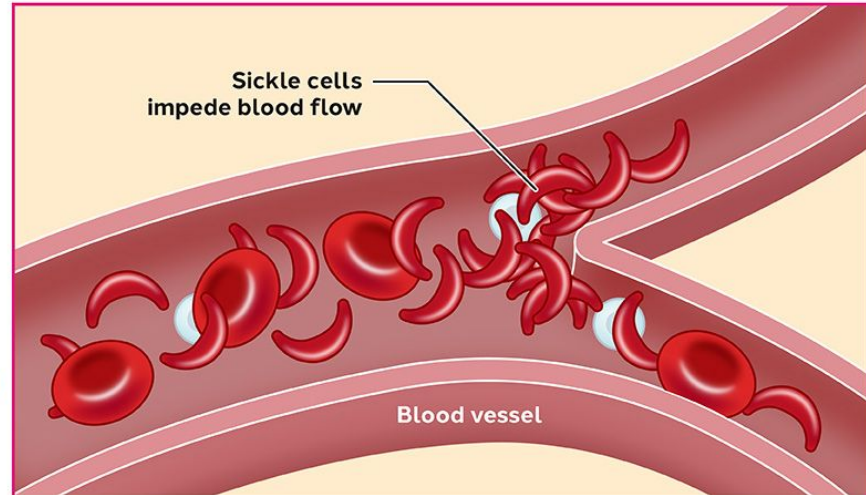
Normal hemoglobin

Sickle cells



Defective hemoglobin

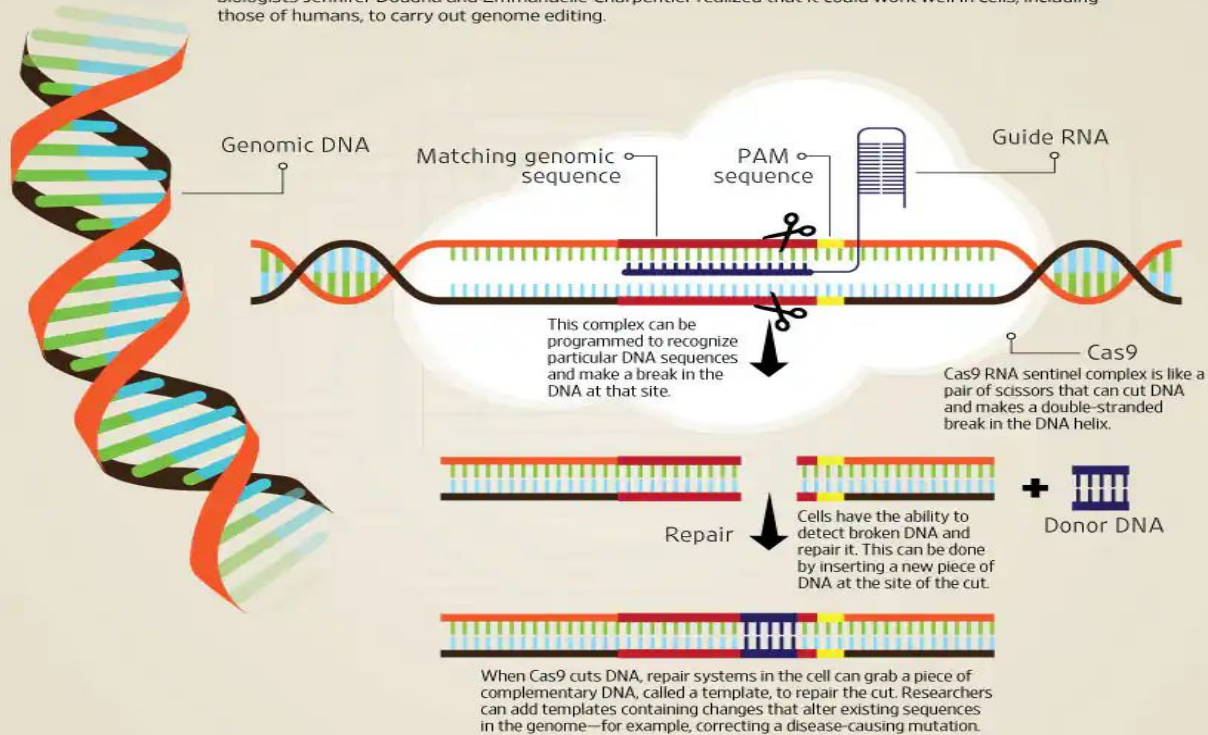
Sickle cells impede blood flow



Blood vessel

HOW CRISPR WORKS

CRISPR-Cas9, abbreviated from clustered regularly-interspaced short palindromic repeats, is a hybrid of protein and ribonucleic acid (RNA) which works as an efficient hunt-and-cut system in bacteria. Molecular biologists Jennifer Doudna and Emmanuelle Charpentier realized that it could work well in cells, including those of humans, to carry out genome editing.



- When viruses infect a cell, they inject their DNA. In bacterium, the CRISPR system allows that DNA to be plucked out of the virus and inserted in little bits

into the chromosome of the bacterium.

- These integrated bits of viral DNA get inserted at a site in the bacteria.

- CRISPR allows cells to record over time the viruses that they have been exposed to, so that cells are protected from those viruses.

How will AI that predicts protein structures change the life sciences?

"If the protein folding problem was set to us by God to teach us how to learn molecular interactions from first principles, we cheated; pharmaceutical researcher Derek Lowe told *The Hindu*. "We have figured out how they usually do it, even if we don't know why"

Rohini Subrahmanyan

Proteins are one of the most important molecules of life, with almost every biological function from birth to death being regulated by them in some way. Each protein is made up of a string of smaller building blocks called amino acids, which contain all the information to transform proteins – from a single sequence to a folded, functional 3D structure.

The steps a protein takes to go from its straight form to its final form are too many to count and too hard to follow, leaving the question of how every protein folds – the famous protein-folding problem – unanswered. "If you want to understand the molecular basis of how cells work, how organisms work, how life works, you need to understand how proteins get their shape," Frank Uhlmann, a biochemist at the Francis Crick Institute in London, said.

Answers on machines

Things changed when Google DeepMind's protein-structure prediction software AlphaFold burst onto the scene in 2020. The highly improved AlphaFold 2 was introduced in 2021. AlphaFold uses machine learning and artificial intelligence (AI) to accurately predict protein structures from an amino acid sequence, seemingly solving the protein-folding problem without learning any of the deeper physical principles that drive this biological process.

"If the protein folding problem was set to us by God to teach us how to learn molecular interactions from first principles, we cheated," Derek Lowe, author of the *Science* column "In the pipeline" and long-time pharmaceutical researcher, told *The Hindu*. "We haven't learned a tremendous amount more about that. We have figured out how they usually do it, even if we don't know why. It's startling how it works as well as it does."

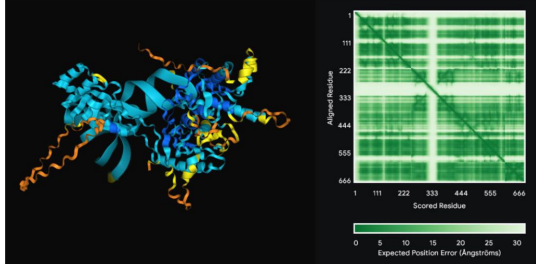
Now, in a *Nature* paper published in May 2024, scientists at DeepMind led by John Jumper introduced AlphaFold 3, building on its predecessors with even more transformative capabilities. AlphaFold 3 can predict protein-protein interactions as well as the structures of other molecules like DNA and RNA, along with the interactions of proteins with all these other compounds.

Democratising research

"AlphaFold 2 predicted the structure of proteins with revolutionary levels of accuracy," Josh Abramson, a research engineer at DeepMind and lead author of the new paper, told *The Hindu* in an email.

"AlphaFold 3 is even more accurate for proteins, but can also predict the structure of DNA, RNA, and all the other molecular components that make up biology. The interaction of all these biomolecules is what makes up the processes of life, so it is important to be able to predict the structure of these interactions."

Apart from being able to give us a lot more insight into biological processes, the new AlphaFold is also more usable by scientists who aren't experts in machine learning. Dr. Uhlmann, who has been using AlphaFold 3 to study how proteins



The three-dimensional structure of the protein-RNA ion PDB 6AW1, as predicted by AlphaFold 3. The plot on the right shows the expected position error in the prediction. ALPHAFOLD3/SERVE

and DNA interact in chromosomes, said, "You don't need to know anything about coding, nor literally everybody can do it. All you need is a Google account, you can upload protein sequences in the DeepMind server, and 10 minutes later you get your results. That completely democratises structure prediction research."

From noise to signal

The original AlphaFold was trained on the thousands of sequences and protein structures present in the protein data bank, a giant protein repository where scientists submit experimentally determined protein structures. "It completely ignores all the fundamental physics and thermodynamics, it's modelling based on learning what real structures tend to look like, taking advantage of tendencies of protein structures that are too subtle for humans to realise," Dr. Lowe said.

Unlike its predecessors, AlphaFold 3 uses a diffusion model, which is what image-generating software also uses. The model works by first training on protein structures, adding noise to the data, and then trying to de-noise it. This way, the model becomes able to work its way back from a noisy structure to a real protein structure. This architecture also helps AlphaFold 3 handle a much larger input dataset.



AlphaFold 3 can predict protein-protein interactions as well as the structures of other molecules like DNA and RNA. GETTY IMAGES



If you want to understand the molecular basis of how cells work, how organisms work, how life works, you need to understand how proteins get their shape

A reliability problem

Its accuracy at predicting protein-protein interactions is also incredibly high – but not its reliability when it comes to interactions between small molecules and proteins. Proteins use a language of 20 amino acids whereas small molecule ligands "have a much larger vocabulary", according to Dr. Lowe.

Greater variations in the dataset and the use of diffusion techniques can lead to the model coming up with answers that look plausible but aren't real. Adding more training data can help circumvent this problem, but not entirely get rid of it.

Nevertheless, AlphaFold 3 predicts protein structures and interactions better than other models right now. Academics and companies can potentially use it to find drug candidates that can bind to proteins and help cure diseases. In fact, DeepMind's spin-off company Isomorphic Labs is using AlphaFold 3 for this very purpose: drug discovery. However, this option isn't open to everyone yet.

A peek under the hood

Additionally, even though scientists are free to use the AlphaFold server to upload their protein sequences, many researchers are riled at not being able to access the model's full code. This means they can't play around with its nuts and bolts and modify it for specific use-cases.

An important implication of this lack of access is that it's currently impossible to use AlphaFold 3 to find structures of proteins bound to drug candidates.

Researchers expressed their disappointment in an open letter signed by more than 600 to date. According to the text, the restriction "does not align with the principles of scientific progress, which rely on the ability of the community to evaluate, use, and build upon existing work." Different groups have also begun a race to crack the model's code and make open-source versions. Responding to the backlash, DeepMind scientists have also changed their initial stance of not releasing the whole code to saying they will do so in six months.

The journey begins

For now, we need to wait and watch how DeepMind decides to let scientists examine AlphaFold 3 more closely, to appreciate its full power. But until then, the model remains one of the best AI-based protein structure prediction models out there, now with the ability to predict interactions with other kinds of biological structures as well.

At the same time, both Dr. Lowe and Dr. Uhlmann wanted to be clear that even if AlphaFold 3 makes very good predictions, it shouldn't be treated as an "infallible oracle". Instead, it offers a good starting point where scientists can obtain some answers, which they can then build on with further experiments and expert analysis. "It's a prediction, you can't take it for granted," Dr. Uhlmann said. "It's not solving your question, but it's a new and exciting discovery tool that helps you build and test new hypotheses."

(Rohini Subrahmanyan is a *Pedance Journalist* with a PhD in biology from the *Dalhousie Centre for Biological Sciences, Bangladesh*.)

AI for protein structure



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- **AlphaFold uses machine learning and artificial intelligence (AI) to accurately predict protein structures from an amino acid sequence, seemingly solving the protein-folding problem without learning any of the deeper physical principles that drive this biological process.**





A woman in Guwahati, Assam, on May 25. Heat wave conditions across India make this a summer no one will forget in a hurry. [AP](#)

Indian cities are 'heat traps' that make summers worse: official

Reuters

Indian cities have become "heat traps" due to their unbalanced growth, depleting water bodies and increasing greenhouse emissions, a senior government official said on June 17, as a scorching summer killed dozens in some parts of the country.

The India Meteorological Department (IMD) has forecast above-normal temperatures for June in the northwest and central parts of the country including Delhi, making it one of the longest heatwave spells.

The highest daily temperatures in the capital have stayed above 40 degrees Celsius since May 12 and are forecast to fall below that mark only on June 26. The IMD's heatwave criteria start with 40 degrees in the plains and 30 degrees for hills where it is generally cooler because of elevation.

Delhi, which is also facing a water shortage, recorded about 44 degrees late Monday afternoon but the IMD said it fell like 49.2 degrees.

"Climate change plays an important role," Krishna K. Vatsa, a member of the National Disaster Management Authority, told Reuters.

Unbalanced urban growth, which has reduced wetlands and water bodies, was another factor, Mr. Vatsa said.

"The emission of greenhouse gases has gone up. The permeable spaces have gone down considerably. The cities actually have become heat traps."

As a result, he said, nights are nearly as uncomfortable as days.

Above-normal temperatures have been forecast for June in the northwest and central parts of the country, including Delhi, making it one of the longest heatwave spells

According to a study by the Centre for Science and Environment (CSE) published last month, land surface temperatures during summers from 2005 to 2010 in cities such as Delhi, Hyderabad, Kolkata and Mumbai tend to drop by up to 11.2 degrees C during the night from their day-time peak.

Between 2014 and 2022 they were only cooling off by up to 11.3 degrees C.

"Hot nights are as dangerous as mid-day peak temperatures," the Centre's report said. "People get little chance to recover from day-time heat if temperatures remain high overnight."

Vatsa said most Indian states were implementing heat action plans that include provisioning drinking water and better medical facilities, as well as rescheduling outdoor work and school vacations.

But Anusita Roychowdhury, CSE's executive director, said there was no clear mandate to implement long-term strategies.

Delhi's long-term plan includes increasing heat insulation of buildings, developing shelters for urban poor and slum dwellers, and investing in cooling water bodies.

Such plans need to be backed financially, said Vishwas Chitale of the Council on Energy, Environment and Water, a think-tank in New Delhi.

"Cities are struggling with their own finance and they don't have additional budgets to implement actions for heat," he added.

Heat Traps

- **Indian cities have become "heat traps" due to their unbalanced growth devouring water bodies and increasing greenhouse emissions.**
- **Unbalanced urban growth, which has reduced wetlands and water bodies, was another factor.**
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- **increasing heat insulation of buildings, developing shelters for urban poor and slum dwellers, and investing in cooling water bodies.**

Invisible suffering of Rohingya refugees



At a recent group psychosocial support session for Rohingya women refugees in Delhi, women burst into laughter when the therapist asked about feeling anxious at night. “I wake up paralysed on many nights. My hands and legs numb thinking there is a fire in our camp again.” Rozina laughed, acting out her paralysis. Another added, “everytime there is a loud sound we run out half naked, without our burqas, fearing another fire. There is no time to cover”. All 20 women in the room were laughing with tears in their eyes.

Psychotherapists say that laughter can be a defense mechanism that protects trauma survivors from feeling the depth of their actual pain. According to United Nations High Commissioner for Refugees (UNHCR) data from December 2023, more than 22,000 Rohingya refugees live in India.

Most of them fled Myanmar between 2012 and 2017 when the Myanmar military started the “clearance operation,” killing Rohingya people, raping women, and destroying their villages in Rakhine state. “I fled from Myanmar when I was 16 years old. I remember everything along the route; murdered and beheaded bodies lying”, says Momiina, a 24-year-old mother of two. Living in shanty-like huts in Delhi, she and others here have witnessed fires burning down their huts. These fires are accidental sometimes, but at other times, they are started by members of nationalist extremist groups, who have claimed responsibility for them on social media.

The repeated fires in the refugee settlement in Delhi trigger and re-traumatise Momiina. “I get so scared when a fire starts or even when there are loud noises, that I pass out.”

She has been diagnosed with severe depression and dissociative identity disorder, a mental health condition where the patient can have two or more separate



Priyali Sur

Founder and executive director of The Azadi Project

There needs to be international attention to the escalating mental health epidemic of Rohingya refugees in India

identities. Momiina manifests at least three to four different identities, all connected to her extremely traumatic past. Sometimes she becomes a four-year-old child whose mother was killed by the junta army in Myanmar, a child Momiina then took under her wing. At other times she takes on the identity of a teenage Rohingya boy who is angry and violent.

Momiina isn't alone in reporting acute mental health illness. At a women's center run by my organisation, The Azadi Project and supported by Mariwala Health Initiative, many women have reported fainting incidents after bouts of anxiety, dissociative episodes, and self-harm. The organisation works only with women, but many men are also dealing with acute mental health illnesses.

While their trauma dates back to the genocide in Myanmar, the discriminatory conditions they face in India, where they are officially labeled as “illegal immigrants”, and denied full access to education, basic health, legal services and formal livelihood opportunities, make matters worse. The growing anti-Muslim, anti-refugee xenophobia pushed them further to live in shadows and absolute fear.

The fear of arbitrary detention and deportation, despite most Rohingya having UNHCR cards recognising them as refugees, adds to their debilitating anxiety and fear. Based on interviews with Rohingya families and lawyers, there are at least 500 Rohingya detainees, including women and children, languishing in detention centers across India. In many cases, these people have been behind bars for decades, held illegally with no criminal charges against them. A walk through any Rohingya settlement in India will reveal that in every other family, there are either people currently detained or those who have spent

considerable time in detention. Momiina's own sister-in-law, Amira, was also in detention for nearly three years after being randomly locked up during the pandemic. She was released only after she became paralysed and very sick. Amira, like most other Rohingya refugees, didn't have a place to process her trauma and heal. An introvert who barely stepped outside, limiting herself to

housework, Amira became further withdrawn after her years in detention. Both Amira and Momiina are now receiving mental health support but this support is just a drop given the pressing need for this population.

Civil society organisations in India that work for Rohingya refugees are starved for funding as most FCRA licences that permit receiving foreign funding have been cancelled. In the last few years, many programs that support Rohingya refugees have either shut down or been reduced to a bare minimum. Only a few UNHCR-supported organisations continue to work in this space but they do so cautiously and not at full capacity.

While there has been considerable attention to the plight of close to a million Rohingya refugees in Bangladesh, there needs to be international attention to the escalating mental health epidemic of Rohingya refugees in India. We need an urgent multi-pronged approach. First, we must address and mitigate the core causes of re-traumatisation, providing the Rohingya people a life with more dignity, agency and official identity in India. Second, we must enable access to primary and tertiary healthcare facilities for everyone who holds a UNHCR card, and third, we must support grassroots organisations to build safe spaces where the Rohingya refugees can access support without fear and start their healing journeys.



World Refugee Day



- **Each year on 20 June, the world celebrates World Refugee Day, the international day to honour people who have been forced to flee.**
- **In line with this year's theme, "Solidarity with Refugees", WHO emphasizes the importance of building inclusive health systems and ensuring equitable care for refugees worldwide.**
- **WHO highlights solidarity and health, celebrates refugee resilience, advocates for their health rights, and strives to create a world where everyone, regardless of migratory status, enjoys universal access to quality health care.**

UNHCR

- **UNHCR, the UN Refugee Agency, is a global organization dedicated to saving lives, protecting rights and building a better future for people forced to flee their homes because of conflict and persecution.**
- **We lead international action to protect refugees, forcibly displaced communities and stateless people.**
- **Our vision is a world where every person forced to flee can build a better future.**
- **Formally known as the Office of the High Commissioner for Refugees, UNHCR was established by the General Assembly of the United Nations in 1950 in the aftermath of the Second World War to help the millions of people who had lost their homes.**

The Hindu Kush Himalaya snow update

What does the report by the International Centre for Integrated Mountain Development highlight? How important is snow persistence? How much of a role does climate change play in river basins receiving low levels of snowmelt this year?

EXPLAINER

Prityali Prakash

The story so far:

The Ganga river basin – India's largest – reached a record low snow persistence in 2024, the Hindu Kush Himalaya snow update of the International Centre for Integrated Mountain Development (ICIMOD) has reported. The Brahmaputra and the Indus basins have suffered similarly, threatening water supply to millions of people. "Tragically this is yet another postcard from the frontlines of a climate crisis that is accelerating even beyond scientists' projections and causing huge challenges in one of the most populated regions of the world," Miriam Jackson, Cryosphere Lead at ICIMOD and a contributor to reports of the UN Intergovernmental Panel on Climate Change, told *The Hindu*.

What is snow persistence?

Snow persistence is the fraction of time snow is on the ground. When this snow melts, it provides water to people and ecosystems. In the river basins of the Hindu Kush Himalaya (HKH), snowmelt is the biggest source of water in the streams. Overall, it contributes 23% of the runoff to the region's 42 major river basins every year. The HKH mountains extend around 3,500 km over eight countries – Afghanistan, Bangladesh, Bhutan, China, India, Nepal, Myanmar, and Pakistan. These mountains are also called the "water towers of Asia" because they are the origins of 10 crucial river systems on the continent – Amu Darya, Indus, Ganga, Brahmaputra, Irrawaddy, Salween, Mekong, Yangtze, Yellow river, and Tarim. These river basins provide water to almost one-fourth of the world's population and are a significant freshwater source for 240 million people in the HKH region.

What does the report say?

The authors of the 2024 HKH snow update analysed data from 2003 to 2024 and found significant fluctuations in snow persistence between November and April every year, when snow accumulates above ground. Based on this, they made grim predictions of lasting impact on the people in the region as well as those downstream of the river basins.

In India, snow persistence in the Ganga, the Brahmaputra, and the Indus river basins dropped significantly in 2024. The Ganga river basin noted its lowest snow persistence in 22 years, 17% below the long-term historical average (also known as "normal"). The previous holder of this dubious distinction was 2018, when it was 15.2% below normal. In 2015, on the other hand, snow persistence was 25.6% above normal.

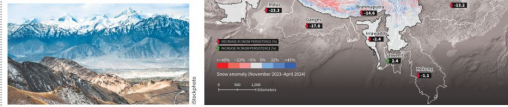
Similarly, snow persistence in the Brahmaputra basin was 14.6% below normal in 2024. It was worse in 2021, when the average persistence was 15.5% below normal. In the Indus river basin snow persistence fell 23.3% below normal this year although this was offset by excesses in parts of the lower altitudes.

Outside India, the basin of the Amu Darya river – which flows through Central Asia – recorded its lowest snow persistence in 2024: 28.2% below normal.

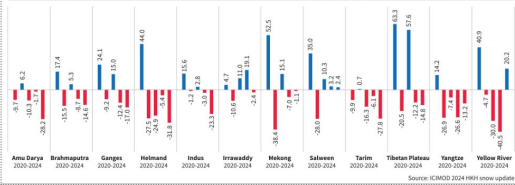
The figure for the Helmand river, an important source of drinking water for Iran and Afghanistan, was almost 32% below normal in 2024, beating a record set in 2016. Persistence in the part where the Mekong river originates in the Himalaya was only slightly below normal this time. This river's delta is Vietnam's

Where does the snow go?

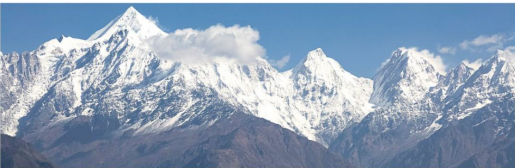
Snow persistence is the fraction of time snow is on the ground. When this snow melts, it provides water to people and ecosystems. In the river basins of the Hindu Kush Himalaya (HKH), snowmelt is the biggest source of water in the streams.



Snow persistence changes between 2020 and 2024 in major river basins of the HKH (in %)



Source: ICIMOD 2024 HKH snow update



Majestic: The Himalayan mountain range at Mansarovar, Uttarakhand. GETTY IMAGES/STOCKPHOTO

"rice bowl").

What explains the lower snow persistence even in 2024?

The primary reason for the lower persistence in 2024 was weak western disturbances, and ICIMOD remote sensing specialist and author of the report Sher Muhammad told *The Hindu*.

"Due to changing climate and global warming, this pattern is becoming increasingly unstable. Although the exact mechanisms are not fully understood, global warming is thought to exacerbate prolonged and intense La Niña El Niño conditions. These phases of a recurring climate pattern across the tropical Pacific Ocean significantly influence global weather patterns, including western disturbances," he added.

Western disturbances are low-pressure systems that originate over the Mediterranean Sea, the Caspian, and the Black Seas and bring rain and snow to the HKH region in winter. "The region where these storms originate experienced persistently high sea-surface temperatures," Mr. Muhammad explained. "This disruption weakened and delayed the arrival of the western disturbance, resulting in reduced winter precipitation and snowfall in the HKH region."

The pattern of high temperatures and altered weather systems explains both the record low snow persistence in 2024 and similar historical records

"We have warned for years that the 1.5 degrees Celsius limit that governments signed up to in the Paris Agreement is not ambitious enough to protect the snow and ice, people and nature of the Hindu Kush Himalayas because the regional global average, and the real temperature increase will be far higher here," Ms. Jackson added.

What explains higher snow persistence?

The persistence of snow in China's Yellow River basin exceeded the normal value by 20.2% in 2024. "The Yellow river basin is an area where the East Asian winter monsoon brings cold, dry air from Siberia and Mongolia," Mr. Muhammad said. "When this cold air mass interacts with moist air from other regions, particularly the Pacific Ocean, it can result in snowfall over the higher altitudes of the upper Yellow River basin."

"When the cold air from the east Asian winter monsoon systems interacts with moist air masses from the Pacific Ocean, it can result in snowfall at higher elevations in the eastern Himalaya," Mr. Muhammad added.

What about India?

Snow persisting on the ground is important for the Ganga river basin because its melt contributes to 10.3% of the latter's water, versus 3% from glacier melt. In the Brahmaputra and the Indus

basins as well, snowmelt brings 13.2% and around 40% of the water, respectively, versus 18%, 48% and 5% from glaciers. "Lower snow in 2024 may affect water availability, particularly and most importantly in the Indus basin, if there is less rainfall in the early season," Mr. Muhammad said.

In the long term, experts say, reforestation with native tree species can help the ground retain more snow. Better weather forecasting and early warning systems can also help local communities prepare for impending water stress.

Ms. Jackson also stressed on the need to reduce emissions, which would mitigate increasing sea-surface and ground temperatures, both of which lower the persistence of snow. "The key work for all of us concerned about a livable future on the earth is to build the political will for our government representatives and business leaders to cut the cord on dirty fossil energy consumption and production, especially across 60 countries, which account for 82% of emissions," she said.

THE GIST

The Ganga river basin – India's largest – reached a record low snow persistence in 2024. The Brahmaputra and the Indus basins have suffered similarly, threatening water supply to millions of people.

The authors of the 2024 HKH snow update analysed data from 2003 to 2024 and found significant fluctuations in snow persistence between November and April every year, when snow accumulates above ground.

In the long term, experts say, reforestation with native tree species can help the ground retain more snow. Better weather forecasting and early warning systems can also help local communities prepare for impending water stress.

Snow persistence

- **The Ganga river basin — India's largest — reached a record low snow persistence in 2024, the Hindu Kush Himalaya snow update of the International Centre for Integrated Mountain Development (ICIMOD) has reported.**
- **The Brahmaputra and the Indus basins have suffered similarly, threatening water supply to millions of people.**

What is snow persistence?

- **Snow persistence is the fraction of time snow is on the ground.**
- **When this snow melts, it provides water to people and ecosystems. In the river basins of the Hindu Kush Himalaya (HKH), snowmelt is the biggest source of water in the streams.**
- **Overall, it contributes 23% of the runoff to the region's 12 major river basins every year.**
- **The HKH mountains extend around 3,500 km over eight countries — Afghanistan, Bangladesh, Bhutan, China, India, Nepal, Myanmar, and Pakistan.**

- **These mountains are also called the “water towers of Asia” because they are the origins of 10 crucial river systems on the continent — Amu Darya, Indus, Ganga, Brahmaputra, Irrawaddy, Salween, Mekong, Yangtse, Yellow river, and Tarim.**
- **These river basins provide water to almost one-fourth of the world’s population and are a significant freshwater source for 240 million people in the HKH region.**

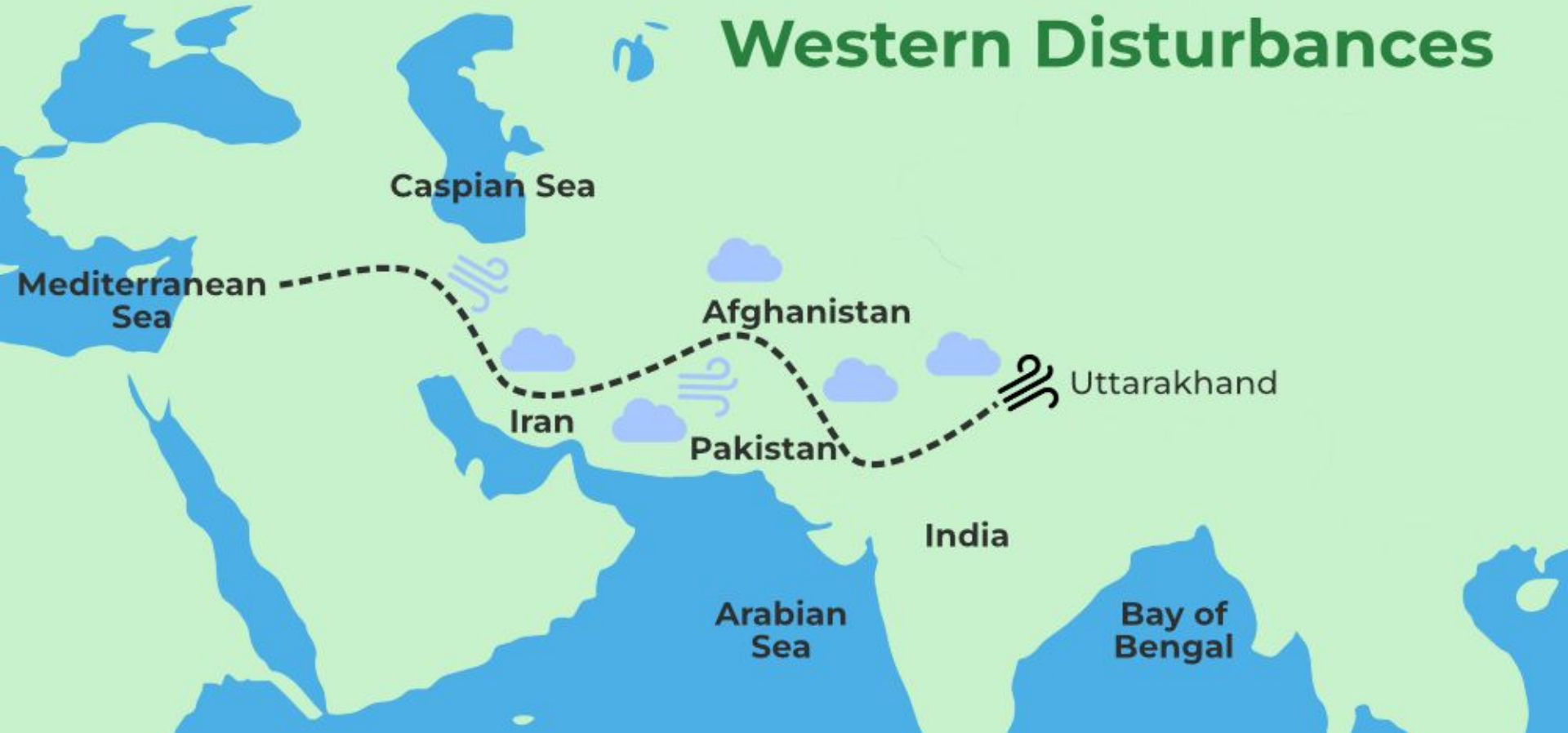
- **In India, snow persistence in the Ganga, the Brahmaputra, and the Indus river basins dropped significantly in 2024.**
- **The Ganga river basin noted its lowest snow persistence in 22 years, 17% below the long-term historical average (also known as ‘normal’).**
- **Outside India, the basin of the Amu Darya river — which flows through Central Asia — recorded its lowest snow persistence in 2024: 28.2% below normal.**

What explains the lower snow persistence in 2024?

- The primary reason for the lower persistence in 2024 was weak western disturbances.
- “Due to changing climate and global warming, this pattern is becoming increasingly unstable. Although the exact mechanisms are not fully understood, global warming is thought to exacerbate prolonged and intense La Niña–El Niño conditions.
- These phases of a recurring climate pattern across the tropical Pacific Ocean significantly influence global weather patterns, including western disturbances,” he added.



Western Disturbances

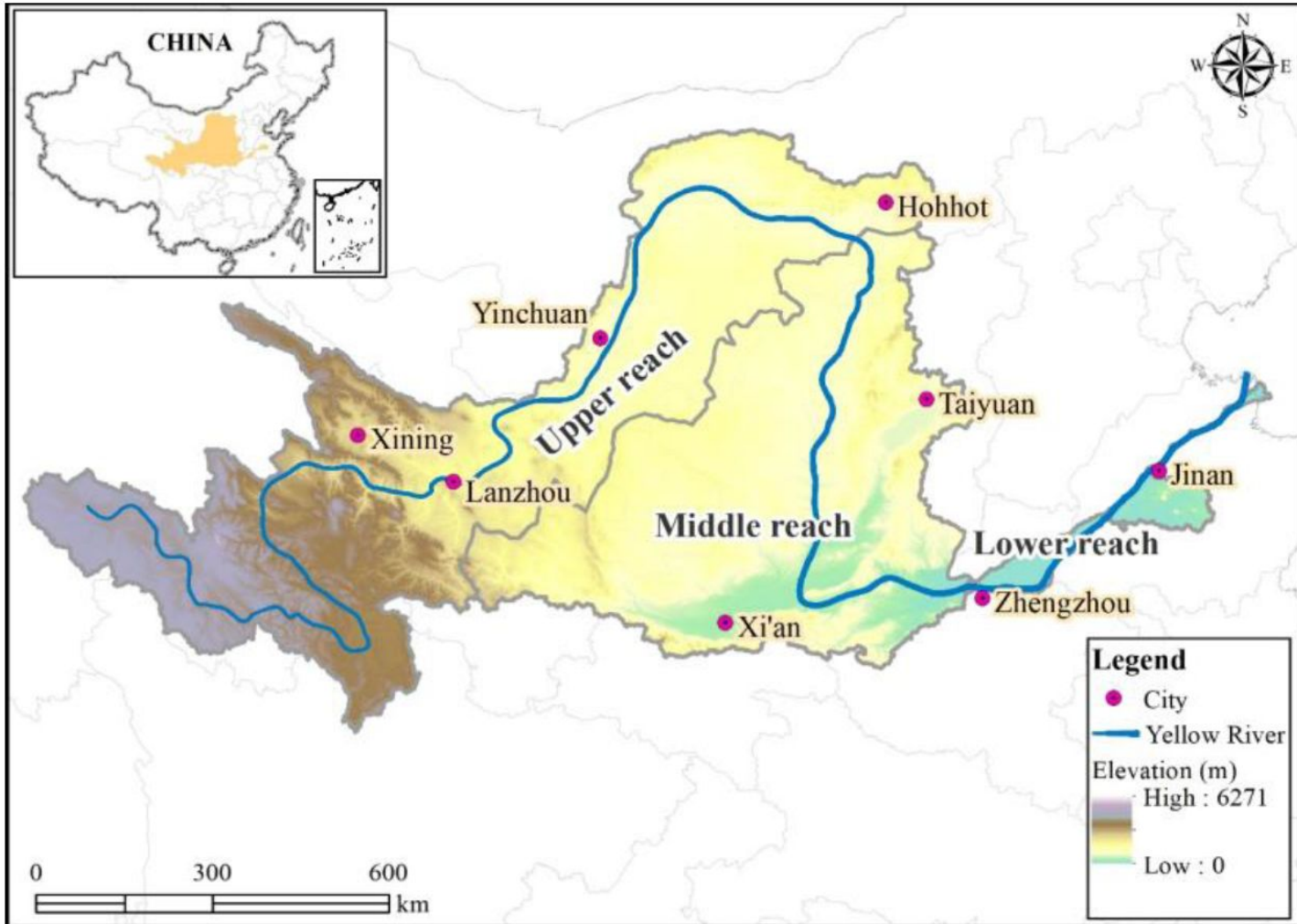


- **Western disturbances are low-pressure systems that originate over the Mediterranean Sea, the Caspian, and the Black Seas and bring rain and snow to the HKH region in winter.**
- **“The region where these storms originate experienced persistently high sea-surface temperatures,”**
- **“This disruption weakened and delayed the arrival of the western disturbance, resulting in reduced winter precipitation and snowfall in the HKH region (Himalaya - hindukush region)**

What explains higher snow persistence?



- **The persistence of snow in China’s Yellow River basin exceeded the normal value by 20.2% in 2024.**
- **“The Yellow river basin is an area where the East Asian winter monsoon brings cold, dry air from Siberia and Mongolia,”**
- **. “When this cold air mass interacts with moist air from other regions, particularly the Pacific Ocean, it can result in snowfall over the higher altitudes of the upper Yellow River basin.”**
- **“When the cold air from the east Asian winter monsoon systems interacts with moist air masses from the Pacific Ocean, it can result in snowfall at higher elevations in the eastern Himalaya,”**



What about India?

- **Snow persisting on the ground is important for the Ganga river basin because its melt contributes to 10.3% of the latter's water, versus 3.1% from glacier melts.**
- **In the Brahmaputra and the Indus basins as well, snowmelt brings 13.2% and around 40% of the water, respectively, versus 1.8% and 5% from glaciers.**
- **“Lower snow in 2024 may affect water availability, particularly and most importantly in the Indus basin, if there is less rainfall in the early season,”**
”

- **In the long term, experts say, reforestation with native tree species can help the ground retain more snow.**
- **Better weather forecasting and early warning systems can also help local communities prepare for impending water stress.**
- **“Improving water infrastructure and developing policies for protecting areas receiving snowfall are important for long-term change,**

Australia hopes to conclude CECA negotiations with India early next year



Amiti Sen
NEW DELHI

Australia is keen to conclude negotiations for the Comprehensive Economic Cooperation Agreement (CECA) with India in the next six-seven months since it may not be in a position to take hard decisions from early next year as the country prepares for its federal elections, according to sources.

New Delhi may find it a challenge to fast-track the talks, especially in sensitive areas such as agriculture, digital trade and government procurement, as views of coalition partners also need to be taken into account by the new BJP-led government, an industry official said.



“India-Australia CECA negotiations were well on track before talks briefly halted due to the Indian elections. The Australian side is keen that the momentum be now maintained as it has barely a six-seven months window to conclude the talks because of the upcoming elections next year,” the source said.

Australia’s federal elections are likely in mid-2025

and the ruling government is expected to steer away from controversial decisions, the source said. The India-Australia Economic Cooperation and Trade Agreement (ECTA) came into force on December 29, 2022.

New areas

It served as a stepping stone for the CECA which is to be a deeper and comprehensive agreement covering five tracks agreed in the ECTA, including goods, services, digital trade, government procurement and Rules of Origin (ROO)-Product Specific Rules Schedule. New areas in which either party has shown interest for coverage include competition policy, MSME, gender, in-

novation, agri-tech, critical minerals and sports.

“Australia, wants market access at least for premium items that are not in competition with items produced domestically in India. But with a new Minister heading the Agriculture Ministry and the interests of coalition partners that are also to be taken into account, negotiations could be tougher than earlier,” the industry official said. Moreover, areas like government procurement and digital trade, where India has not opened up significantly in an of its existing free trade deals because of sensitivities, may also be difficult to navigate.

(The writer is with The Hindu businessline)

CECA



- **The Comprehensive Economic Partnership Agreement (CECA) is a free trade agreement (FTA)**
- **It promotes bilateral trade and investment between the two countries.**
- **It eliminates tariffs on goods traded and liberalises services sectors to facilitate great business opportunities and cooperation between Singapore and India.**

- **It is a type of free trade pact that covers negotiation on the trade in services and investment, and other areas of economic partnership.**
- **CEPA also looks into the regulatory aspect of trade and encompasses an agreement covering the regulatory issues.**

IR IN NEWS

- **Russia, N. Korea sign defence pact, vow to assist each other if attacked**
- **South Africa's Ramaphosa sworn in for second full term as President**
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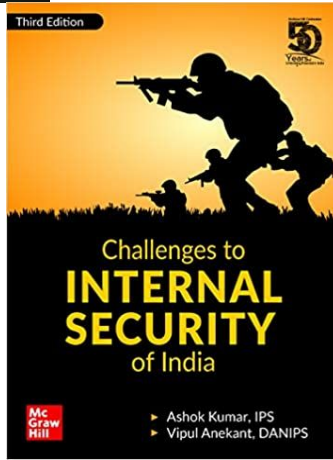
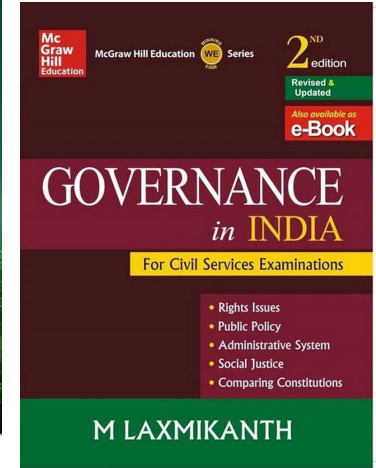
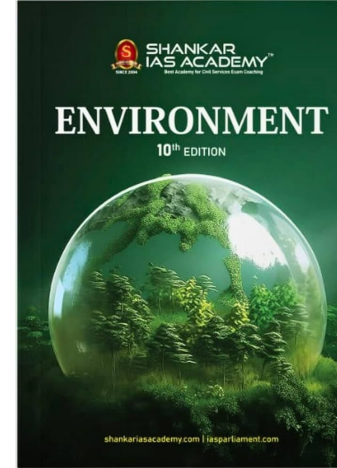
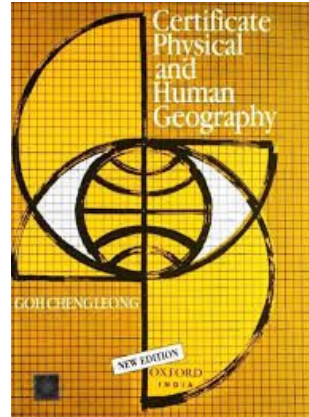
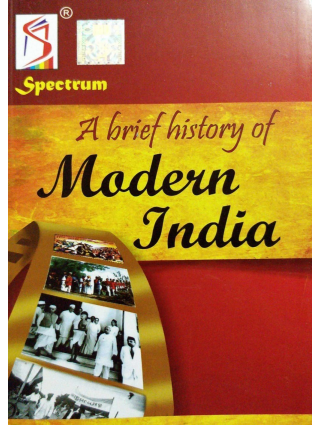
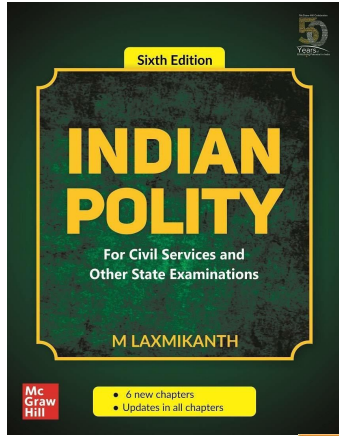
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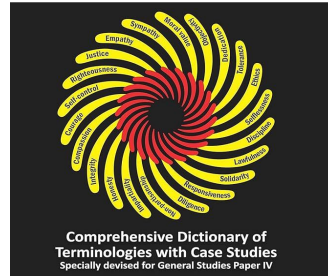


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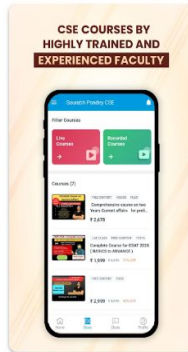
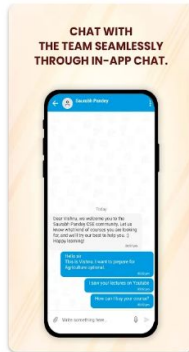
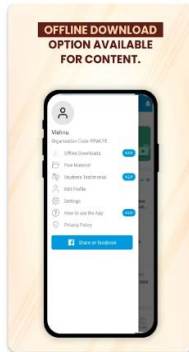
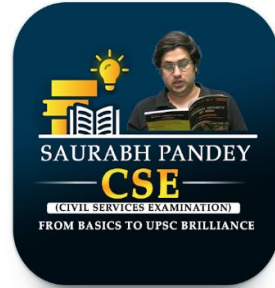
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X 22nd october 2...



Periodical cicada emergence disrupts food webs

The periodical mass emergence of cicadas in eastern North American forests can "rewire" forest food webs and initiate a cascade of impacts that propagates throughout the food chain, as per a study that quantified effects of the 2021 brood X cicada emergence. The study found that when insect-eating birds have prey in the form of cicadas and thus shift their focus away from their usual prey – leaf-eating caterpillars – the caterpillars feast more heavily upon the leaves of oak saplings, doubling insect leaf damage.

- The periodical mass emergence of cicadas in eastern North American forests can "rewire" forest food webs and initiate a cascade of impacts that propagates throughout the food chain, as per a study that quantified effects of the 2021 Brood X cicada emergence.

The cicadas are a superfamily, the Cicadoidea, of insects in the order

Hemiptera.



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X 10th october 2...



States as per Article 244(2).

What are Scheduled Areas?

- Scheduled Areas cover 11.3% of India's land area, and have been notified in 10 States: Andhra Pradesh, Telangana, Odisha, Jharkhand, Chhattisgarh, Madhya Pradesh, Rajasthan, Gujarat, Maharashtra, and Himachal Pradesh

How are Scheduled Areas governed?

- The President of India notifies India's Scheduled Areas. States with Scheduled Areas need to constitute a Tribal Advisory Council with up to 20 ST members.
- They will advise the Governor on matters referred to them regarding ST welfare.
- The Governor will then submit a report every year to the President regarding the administration of Scheduled Areas.

- The national government can give directions to the State regarding the administration of Scheduled Areas.
- The Governor can repeal or amend any law enacted by Parliament and the State Legislative Assembly in its application to the Scheduled Area of that State.



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X 7TH DECEMBE...



Garba dance of Gujarat makes it to UNESCO list

Sreeparna Chakrabarty
NEW DELHI

Gujarat's traditional dance form "Garba" was on Wednesday included in the list of Intangible Cultural Heritage by the United Nations Educational, Scientific and Cultural Organization (UNESCO).

The popular dance form is the 15th cultural item from India to make it to the UNESCO list. Kolkata's Durga Puja was the last one added two years ago.

The inclusion has been made under the provisions of the 2003 Convention for the Safeguarding of Intangible Cultural Heritage. The international cultural body described the 'Garba' as a ritualistic and devotional dance performed in India.

- Gujarat's traditional dance form 'Garba' was on Wednesday included in the list of **Intangible Cultural Heritage** by the United Nations Educational, Scientific and Cultural Organization (UNESCO).
- The popular dance form is the 15th cultural item from India to make it to the UNESCO list. Kolkata's Durga Puja was the last one added two years ago.
- The inclusion has been made under the provisions of the 2003 Convention for the Safeguarding of Intangible Cultural Heritage.
- The international cultural body described the 'Garba' as a **ritualistic and devotional dance performed in India.**



Garba Dance is Making the World Sick

Garba is a traditional dance form of Gujarat, India. It is performed during the Navratri festival. The dance is characterized by its rhythmic movements and the use of traditional instruments like the dhol and the ghatis. The dance is performed in a circle, and the participants are dressed in traditional Gujarati attire. The dance is a blend of folk and classical dance forms. It is a popular form of entertainment and is often performed in public places. The dance is a reflection of the rich cultural heritage of Gujarat. It is a beautiful and graceful dance form that has gained international recognition. The dance is a source of pride for the people of Gujarat. It is a beautiful and graceful dance form that has gained international recognition. The dance is a source of pride for the people of Gujarat.



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Russia loads 'Avangard' missile into launch Silo, fears of nuclear warfare on rise | World DNA

Que-3 With reference to exercise 'Mitra Shakti', consider the following statements

- Between India and Nepal.
- The aim of the exercise is to jointly rehearse sub-conventional operations under Chapter VII of the United Nations Charter, which authorises the Security Council to take enforcement measures, including the use of military force, to address threats to international peace and security.
- "Exercise MITRA SHAKTI-2023" recently commenced in Goa.

How many of the above statements are correct?

a) Only one b) Only two
c) All three d) None

Ans 3- (a)

- "Exercise MITRA SHAKTI-2023" recently commenced in Aunah (Pune).
- Between India and Sri Lanka.

The Constituent Assembly debated whether fundamental rights including this one could be suspended or limited during an Emergency. The Article cannot be suspended except during the period of Emergency.

Can High Courts be approached in cases of violation of fundamental rights?

- Both the High Courts and the Supreme Court can be approached for violation or enactment of fundamental rights through five kinds of writs:
- Habeas corpus (related to personal liberty in cases of illegal detentions and wrongful arrests)
- Mandamus — directing public officials, governments, courts to perform a statutory duty;
- Quo warrant — to show by what warrant is a person holding public office;

- Prohibition — directing judicial or quasi-judicial authorities to stop proceedings which it has no jurisdiction for; and
- Certiorari — re-examination of an order given by judicial, quasi-judicial or administrative authorities.
- In civil or criminal matters, the first remedy available to an aggrieved person is that of trial courts, followed by an appeal in the High Court and then the Supreme Court.
- When it comes to violation of fundamental rights, an individual can approach the High Court under Article 226 or the Supreme Court directly under Article 32.
- Article 226, however, is not a fundamental right like Article 32.

IE

- 12th BRICS summit

1023 Nobel Prize In Economic Sciences awarded To Claudia Gold...

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Que-2 Consider the following statements

- Article 244, pertaining to the administration of Scheduled and Tribal Areas, is the single most important constitutional provision for STs.
- Articles 244(1) provides for the application of Fifth Schedule provisions to Scheduled Areas notified in any State other than Assam, Meghalaya, Tripura, and Mizoram, the Sixth Schedule applies to these states as per Article 244(2).
- The Prime Minister of India notifies India's Scheduled Areas.

How many of the above statements are correct?

a) Only one b) Only two
c) All three d) None

Ans (b)

The President of India notifies India's Scheduled Areas.

Scheduled Areas cover 11.3% of India's land area, and have been notified in 10 States: Andhra Pradesh, Telangana, Odisha, Jharkhand, Chhattisgarh, Madhya Pradesh, Rajasthan, Gujarat, Maharashtra and Himachal Pradesh. In 2015, Kerala proposed to notify 2,133 habitations, five gram panchayats and two wards in five districts. It awaits the Indian government's approval.

- The President of India notifies India's Scheduled Areas. States with Scheduled Areas need to constitute a Tribal Advisory Council with up to 20 ST members. They will advise the Governor on matters referred to them regarding ST welfare. The Governor will then submit a report every year to the President regarding the administration of Scheduled Areas.
- The national government can give directions to the State regarding the administration of Scheduled Areas. The Governor can repeal or amend any law enacted by Parliament and the State Legislative Assembly in its application to the Scheduled Area of that State. The Governor can also make regulations for a Scheduled Area, especially to prohibit or restrict the transfer of land by or among members of the STs, and regulate the allotment of land to STs and money-lending to STs.



Ethics vs privilege committee

- Objective: It oversees the moral and ethical conduct of members and examines cases of misconduct referred to it.
- Appointment of members in Lok Sabha: The members of the Ethics Committee are appointed by the Speaker for a period of one year.

Procedure for complaints

- Any person can complain against a Member through another Lok Sabha MP, along with evidence of the alleged misconduct, and an affidavit stating that the complaint is not "false, frivolous, or vexatious".
- If the Member himself complains, the affidavit is not needed.
- The Speaker can refer to the Committee any complaint against an MP.
- The Committee does not entertain complaints based only on media reports or on matters that are sub-judice.
- The Committee makes a prima facie inquiry before deciding to examine a complaint. It makes its recommendations after evaluating the complaint.

- The Rules (for example, the Rules of Procedure and Conduct of Business in the Lok Sabha) applicable to the Committee of Privileges also apply to the ethics panel.
- An allegation of corruption against an MP can be sent to either body, but usually more serious accusations go to the Privileges Committee.
- The mandate of the Privileges Committee is to safeguard the "freedom, authority, and dignity of Parliament".
- These privileges are enjoyed by individual Members as well as the

House as a whole.

- An MP can be examined for breach of privilege; a non-MP too can be accused of breach of privilege for actions that attack the authority and

Santiniketan finds its place on UNESCO's World Heritage List

World body makes announcement on Sunday. Manu's son was, nurtured by Tagore, has been reported by Bengal Culture Ministry says it holds important heritage in human values

By India Desk

Santiniketan, a town established by Nobel laureate Rabindranath Tagore, has been added to UNESCO's World Heritage List on Sunday. The town, located in West Bengal's Birbhum district, is known for its unique blend of Indian and Western architectural styles, and its role in the development of modern Indian education.



The UNESCO World Heritage Committee, which meets in Paris, announced the addition of Santiniketan to the list of World Heritage Sites. The town, founded by Rabindranath Tagore in 1901, is a unique blend of Indian and Western architectural styles, and its role in the development of modern Indian education. The town is known for its unique blend of Indian and Western architectural styles, and its role in the development of modern Indian education.

Santiniketan, a town established by Nobel laureate Rabindranath Tagore, made it to the UNESCO's World Heritage List on Sunday.

Located in West Bengal's Birbhum district, Santiniketan, which means "abode of peace", started taking shape in 1901 and is the place where Tagore laid the foundations of Visva-Bharati University

EU chief promises a plan of action as migrants flock to Italian island

Ulysia van der Leyen, along with Italian PM Giorgia Meloni, visits Lampedusa where more than 2000 people have arrived this week. EU leaders program have arrived in Italy this year, almost double the figure by the corresponding period in 2022.

By India Desk

European Commission President Ursula von der Leyen said she will announce a plan of action to address the migration crisis in Italy, including the possibility of sending more troops to the island of Lampedusa, where more than 2,000 migrants have arrived this week.



The plan includes sending more troops to the island of Lampedusa, where more than 2,000 migrants have arrived this week. The plan also includes providing more support to the Italian government in dealing with the migration crisis. The plan also includes providing more support to the Italian government in dealing with the migration crisis.

How many of the above statements are correct?

- a) Only one
- b) Only two
- c) All three
- d) None

Que-2 With reference to Parliaments special sessions, consider the following statements

- There is specific provision in the Constitution that deals with special sessions.
- Article 352, which deals with the proclamation of Emergency, refers to a 'special sitting' of the House, this clause was added through the 44th Amendment Act in 1978, which included safeguards against the Emergency.
- The Question Hour was suspended during the session.

How many of the above statements are correct?

- a) Only one
- b) Only two
- c) All three
- d) None



Que-3 Consider the following statements about Sacred Ensembles of the Hoysala

- This includes five temples in Karnataka, has been recently inscribed on the UNESCO's World Heritage List.
- The Hoysala Temples, built in the 12th and 13th centuries by the Hoysala kings, are dedicated to Shiva and Vishnu.
- The temples became targets of plundered and destruction by the Delhi Sultanate army of Alauddin Khaji in the early 14th century and another Delhi Sultanate army of Sultan Muhammad bin Tughluq in 1326 AD.

How many of the above statements are correct?

- a) Only one
- b) Only two
- c) All three
- d) None



Que-4 Consider the following statements about SHREYAS scheme

- It comprises 4 central sector sub-schemes.
- The objective of the Scheme is to provide coaching of good quality for economically disadvantaged Scheduled Castes (SCs) and Other Backward Castes (OBCs) candidates to enable them appear in competitive and entrance examinations.
- The ceiling of the total family income under the scheme is 2 lakhs per annum and 3500 slots are allotted per annum.

How many of the above statements are correct?

- a) Only one
- b) Only two
- c) All three
- d) None

Que-5 Consider the following statements about Women's Reservation Bill

- The Constitution (One Hundred and Twenty-Eighth Amendment) Bill, 2023, seeking to reserve 33% of seats in Lok Sabha and state Assemblies for women.



Que-5 With reference to Shumang Leela, consider the following statements

- Shumang Leela is a traditional form of theatre in Tripura.
- In this the roles of women are all played by men, called Nupi Shabis.
- It is performed in an open courtyard surrounded by spectators on all four sides.

Which of the following given above is/are correct

a) 1 and 2 only b) 1 only
c) 1, 2 and 3 d) 2 and 3 only

Ans: (d)

- Shumang Leela is a traditional form of theatre in Manipur.
- In the case of women's theatre groups, the roles of men are played by women.
- Shumang Leela translates to "courtyard performance".
- Today, Shumang Leela is of two types: Nupa Shumang Leela, performed only by men, and Nupi Shumang Leela, performed only by women.

Que-6 Consider the following statements about Red Sanders also called Red Sandalwood

- It is a species found in the southern tropical dry deciduous forest of Telangana.
- The tree reaches an average height of 10 to 15 metres.
- The species is listed as 'Endangered' in the International Union for Conservation of Nature and falls in Appendix II of CITES.

Which of the following given above is/are correct

a) 1 only b) 1 and 3 only
c) 1, 2 and 3 d) 2 and 3 only

Ans: (d)

- It is a species found in the southern tropical dry deciduous forest of Andhra Pradesh (AP).
- CITES (shorter name for the Convention on International Trade in Endangered Species of Wild Fauna and Flora, also known as the Washington Convention).
- In India, it has been enlisted under Schedule IV of the Wildlife (Protection) Act, 1972.
- The heartwood of Red Sanders is in demand in the domestic and international markets for making

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furniture, handicrafts and musical instruments in China and Japan. The red dye obtained from the wood is used as a colouring agent in the textiles, medicine and food industries.

Que-7 Consider the following statements about Compressed biogas (CBG) and compressed natural gas (CNG)

- Chemically, CBG is the same as CNG — both are compressed methane — and has the same calorific value.
- CNG is a by-product of petroleum, CBG can be produced from any biomass, be it crop residue, cattle dung, sugarcane press mud, municipal wet waste or effluents from a sewage treatment plant.
- CBG cannot be transported through cylinders or pipelines to retail outlets.

Which of the following given above is/are correct

a) 1 and 2 only b) 3 only
c) 1, 2 and 3 d) 2 and 3 only

Que-8 Finance Minister announced 500 new 'waste to wealth' plants under Galvanizing Organic Bio-Agro Resources Dhan scheme (GOBARDHAN) in the Union Budget 2023. Consider the following statements about this

- The new GOBARDHAN scheme is an upgrade and an expansion of the old one of the same name, launched in 2018 by the Department of Drinking Water and Sanitation.
- This scheme limited itself to cluster or community-level biogas plants, for instance, for Anganwadis or farms.
- Compressed biogas (CBG) was never a part of the initial scheme launched in 2018 because it is very different from biogas in terms of utilisation and constituents.

Which of the following given above is/are correct

a) 2 only b) 1 and 3 only
c) 1, 2 and 3 d) 2 and 3 only

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c) 1, 2 and 3 d) 3 only

Ans: (b)

- In the union budget of FY 2023-24, it is announced to launch a mission to eliminate sickle cell anemia by 2047.

Que-7 Lamu Archipelago, recently in News, belongs to which country

a) Somalia b) Malaysia
c) Indonesia d) Kenya

Ans: (d)

- For development of Ladakh.
- The Indian Army is organising multiple welfare activities, such as running schools and infrastructure development projects, as part of "Operation Sadbhavana" in the Union Territory of Ladakh.

Que-8 Consider the following statements about "Operation Sadbhavana", recently in News

- Launched by an Indian Army.
- For development of Jammu and Kashmir.

Some of the objectives achieved through Operation Sadbhavana are national integration, tourism, women's empowerment, employment generation, education, and

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Que-1 Consider the following statements

- A spy balloon is literally a gas-filled balloon that is flying quite high in the sky, more or less where we fly commercial airplanes.
- Disadvantage that low Earth orbit satellites have is that they are continually moving around the Earth.
- Geosynchronous orbit satellite has the disadvantage that it's harder to see things clearly when you're very, very far away.

Which of the following given above is/are correct

a) 1 and 2 only b) 1 and 3 only
c) 1, 2 and 3 d) 3 only

Ans: (c)

- The disadvantage these low Earth orbit satellites have is that they are continually moving around the Earth.
- of what we call persistence, allowing satellites to capture images continuously.

Que-2 With reference to Paris Club, consider the following statements

- The Paris Club is a group of mostly western creditor countries.
- It grew from a 1956 meeting in which Brazil agreed to meet its public creditors in Paris.
- Their objective is to find sustainable debt-relief solutions for countries that are unable to repay their bilateral loans.

Which of the following given above is/are correct

a) 2 only b) 1 and 3 only
c) 1, 2 and 3 d) 2 and 3 only

Ans: (b)

- It grew from a 1956 meeting in which Brazil agreed to meet its public

Exchange traded fund

- An exchange-traded fund (ETF) is a pooled investment security that can be bought and sold like an individual stock.
- ETFs can be structured to track anything from the price of a commodity to a large and diverse collection of securities.
- ETFs can even be designed to track specific investment strategies.

ETF share prices fluctuate all day as the ETF is bought and sold; this is different from mutual funds, which only trade once a day after the market closes.

- ETFs offer low expense ratios and fewer broker commissions than buying the stocks individually.
- An ETF must be registered with the Securities and Exchange Commission.

Pros and Cons of Exchange-Traded Funds

<ul style="list-style-type: none"> Lower costs Diversification and risk management Tax benefits Easy to trade 	<ul style="list-style-type: none"> Potentially higher costs Limited control Tracking error
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BIMSTEC
WHAT YOU SHOULD KNOW

Stands for The Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation

7 MEMBER COUNTRIES

Founded in 1997 through Bangkok Declaration

- Accounts for 20% of the world's population
- Estimated GDP of \$2.7 trillion
- Most populous the world's traded goods from the Bay region year
- Focus Areas: trade, technology, energy, transport





DELIMITATION COMMISSION

- Delimitation literally means the act or process of fixing limits or boundaries of territorial constituencies in a country or a province having a legislative body. The job of delimitation is assigned to a high power body. Such a body is known as Delimitation Commission or a Boundary Commission
- In India, such Delimitation Commissions have been constituted 4 times - in 1952 under the Delimitation Commission Act, 1952, in 1963 under Delimitation Commission Act, 1962, in 1973 under Delimitation Act, 1972 and in 2002 under Delimitation Act, 2002.

- The Delimitation Commission in India is a high power body whose orders have the force of law and cannot be called in question before any court. These orders come into force on a date to be specified by the President of India in this behalf.
- The copies of its orders are laid before the House of the People and the State Legislative Assembly concerned, but no modifications are permissible therein by them.

productivity, uphold good health and prevent poverty.

- The second set consists of policies to reduce inequality and promote economic security at older ages in a fiscally sustainable manner, considering pensions and health care.
- While many older persons are in excellent health or economically active stages, others live with ailments or are in poverty. Public spending in most countries has not been sufficient to cover the growing demand for long-term care, the analysis points out.

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Question 5 With reference to Doppler radar network, consider the following statements

- It is named after Christian Doppler, the physicist who first proposed the concept of the Doppler effect.
- It is a system of multiple radar stations that work together to provide comprehensive coverage of a specific area.
- The entire stretch of India will be covered under the Doppler Weather Radar Network to better predict extreme weather events more accurately.

Which of the following given above is/are correct

- a) 1 and 2 only b) 1 only
c) 1, 2 and 3 d) 2 and 3 only

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- 5- (c)
- It is named after Christian Doppler, the physicist who first proposed the concept of the Doppler effect. The Doppler effect is the change in frequency or wavelength of a wave (such as sound or light) as it approaches or moves away from an observer.

What is a Doppler radar network?

- A Doppler radar network is a system of multiple radar stations that work together to provide comprehensive coverage of a specific area. The system uses the Doppler effect to detect and track moving objects, such as weather systems, aircraft, and vehicles.

How does a Doppler radar network work?

- Each station in the network includes a radar transmitter, which sends out a microwave signal, and a radar receiver, which detects the reflected signal. The transmitter and receiver are typically located at the same site, but they can also be separated by a significant distance. The radar signal reflects off any moving objects in its path and the change in frequency of the signal due to the Doppler effect is used to determine the speed and direction of the moving object.

What are the uses of a Doppler radar network?

- Doppler radar networks are widely used for weather forecasting and severe weather warning, tracking of aircraft and vehicles, and also used in meteorology and atmospheric sciences. These radar networks provide detailed information about storm systems, including the location, size, and movement of thunderstorms, tornadoes, and other severe weather events.

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Question 6 Consider the following statements about Army Day

- India celebrates Army Day on January 15 every year.
- The Army Day is celebrated every year to honour Cariappa and the defence forces.
- 75th Army Day was held in Hyderabad this year.

Which of the following given above is/are correct

- a) 1 and 2 only b) 1 and 3 only
c) 1, 2 and 3 d) 2 and 3 only

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- In 1997 Bangkok Declaration launched a modest grouping (of Bangladesh, India, Sri Lanka and Thailand), with the acronym, BIST-EC.
- Originally formed as BIST-EC (Bangladesh, India, Sri Lanka and Thailand Economic Cooperation) in 1997, it became BIMST-EC after Myanmar joined, and BIMSTEC in 2004, with the inclusion of Nepal and Bhutan. This unique set of five countries from South Asia and two from Southeast Asia are parents to an institution with an unwieldy name but lofty ambitions.



6- (a)

- The portal ensures end-to-end coverage of all the linked schemes.
- Anyone can apply for a loan.

7- (b)

- Any serving or retired three-star officer from either of the three services, below 62 years on the date of projected appointment, would be eligible to be elevated as the CDS and will superannuate at the age of 65. Earlier, the post was only open for four-star generals.

8- (c)

- The Chief of Defence Staff is principally responsible for getting the armed forces better integrated than operating in silos as has been the case for decades.
- The job includes the creation of new military commands which integrate the Army, Air Force, and Navy to fight together.
- According to the government, the CDS acts as the Principal Military Adviser to the Defence Minister only on tri-services matters. The three service chiefs will continue to advise the Defence Minister exclusively on the matters concerning their respective services.
- The CDS will not hold any military command, including over the three service chiefs.
- As the Permanent Chairman of the Chief of Staff Committee, the CDS brings about jointness in operation, logistics, transport, training, support services, communications, repairs and maintenance of the three services.

Target Mains -2024/25 -

Q Explain the factor responsible for reduction in “snow persistence “ in himalayan - hindukush region .

Q हिमालय-हिन्दुकुश क्षेत्र में "बर्फ की निरंतरता" में कमी के लिए जिम्मेदार कारक की व्याख्या करें।

**Connect with sir
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**send your answer - Saurabh pandey
upsc telegram channel**



